

# **Pesticides and maternal child health, experience and the construction of knowledge among the Huichol**

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## **Declaration**

I Jennifer Bridget Gamlin confirm that the work presented in this thesis is my own. Where information has been derived from other sources I confirm that this has been indicated in the thesis.

## **Abstract**

Pesticides can be harmful to the reproductive process and even low dose exposures can lead to miscarriage, developmental delays and birth defects. Huichol Indians from the Sierra Madre highlands in northern Mexico supplement their subsistence lifestyle with annual migration to coastal tobacco farms, where they are exposed to the many pesticides that are used in the production process. The specific working and living conditions that they experience combined with cultural, economic and social factors ensure that this group of workers are particularly at risk to the effects of pesticides.

This thesis will discuss how these migrant labourers understand their reproductive, maternal and child health outcomes considering the context within which they live and work, in particular their exposure to pesticides, traditional beliefs about health and their knowledge and practices relating to maternal and child health. Using ethnographic data and drawing largely on interpretative and critical medical anthropology this thesis will explore how supernatural understandings of illness causality, experiences as migrant labourers and their indigenous world view affect their understanding of the risks of pesticides.

Underlying the central problems of their health are social, political, racial and economic conditions that have structured the way in which this population lives and works, ensuring that they are in harm's way both as migrants and while living at home in the highlands. The thesis concludes that the greatest determinants of their knowledge and practices are historical and on-going forms of structural and everyday violence, mediated through their beliefs in supernatural causality.

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## **Abbreviations and Acronyms**

### **General**

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CMA	Critical Medical Anthropology
EM	(Illness) Explanatory Model
HBM	Health Beliefs Model
OR	Odds Ratio
MCH	Maternal Child Health
NGO	Non Governmental Organisation
RH	Reproductive Health
r/mch	Reproductive and Maternal Child Health
SES	Socio Economic Status
SV	Structural Violence

### **Pesticides, biochemical and biomedical**

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ACHE	AcetylCholinesterase
AGD	Ano-genital distance
BUCHE	Serum Cholinesterase
CM	Congenital Malformations
CNS	Central Nervous System
DAP	Dialkylophosphate
DETP	Diethyl phosphate

DDT	Dichlorodiphenyltrichloroethane
EDC	Endocrine Disrupting Chemical
LH	Luteinizing hormone
NTD	Neural Tube Defect
OP	Organophosphate
PCB	Polychlorinated biphenyls
POPs	Persistent Organic Pollutants
T (4)	Thyroxine (thyroid hormone)
TSH	Thyrotropin (receptor hormone)
TTP	Time to Pregnancy

### Institutions

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ARIC	Asociación Rural de Interés Colectivo Tabalcalera (Rural Association of Mutual Interest - Tobacco Farmers)
BAT	British American Tobacco
CDI	Consejo para el Desarrollo de los pueblos Indígenas (Council for the Development of Indigenous Communities, previously INI)
EZLN	Ejército Nacional de Liberación Nacional (Zapatista National Liberation Army)
IMSS	Instituto Mexicano de Seguro Social (Mexican Instituto for Social Security –social security for employees in private sector)
INAH	Instituto Nacional de Antropología e Historia (National Institute of Anthropology and History)

INEGI	Instituto Nacional de Estadistica e Geografia (National Institute of Geography and Statistics)
INI	Instituto Nacional Indigenista (National Indigenous Institute)
INSP	Instituto Nacional de Salud Pública (National Institute of Public Health)
PAN	Partido de Acción Nacional (National Action Party)
PRI	Partido Revolucionario Institucional (Institutional Revolutionary Party)
PRONJAG	Programa Nacional para Jornaleros Agrícolas (National Agricultural Workers Programme)
SEDESOL	Secretaria de Desarrollo Social (Social Development Ministry)

## Glossary

### Spanish

Agencia	Agency/political division within each governorship
Agente	Agent/community representative
Albergue	Hostel
Albur	Play on words of a sexual nature
Almuerzo	Breakfast
Asistencialismo	Welfareism
Barranca	Valley/low lying regions within the sierra
Brecha	Vehicle accessible dirt track
Brujo/a/Brujería	Witch/witchcraft
Faltas al costumbre	Traditional/religious errors or sins
Caldo	Soup/gravy
Campesino	Peasant farmer
Carretón	Stilted maize store
Cargo	Traditional/religious role
Casa de la salud	Health house/post
Chaman	Shaman
Chaquira	Bead jewellery
Comida	Main meal of the day/lunch
Compadre/compadrazgo	Term used by men to refer to the godfather of your child/describes the relationship between two compadres
Cora/corita	Cora ethnic group/diminutive form, both used to refer to Indigenous women with connotations of inferiority
Comité de Ancianos	Committee of elders

Comunero	Fully signed up member of a Huichol governorship
Convivio/conviviendo	Social occasion/spending social time with people
Cosmovision	World view/view of the cosmos
Criollo	Second generation Spanish immigrant
Cuadro de estambre	Yarn painting
Cumplir/Cumplimiento	Fulfil (religious obligation)/fulfilment
Curandero	Healer
Deberes	(religious) obligations
Ejido	Communally owned land
Ejidatarios	Communal land owners
Empacho	Folk illness
Envidia	Envy
Faena	Community work
Fiesta	Ceremony+ ritual + party
Florece	Children's centres/schools run for children of tobacco workers
Huicholitos	Diminutive form of Huichol with racist connotations
Incumplidos	People who have not fulfilled their religious obligations
Limpia	Ritual cleansing
Mal de aquí	Illness from here/Huichol illness
Mal de ojo	Evil eye
Mandas	Religious tasks
Médico de modulo	Travelling doctor
Mestizo	Mixed race/blood (European with Indigenous) Spanish speaking population
Milpa/Coamil	Maize field

Mitote	Agricultural ritual/fiesta
Mochila	Backpack
Morral	Traditional woven bag
Oportunidades	'Opportunities' welfare programme
Pasante	Trainee doctor
Patrón	Employer (tobacco farmer)
Pena/penosos	Shame/ashamed
Peyote	Hallucinogenic cactus
Peyotero	Peyote gatherer
Plaguicidias	Pesticides
Pollero	People smuggler
Pozole	Traditional stew/soup
Rancho/Rancheria	Extended family ranch or circle of houses
Sarta	Length of threaded tobacco
Seguro Popular	Insurance scheme for the uninsured
Sierra	Highlands/mountains (homelands of the Huichol) also refers to the Highland/plateau region within the Sierra
Susto	(Shock), folk illness common throughout Latin America
Telesecundaria	Television based secondary school
Tlacuache	Large native Mexican rodent
Tramite	Red tape/oficial paperwork
Venado	Deer
Veneno	Poison

### **Huichol**

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Ayr + ane      How are you?

Hara'mara	God of the sea
Hauki!	Don't know!
Hikuri	Peyote cactus
Hikuri Neixa	Fiesta of Peyote
Jicara	Sacred gourd bowl representative of a deity
Jicarero	Carer of a jicara
Kaka'uyari/ri xi	Huichol deity/deities
Kauymali	God of creation
Kawewiene	Ceremony conducted by mara'akame 5 days after death
Ki	Single house
Kie	Home/house ( more than one building)
Kiekari	Extended family ranch
Kieri	God/toxic plant
Kutsuri	Traditional woven bag
Kwiniya	Illness
Mara'akame/te	Shaman/plural of
Muviere	Shaman's wand
Niwetsika	God of maize
Niwe	Baby/child
Niweyame	Vagina/place where baby comes out of
Tatewari	Great Grandfather
Tatewari Maxa Kwaxi	Great Grandfather deer god
Teiwari	Non-huichol (mestizo or foreign)
Teiwarit+a	Non Huichol territory (anywhere outside the Sierra)
Topil	Huichol law keepers

Tukipa	Ceremonial centre
Uaye	Medicine/pesticides
Wixárika	Huichol
Wixárika yeiya	The Huichol way or customs
Xiriki	Ceremonial house
Xukuri	Traditional headscarf worn by women

### **Huichol Illnesses**

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Maxariya	Illness of the deer
Ik + riya	Illness of maize
Teparixiya	Illness located in the stomach
Atacuaxiya	Illness of the toad
Tsik+ri	Illness related to sight.

## **Notation Conventions**

### **i. Language and translation**

Words in foreign languages are in italics the first time they appear in the text and thereafter in plain text. All full list of non-English words used in the thesis can be found in the glossary.

On the whole written Wixarika is pronounced phonetically, like Spanish. The language also uses the letter +, this sounds somewhere between ‘uw’ and ‘oo’. Thus tewarit+a (non Huichol territory) is pronounced tewarytuwa and the name +tuama sound like Ootuwama.

Attempts were made during translation to ensure exactness. Inaccuracies in Spanish have been maintained in English, grammatical errors have not been corrected.

All Spanish to English translations were carried out by me, Huichol to Spanish translations by Juan, Rosa and Totupica.

### **ii. Informant speech**

All informant speech is given in *italics*. (In contrast, citations are all in plain text between inverted commas)

Generally Interviewees are identified in transcriptions by the first letter of their name, with the interviewee (myself) identified with the letter J.

Where the informant is Julio or Jorge, their names are given in full to avoid confusion with the J of Jennie (interviewee).

When Interviews were conducted by another interviewer, e.g. Totupica, this name is given in full.

Where two informants with name beginning with the same letter are present at one interview, their names are abbreviated, eg Ll (Lola) and Le (Leonardo).

Where sections of conversation have been omitted these are presented as (...).

Pauses are written as such ... (pause)...

## **Chapter 1 Introduction.**

An increasing body of research suggests that the chemicals that are used in agriculture can interfere with human reproduction and child health outcomes. Often those most affected by this problem are migrant agricultural workers in developing countries where agriculture continues to rely heavily on manual labour and where legislation regarding the use of agrochemicals is less rigorously enforced. These workers represent some of the most marginalised groups in society.

We know from laboratory studies that chemicals such as pesticides and insecticides can interfere with the reproductive processes of rats and birds, causing a decline in fertility and increases in congenital malformations. Animal intervention studies also suggest that these effects can be teratogenic, interfering with the reproduction of animals one, two and three generations after the original exposure. Experimental studies are recent and such relationships have yet to be established in human population, but there is growing evidence that direct and indirect exposure to agricultural chemicals can damage human sperm, ova and embryos, causing congenital malformations, reduced fertility and long term childhood developmental problems.

In rural Mexico multinational corporations such as British American Tobacco and Phillip Morris wield political and economic power over agricultural regions that are dependent on their business. In small towns such as Santiago Ixquintla, where this study was conducted, the local economy is entirely dependent on agriculture of which a major section is agrochemical retail. Large amounts of these are used on all crops and the sale and spraying of these products is a lucrative business.

Mexico has one of the largest populations of *jornaleros agricolas*, (agricultural day labourers) in the world and the Mexican National Agricultural Workers'

Programme (PRONJAG) estimates that 3.5 million rural Mexicans are employed as day labourers earning little more than the minimum wage of 60 pesos (£3) per day (PRONJAG, 2010). The majority of these workers are from Mexico's indigenous communities. These *campesinos indigenas* (indigenous peasant farmers) are the descendants of communities that existed in Mexico before the arrival of the Spanish and retain cultural and linguistic traditions from this period (Stavenhagen, 1996). These are communities who retail their own illness explanatory models and traditional systems of medicine and healthcare alongside a strong symbolic and religious cultural matrix. Finding illness prevention strategies is complicated among these populations because their understanding of health and reproduction continues to be deeply rooted in traditional concepts of wellbeing and specific notions of illness embodiment and because they are economically and culturally dependent on poorly paid agricultural labouring for their survival.

In this thesis I discuss this problem in relation to the Huichol people of northwest Mexico. This indigenous population is an extreme example of a population exposed to pesticides largely through a tradition of family migration for work. Civil society campaigns have had some impact on reducing exposure to these chemicals but these small improvements are unable to compensate for the underlying structural and cultural issues that continue to ensure these workers are particularly at risk.

Using ethnographic methods and a multidisciplinary theoretical approach I explore how migrant labourers from the indigenous Huichol municipality of Santa Catarina (Tuapuire in Huichol) understand pesticides and their impact on their wellbeing, in particular their reproductive health. In this chapter I will firstly provide a rationale for my principal research question 'What do Huichol migrant labourers know about the effects of pesticides on reproductive health', briefly justifying the location, what is already known about perception of risk in relation to pesticides and describing the multidisciplinary approach that I took

to addressing this question. I will finish this introductory section with a presentation of the aims and objectives of my research.

In the second section of this chapter I will describe the contextual background to this study, providing details of both research settings, the Huichol people, and their homelands in homelands in the Sierra Madre Occidental.

### **1.1 Rationale**

This study evolved from a combination of previous research and study experiences in Mexico that reflect my own multidisciplinary background and experiences.

Between 1995 and 2002 I lived in Mexico, firstly working with marginalised urban indigenous families in the state of Oaxaca while volunteering with a street children's NGO, and from there to study an MA in Latin American Studies in the Political Science faculty of the National Autonomous University of Mexico (UNAM). During this time, inspired by the Zapatista movement, I developed a deeply politicized interest in indigenous Mexico. On completing the MA I took up employment with a series of reproductive health NGOs and in 2002, aware of my need for formal training in the area of population health, I returned to the UK to study for an MSc in Demography and Health.

On completing the MSc I began work at the UCL Institute of Global Health (formerly Centre for International Child Health) where I was employed as a research assistant to develop research proposals on the health effects of child labour. While in this position I looked up previous NGO contacts in Mexico and was put in contact with Patricia Diaz of the Huichols and Pesticides NGO. The NGO very kindly shared with me the dataset of their epidemiological study of the health impacts of pesticides on tobacco labourers in Nayarit and I conducted a secondary analysis of this, focussing on the effects of pesticides on Huichol children (Gamlin et al., 2007). During this period I made several trips to the

tobacco plantations in Nayarit and developed contacts with the Agricultural Workers programme (PRONJAG), both at its headquarters in Mexico City and in their regional office in Nayarit. Patricia Diaz also introduced me to Federico Langarica, the ex-tobacco union leader who became my guide to the field. Langarica had been ousted from his job as union leader by the tobacco companies for supporting the rights of workers. His perspective on the context was acutely political, thus he passed on to me his critique of the multinational tobacco corporations, unjust working conditions and his own personal family history of growing tobacco. He also personally knew almost every tobacco producer in the regions and was able to facilitate unique access to plantations and people.

I had always been interested in working with Mexican indigenous populations and had focussed on their worldviews/cosmovisions as a 'critique of modernity' for my MA thesis. Despite my interest in the cultural aspects of indigenous communities my motivation had never been the ritual and spiritual aspects of their lives nor the classical anthropological investigation of culture, beliefs and practices. When I first began working with Huichols and Pesticides and came to meet other *Huicholeros* (label given by anthropologists and activist alike who identify themselves as specialists in the Huichol) I was immediately struck by the tendency to idealize this ethnic group and their overwhelming emphasis on culture and spirituality over the real conditions of life, poverty and survival.

At this time I was developing a research proposal for a large scale epidemiological study of the health impacts of pesticides on tobacco migrant's children. Patricia Diaz had also alerted me to the fact that there was much evidence, including a local study, of the effects of pesticides on the reproductive process. She in fact put me in touch with a local doctor/researcher who had gathered considerable evidence of an association between agricultural exposure to pesticides and congenital malformations and I was investigating how to obtain access to a national database of congenital malformation.

While recognizing the policy importance of establishing a cause effect relationship between pesticides and health I was also acutely aware of the disjuncture between biomedical concepts of health and the indigenous world view. In my view the epidemiological study needed to be complemented by an ethnographic investigation that sought to explore what this population of migrant workers knew about pesticides. The context within which they worked was also particularly interesting because, unlike other migrant communities in Mexico, these tobacco workers live in the open air and are exposed 24 hours a day to pesticides making them particularly vulnerable. Thus it all came together, my interest in reproductive health, indigenous people and an exploration of these within a wider political and economic context clearly marked by injustices. The epidemiological study was never funded, but I was fortunate to obtain a multidisciplinary ESRC/MRC Studentship for my own anthropological exploration, thus the PhD came to be.

### **1.1.1 Location**

This research was conducted on two research sites, the tobacco growing region of Nayarit state to where many thousands of Huichol migrate every year, and the Sierra Madre Occidental, homelands of the Huichol ethnic group so that I could explore both how they experience pesticides in their working lives and what this might mean to them within the context of their particular set of beliefs and practices.

Nayarit state is the largest tobacco growing region in Mexico. At its peak during the 1980s the state produced approximately 33,000 hectares of tobacco and employed upwards of 55,000 labourers, mostly concentrated in the coastal region of Santiago Ixquintla (Pacheco de Ladrón, 1999). Here the tobacco industry is organised by a system of contract agriculture whereby multinational corporations supply seeds, chemical regimes and production guides and purchase the end product, leaving small scale local producers, responsible for paying and hiring labourers, applying agrochemicals, drying and packing the tobacco and shouldering responsibility for any human or crop damage or loss.

The tropical climate of Nayarit is suitable for all year round farming and land is in continual cultivation. This intensive land use and year round heat mean that farming demands large quantities of fertilisers to maintain production levels, insecticides, herbicides and fungicides to combat the frequent plagues of white fly, tobacco worm or blue mould and pesticides to keep larger leaf eating insects from destroying entire crops. The sowing guide provided by tobacco companies recommends the application of 46 different agrochemicals of which eight are organophosphate based, until recently including the extremely toxic Metamidofos, a pesticide that is now prohibited.

The Huichol people who are the focus of this study have a particular religious and symbolic link with the region: it is home to *Hara'amara* on the Nayarit coast, one of their five most sacred sites, and the tobacco plant that is grown there more intensively than in any other region in Mexico has also been used ceremonially by the Huichol for centuries, giving it a symbolic meaning. Furthermore this particular harvest season fits neatly into the 'quiet' period in their native cycle of agricultural production and ritual. Shortly after the tobacco picking season is over they must begin preparing their own land and planning the many ceremonies that will take place in their communities during the coming months to ensure a good harvest of maize.

Although the people who participated in this study sit within a small and complex cultural niche, the manner and conditions under which they work are shared by hundreds of millions worldwide, giving this research question relevance beyond the specific context that I studied. In Mexico an estimated 5 million rural people earn their living as agricultural labourers, of whom 3.5 million are migrant labourers travelling from region to region throughout the year. An estimated 2 million are indigenous, 750,000 are women and one million are under the age of 18 (PRONJAG, 2010). Within the national context tobacco production is particularly interesting because, in contrast to the majority of agricultural work in Mexico, it attracts whole families of migrants

from small children to grandparents, but particularly young families in the throes of their reproductive years.

**Figure 1: Map of study region**



### 1.1.2 The problem of pesticides

This research was initiated as a multidisciplinary study straddling public health and anthropology, reflecting my own approach to the problem. Although ultimately my findings and population have dictated the need for an anthropological explanation, this is essentially based on a public health concern: exposure to harmful pesticides.

The World Health Organisation defines 'Reproductive Health' (over and above the WHO definition of health) as addressing the '*reproductive processes, functions and system at all stages of life*'. For this research I am interested in all aspects of this process: the production and development of spermatozoa, ovum and embryos, foetal development, pregnancy, pregnancy outcomes including time to pregnancy and birth intervals as well as the health of newborn babies

including birth weight and congenital malformations<sup>1</sup>. These reproductive processes can all be interrupted or affected by Endocrine Disrupting Chemicals (EDCs), a category that includes organophosphate (OP) as well as some pyrthroid, carbamate and organochloride pesticides. Scientific evidence has linked EDCs to almost every stage of reproduction: the production of sperm and ovum, embryogenesis and early foetal development (in particular the stage of neurological development in early pregnancy), extended pregnancy intervals (as a proxy for a variety of fertility problems) and congenital malformations, particularly orofacial defects, Neural Tube Defects (NTDs) and antiandrogenic defects, miscarriage or foetal death.

These outcomes are mostly part of the same process. Damage to sperm, ovum, embryo or foetus can results in congenital defects. If sperm and or ovum are harmed it may be more difficult or impossible for a woman to conceive. If she does, the embryo may be unhealthy and could die before a woman knows that she is pregnant or any time before the baby is born. Either of these outcomes would lead to longer birth intervals for affected parents. The pregnancy may continue with congenital defects such as anencephaly (missing part of the brain), it may be stillborn, or may survive with any of a range of less serious or correctable defects. Pesticides have also been linked to low birth weight, preterm delivery and impaired neonatal reflexes. In the annex I include a full review of current evidence of these effects, including a specific focus on epidemiological studies of pesticides in Mexico.

As I state above, the intention of this study was not to ascertain the effects of pesticides on health, but how this relationships is understood by the population of Huichol migrant workers. Here my interest is to understand what knowledge agricultural workers have of pesticide risk and how this information fits with their understanding of the body and sickness and in particular the issue of

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<sup>1</sup> The definition of reproductive health being used in this thesis does NOT include issues about sexually transmitted diseases or infection, sexual health issues relating to sexual pleasure or sexual dysfunctions or other sexual health issues that are not directly related to the process of reproduction.

reproductive health. Explorations of risk perception in relation to pesticides in Mexico or among Mexicans in the US are limited, but what research has been conducted does tend to coincide: little is known about the types of harm that can be caused and there is no automatic association between knowledge or beliefs about potential harm and behaviour. Many see pesticide harm as something that happens to others, or they are ashamed to demonstrate weakness by admitting they have been affected. Perhaps most importantly, although most people could identify some symptoms of exposure, very few perceived any long term risk, which is ultimately where my concerns relating to reproductive health lie.

While there was no clear consensus about perception of risk in relation to pesticides, these studies were indicative of the theoretical approach I should take to explore this question among Huichol migrants and provided pointers for the specific questions that I may need to explore.

#### *Knowledge and beliefs about health and risks*

Most papers reported that interviewees could describe a number of outcomes of high level exposure and the types of symptoms experienced by people who have mixed or sprayed pesticides. Their comments include references to dizziness, drowsiness, elevated blood pressure and skin irritation (Rao et al., 2007, Elmore and Arcury, 2001). Both Cartwright and Elmore & Arcury note that these symptoms were thought to last one, two or three days if not treated but there was little mention of long term harm. Elmore suggests that 'some had heard that they [pesticides] can cause cancer, sterility and death' (p157), but concludes that 'Most workers believe that they are susceptible to immediate but not long term consequences'.

Baer and Penzell interviewed 30 mostly Mexican Latino farmworkers who had previously been hospitalized after a single event of pesticide poisoning (Baer and Penzell, 1993). Seven of the 28 (25%) of Mexicans felt that they had

certainly (n=4) or probably (n=3) developed *susto*, (a folk illness with a variety of psychological and physiological symptoms well known in Latino populations that is believed to originate from a shock, an accident or bad news of some sort as a result of the poisoning. These seven people also experienced a greater number of symptoms four months later than did the 21 who did not attribute their ongoing problems to *susto*. The authors conclude that ‘... a self-diagnosis of *susto* may be indicative of greater morbidity and mortality’ (Baer & Penzell p321), suggesting that there may be a crossing of sign with indigenous or folk illness explanatory models.

There did seem to be agreement that pesticides would harm children more than adults and could cause different problems for women. Elmore, who largely interviewed men, quotes that ‘kids get sicker because they are smaller and more susceptible’ and Rao et al, who specifically interviewed mothers, quotes one interviewee who suggests that pesticides mainly affect women, ‘I think it causes the same harm, but in a different way [for men and women]. I think that women are affected more in the entire body, I think that in children, it’s in the whole body, they have fewer defences, I mean their organs are smaller. [If a pregnant woman] is in the area when it smells bad, or where chemicals filter into your body, then its logical that the baby is absorbing them, and I think it’s logical that its development can be damaged’ (Rao et al., 2007). Only a few mentioned that the effects and symptoms would depend on the amount and type of exposure.

The only real form of prevention from harm is non-exposure and all of the papers describe some knowledge of the use of protective clothing and gear. Several people mention the importance of washing clothes, hands and bodies (Salazar et al., 2004, Rao et al., 2002, Cartwright, 2001). Interviews on this issue demonstrate some confusion as well as the presence of different cultural elements in their understanding of prevention. One Amuzgo women states how she believes that you ‘become ill like this if they don’t keep your room clean’ another that you need to ‘wash with lemons, drink milk, eat bananas and take

Alka Selzer' to eliminate the toxic gasses and a third that 'after some time you become resistant'(Cartwright, 2001 p288).

The Oaxacan woman interviewed related the physical symptoms of pesticides to negative emotions, a key aspect of the Amuzgo illness explanatory model, and Cartwright concludes that 'the possible physiological consequences of poisoning with pesticides make these emotional illnesses more harmful'. Rao et al found that nearly one third of Latino women thought pesticides were an infection and believed them to be contagious. One woman referring to her husband describes how 'you can't get infected once he has taken a shower', and that you must 'wash fruit and vegetables to prevent infection '(Rao et al., 2007). The authors also comment that among the women interviewed, there was a general incomprehension of the problem that pesticide residues that can remain on plants, clothing and other surfaces when the product itself is no longer visible. These workers maintained that only people who work directly with them can be affected, in contradiction to the 'contagion' theory.

Few of the interviewees admitted to using protective clothing, although they knew of risks, the excuse being that protective gear is very impractical for the hot climates they must work in. The adolescents interviewed by Salazar et al describe how 'when it gets hot we take it off' and 'we don't cover our mouths because it is hard to breathe'. The same population also admitted that they did not heed advice on food consumption, stating that 'you are, like, so hungry, you sit down wherever you can, sometimes you don't even wash your hands' and they claimed to be 'used to' eating contaminated food (Salazar et al., 2004, p154-5). The author explains this pragmatically as 'time constraints, lack of education about hazards and complacency', but at the same time acknowledges the lack of a relationship between knowledge and behaviour.

#### *Perceived risk*

The pesticides used in agriculture are mostly designed to kill insects, fungi or other plant type plagues and other very small creatures. Rao et al noted how

this has influenced worker's perception of vulnerability, through belief that pesticides only affect the organisms they are targeted at, as one 41 year old woman comments, 'I think it's special for bugs, for insects, that it doesn't do anything to you. I don't think it's that strong, it's just for insects'. This may have influenced the generalized feeling that admitting you have been affected by pesticides is a sign of weakness. Hunt describes how Mayan farm workers felt they 'should be able to put up with it', as it was a sign of weakness to admit that they could not deal with the effects of exposure to pesticides (Hunt, 1999). It is undesirable to admit weakness, and Amuzgo women were also reluctant to admit that their partners who had direct contact with pesticides had suffered an ill effect. For them it was something that always 'happened to someone else and someone else was the vulnerable one' (Cartwright, 2001, p230).

Most farm workers are young and relatively healthy. Perhaps for this reason even those who were concerned about health effects had more pressing concerns such as buying food for the family or sending money back to Mexico (Arcury et al., 2001, Elmore and Arcury, 2001). Perception of risk, as with illness itself, is framed within the logic of workers who are not paid if they do not work and where concern for one's own wellbeing is not their main priority, suggesting the influence of wider structural factors. Cartwright rightly points out that what people are told about pesticides is mediated through their own beliefs, creating a fusion of biomedically founded ideas with diverse cultural realities and economic practices and realities.

These studies suggest the important influence of personal experience on formation of beliefs and practices regarding pesticides. Personal experience of illness in this context, or lack of it, contributes to the explanation of why the issue of long term effects is almost absent from their understanding of pesticides. These studies also suggest that more specific knowledge of the maternal and reproductive health effects of pesticides is particularly poor, with the only mention being speculative.

Theoretical studies of risk perception (to be discussed in chapter 4) have suggested that lay understandings of pesticides are broad. Referring to the culturally specific hermeneutic nature of lay people's understanding of risk Jensen et al note that 'Lay people [...] would be employing their full range of senses, including not only their eyes nose and mouth but also *experiences, memories* and *moral convictions*, to make sense of pesticide risks' (Jensen and Blok, 2008) (my emphasis). Alternatively, Block et al argue 'They [lay people] mix together, as a matter of course, certain scientific issues with broader *social, ecological* and *moral* commitments. Lay people possess a much broader understanding of risks than do experts'. These authors suggest that how people understand pesticide risk is influenced by a far wider range of factors than any science based knowledge that they may or may not have acquired about this exposure and broader social and moral commitments place their conception of risk within a hierarchy with other commitments. These positions, and the empirical studies discussed above suggest that I would need to approach my principal research question from a *broad and open theoretical standpoint*. The position should seek to explore i) the Huichol conception and explanatory models of health and illness (as suggested by Baer and Penzell, 1993 and Cartwright, 2001) , ii) different ways of perceiving how pesticides may enter or affect the body, (as noted by, amongst others, Rao et al 2007 and Salazar el at 2004)and iii) the wider structural influences on their understanding of pesticides (as noted by, among others, Arcury, 2001 and Elmore and Arcury, 2001).

### **1.1.3 The theoretical approach: beliefs, culture and structural violence.**

This study is multidisciplinary because the problem being addressed cannot easily be solved using one single approach. As I have stated above, I began this study acutely aware that the distance between biomedical evidence of how pesticides affect the body and how indigenous workers understand or experience this process, is wide. As Kleinman states the 'gap between experience and biology' cannot be filled with one type of knowledge alone (Kleinman, 1995 p80). Farmer is critical of how 'each of the socio-medical

sciences –medical anthropology, medical sociology, health economics and so on– tends to stake out its specific turf (Farmer, 2001). Representatives of these fields then tend to claim that their disciplinary focus is of paramount importance in explaining the phenomena under scrutiny, regardless of what that phenomena happens to be'. The author of 'Infections and inequalities, the modern plagues' is particularly critical of how medical anthropology very often upholds culture as the determinant' (Farmer, 1999 p257), a concern that I share.

Explanatory models of illness and prevention, well-being and health seeking, pain and suffering, beliefs about what we are or are not vulnerable to, and the different elements that affect agency in health all offer different perspectives. Here I will outline the different theoretical approaches that have contributed to my interpretation of the way these indigenous migrant workers understand the effects of pesticides on their reproductive health.

Knowledge and beliefs or discourses and understandings about health have mostly been approached within international public health as part of a broader conceptual framework of the determinants of health behaviour. On the whole it has been assumed that knowledge leads to action and that peoples' understanding of health will determine their health seeking behaviour and in turn their health. This assumption has since been challenged on theoretical grounds, through empirical research and particularly in relation to reproductive health (Noar and Zimmerman, 2005, Bettinghaus, 1986). Novel theories have been developed and adapted around this same theme with, for example, the added dimension of attitudes, unpacking of the role of belief and the role of persuasive communication techniques. Such approaches have proven successful at addressing some major health issues and various conceptual frameworks have been informative in advancing our understanding of lay knowledge about health and the determinants of health behaviour.

The Health Beliefs Model (HBM) framework deals with understanding beliefs about health and since these appear to form part of perceptions of risk in relation to pesticides. I will briefly explore the model's usefulness for understanding people's beliefs and knowledge about pesticides. The model has been criticised on two accounts, firstly for its failure to sufficiently account for cultural difference and secondly for being based on the assumption that knowledge leads to behaviour. The second of these critiques is echoed by the literature on pesticides that I review above. I fully recognise these limitations and will introduce this model from a critical position, to ask whether there is a relationship between what this population know about pesticides and their behaviour.

There is much discussion to be had on the epistemologies of medicine, illness and health and this thesis will address some of these arguments precisely because it is an attempt to bridge the biomedical with the non-biomedical study of health. The field of study that has dealt with the contradictions and dichotomies of public health/medicine and social science in both an applied and a critical manner is medical anthropology. This discipline does not work with one 'conceptual framework' or offer a definitive theoretical bridge between the disciplines, but rather proposes a series of conceptual approaches and tools for understanding health problems, particularly in non-western cultures, from a non-biomedical perspective. Meanwhile it highlights the value of research that is conducted from what Kleinman refers to as an 'interpositional' perspective (Kleinman, 1995). This being one that strives to avoid the ethnocentrism of biomedicine without collapsing into relativity, by combining multiple positions on an issue.

Three positions in medical anthropology are relevant to the problem addressed here and serve to address the empirical questions that are thrown up in literature about perception of pesticide risk and listed at the end of the previous section: i) the influence of traditional medical explanatory models -including what forms of biomedical knowledge they may have, ii) different ways of

perceiving how pesticides may enter or affect the body and iii) the wider structural influences on their understanding of pesticides.

The first of these is focused on illness representations; understanding the medical culture of the particular group being studied, in this case the ethnomedicine of Huichol people. This approach is criticized for reinforcing the ethnocentric belief that these non-medical interpretations are folk beliefs while biomedicine is knowledge, thus reinforcing the existing hierarchy of 'knowledge vs belief'. However it is necessary to establish the basic premises of Huichol medicine, the ways in which the Huichol understand illness, disease and causality before we can approach the issue of understanding pesticides since this is the lens through which this population understand their health. In this case such an analysis should include representations and interpretations of the body and processes of reproduction. The purpose of this approach is not to identify the Huichol's interpretations as false beliefs or incorrect knowledge, but to explore how the issue of pesticides is understood and what cultural knowledge contributes to this.

A second position is the interpretative approach, questioning the concepts of wellbeing, disease, reproduction, health and illness as universal and the epistemological and nosological issues that are attached to understanding and working with non-western conceptions of these entities. In order to understand the human body and disease in settings that do not share a scientific understanding of the world, this essentially epistemological position in medical anthropology proposes that we re-think the analytical categories that pre-determine how we conceive the issues that are being studied. For example, with reference to the concept of 'body', Csordas talks of 'collapsing dualities', in particular the mind/body dichotomy and erasing the boundaries between epistemological divisions within the entire concept, similarly Scheper-Hughes & Lock talk of 'suspending' our usual belief in certain dichotomies (Csordas, 1990, Scheper-Hughes and Lock, 1987). Good refers to this as the 'meaning centred tradition' in medical anthropology, the questioning of whether the notion of

disease is in itself an explanatory model for something conceptually different (Good, 1994b). This position necessitates unpacking the concepts of disease, illness and the body, one of medical anthropology's principal contributions to the understanding of health. I will draw on this position to question whether the given concept of disease is actually what Kleinman refers to as a 'category fallacy', and one not shared universally, by looking at the concept in the context of Huichol medicine and health (Kleinman, 1978b).

The third position within this discipline that is useful here is the field of critical medical anthropology (CMA). In contrast to the other two positions, CMA is interested in the social production as opposed to the cultural construction of illness. Critical perspectives analyse the underlying structures of social and cultural inequality that *manufacture* or *generate* illness and are critical of the 'conflation of structural violence and cultural difference' (Farmer, 2001). This critical approach takes political and historical issues as a starting point with the aim of taking a step back from the medical interpretation of illness to look at underlying causal factors. This is not anthropology's answer to the social determinants of health but rather it asks *why* these structural inequalities are there in place in the first place, how power shapes social processes and what the relationships between people and structures that ensure the continued ill health of a community are (Baer et al., 1986). Critical Medical Anthropology is political, a perspective that is highly relevant to the study of pesticides in this context. In his critique of international health research, Kleinman discusses how 'the sources of human misery are based on the dynamic effects of large-scale political and economic forces working within local worlds' (Kleinman, 1995). Ironically, and of relevance to this study, Kleinman's essay 'A critique of objectivity in international health' makes reference to how baseline 'unexposed' data on families who had been affected by the Bhopal Union Carbide disaster was not considered 'acceptable evidence' that these families' health had been damaged by the leaked pesticides. On this basis thousands of families were denied compensation. His basic argument is that corporations wield great economic power and will intervene to ensure research does not put them out of

business. Both pesticide manufacturers and the agricultural corporations who employ them will use research to their advantage, arguing that this 'lack' of conclusive evidence reinforces the fact that they are essentially not harmful to the human body. This critical approach is highly relevant for understanding the particular context of this research.

#### **1.1.4 Aims and Objectives**

The aim of this thesis is to explore *how* Huichol people understand the relationship between pesticides and reproductive health.

Thus, in order to achieve this, as a step by step process I will explore the following questions.

- i) What are the knowledge and practices of Huichol men and women regarding traditional and modern medicine and healthcare?
- ii) What knowledge do Huichol men and women have of the reproductive process?
- iii) What knowledge do Huichol women and men have about the potentially harmful effects of pesticides?
- iv) What perception of risk do Huichol women and men have in relation to reproduction, maternal and child health?

This aim was reached through a qualitative research process and the following methods relating to preparation, data collection and analysis were used.

#### **1) Preparation and background work**

- i. Conducted a review of academic literature and research on relevant issues.
- ii. Discussed the proposal for this research with Huichol political and religious authorities to gain approval, consent and support.
- iii. Obtained permission and support from local political and *ejidal* authorities regarding access to tobacco workers and farms.

- iv. Identified approximately thirty Huichol families who migrate annually to the coastal tobacco plantations of Santiago Ixquintla and interview them in brief to establish suitability and willingness to participate in this research.
- v. Planned a series of visits to the tobacco plantations during harvest season and follow up visits to sierra communities to collect in depth ethnographic data.

## 2) Data collection

- i. Recorded all research activities, observations, visits, and relevant conversations in the form of a field diary.
- ii. Conduct informal activities and hold informal conversations with research participants on the plantations in advance of formal interviews.
- iii. Conducted qualitative research activities with migrant families where feasible –including experimentation with photovoice research techniques and structured free-listing to explore understandings in preparation for in-depth interviews.
- iv. Conducted approximately 30 semi-structured and in-depth interviews with each of the Huichol migrants identified to explore the questions posed above.
- v. Conducted approximately ten structured interviews with pesticide sellers from the town of Santiago Ixquintla about their knowledge and practices relating to the pesticides they sell.
- vi. Interviewed up to ten tobacco farmers regarding their use and understanding of pesticides.
- vii. Conducted semi-structured interviews with key informants from the health sector working in Highland communities.
- viii. Conducted interviews with traditional and religious authorities from within the selected Huichol communities.
- ix. Attended key events in the sierra and during tobacco harvest as an observer.

- 3) Data organisation and analysis.
  - i. Translated all Huichol interviews into Spanish, transcribe all interviews.
  - ii. Organised and store transcriptions using an electronic data analysis programme, in Spanish.
  - iii. Analysed data using NVivo analysis programme.
  - iv. Where necessary translated Spanish to English for citation in the thesis.
  - v. Discussed preliminary results with a group of key informants in the Sierra.

The results of this research will be presented and discussed as follows. Chapter 2 describes the methods used to research the issues described above and the limitations encountered during this process. Chapter 3 looks in further detail at the context of this study, providing details of the population I worked with, political, social and demographic details of their homelands and a review of existing literature on Huichol medical knowledge and practices. Chapter 4 provides a theoretical context for the study, juxtaposing the different positions in medical anthropology that I take. Chapters 5 to 7 will describe and discuss my findings. These chapters will work through the themes of health, reproductive health and practices and understanding of pesticides separately. In my concluding chapter I summarise the theoretical themes that I have developed in relation to my field data and finally present a number of policy recommendations.

## **1.2 Background**

### **1.2.1 Sierra homelands**

The Huichol highlands are divided into four ‘governorships’: Santa Catarina, San Andrés and San Sebastián, in the state of Jalisco and Guadalupe Ocotlán in Nayarit. Each has a separate political structure and governor, linked through

their shared culture, territory and political struggles. For practical reasons it was necessary to confine the study to one of these four governorships since the follow-up period would entail visiting the individual communities and hamlets where participants were from. After a full year of exploratory research with Huichol communities in Nayarit and Jalisco, Santa Catarina (Tuapurie in Huichol) was selected because a group of researchers from the University of Guadalajara, who have a long established nutritional programme in the community, had begun training a small group of health promoters with an interest in expanding their work into maternal and child health.

Tuapurie is the least economically developed of the governorships; it has vehemently rejected communications and any forms of outside investment or infrastructure. On a socioeconomic, cultural and demographic level the four communities are similar; each has unacceptably high levels of infant and maternal mortality, a scattering of basic health clinics and education establishments, each holds the same rituals, is respectful of the same deities and visits the same sacred sites. The entire Huichol territory is classified by the government as 'highly marginalised' and as such families in all four regions are eligible for Conditional Cash Transfers (CCTs) from the *Oportunidades* welfare programme. Families from all corners of the *Sierra Huichola* (Huichol Sierra as it is known to many in the mestizo towns below), as far north as the state of Durango, migrate to the tobacco harvest in Nayarit.

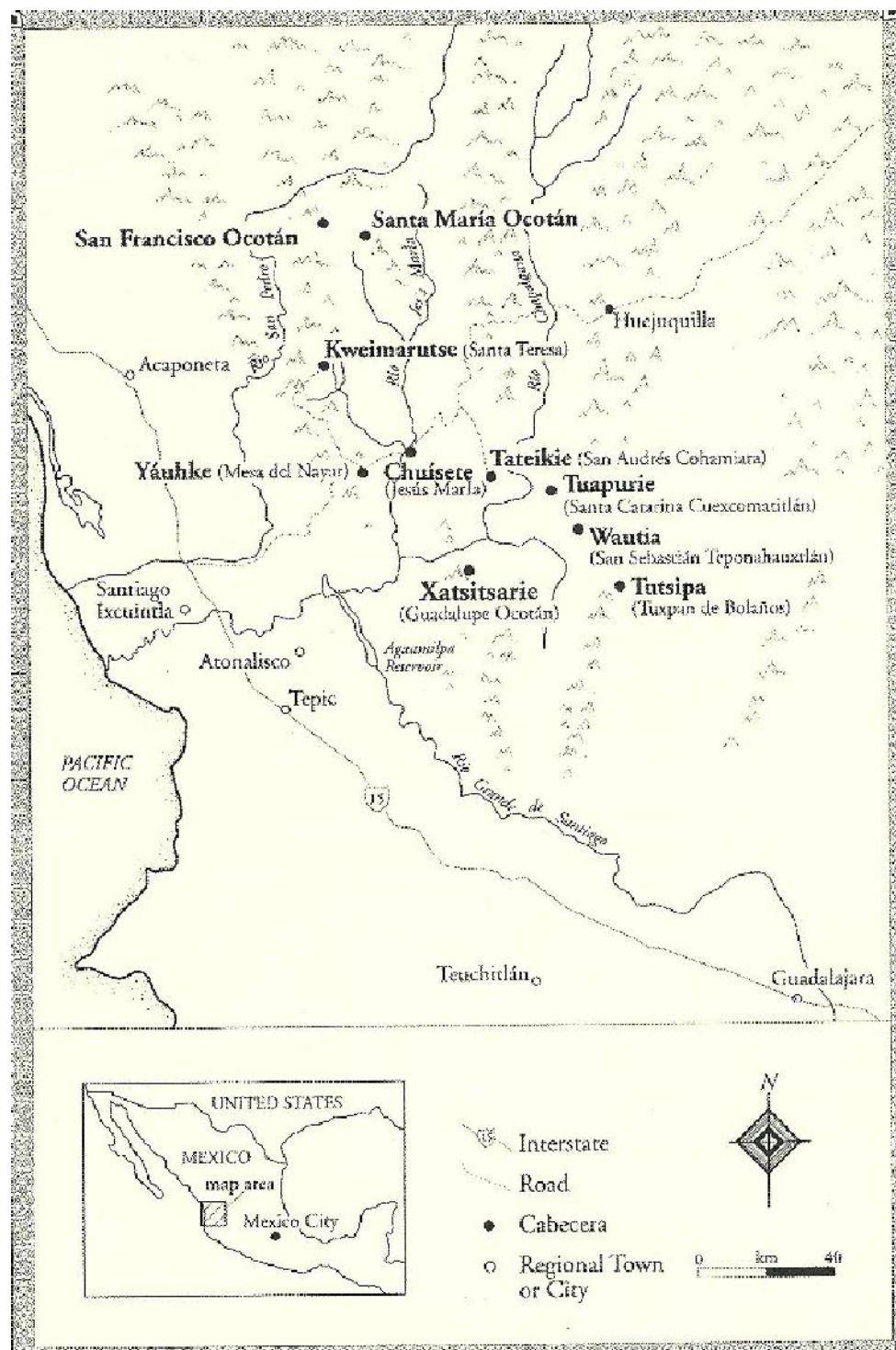
There were no other public health programmes or organisations working in the Sierra at the time of this study and gaining access and community consent for the project was a major hurdle. Initial contact with the community was made through the Santa Catarina Health Committee. Two promoters were assigned by this group as assistants and the project was approved by the community at their general assembly meeting in November 2009. I began data collection with my two Huichol research assistants, Juan and Rosa, in February of 2010.

### **1.2.2 The Huichol homelands and people**

The Wixárika today occupy 4,107Km Sq of the Gran Nayar, a geo-cultural region located in the southern and middle sections of the Sierra Madre Occidental mountain range in the northwest of Mexico. Their semi-autonomous territory straddles the states of Nayarit, Jalisco, Zacatecas and Durango and consists of four traditional governorships: San Andrés Cohamiata (Tateikei), Santa Catarina Cuexcomatitlán (Tuapurie), San Sebastian Teponahuastlán (Wa+tia), and Guadalupe Ocotán (Xatsitsarie). The first three of these are politically dependent on the municipalities of Mexquitic and Bolaños in Jalisco state and the latter on El Nayar, Nayarit (Neurath, 2003b).

Until the 1960's the Gran Nayar had only minimal contact with mestizo Mexico. There were no health centres, schools or governmental representations of any kind in the region. Little was known about the ethnic groups that lived there, save a handful of studies written at the turn of the century (Lumholtz, 1902, Diguet, 1992, Zingg, 2004). In 1960 the then INI initiated the 'Cora-Huichol Coordinating Centre' and in 1966 the 'Plan Huicot' (Huichol-Cora-Tepehuano) aimed at 'Promoting development, improving communications, increasing agricultural production and cattle farming' among the three indigenous groups of the Gran Nayar (Neurath, 2003b). The first health centres, doctors and health promoters arrived shortly afterwards. Today approximately 30,300 people speak Wixárika as a first language (Neurath, 2003b). Bilingual primary schools and *telesecundarias* (secondary level schools based on centrally run television programmes) are in the larger pueblos and the CDI runs a series of hostels (albergues) attached to larger primary schools for children who live in the surrounding rancherias. Huichol children begin to learn Spanish when they start primary school around the age of 6 but Mexico's official language is scarcely spoken among men or women over the age of about 35 and very few elderly people speak much Spanish at all. Furthermore, as I will discuss, many children rarely or never attend primary school.

**Figure 2: Map of Wixárika territory including Nayarit coast**  
 (Liffman 2011)



Like all indigenous people of Mesoamerican origin, the Huichol are skilled agriculturalists who for centuries have sustained their population largely on the

production of maize. Cultivating the milpa or *coamil* (maize field), more than a simple subsistence activity, it is also a religious rite. Only those who grow the sacred and traditional varieties of maize can participate in communal ceremonies and only those who participate in ceremonies can, by traditional law, work the land. Cultivating the coamil is one of the many important religious tasks the Huichol must complete throughout their lives if they are to remain in good health. In addition, perhaps reflecting their Aridamerican roots, the Huichol are skilled hunter-gatherers and most communities have access to a range of fruits, insects, small animals and river life that provide nutritional variety, albeit in small quantities. This is a population with a very low calorie diet who have historically suffered from cycles of severe food scarcity that in some communities has been evidenced by high levels of malnutrition related mortality (Fajardo Santana, 2007). Despite centuries of careful management and intricate knowledge of their land and resources, in many parts of Huichol territory a combination of population growth and conflict over land rights has left many families unable to produce or gather enough food to last throughout the year. Supplementing their subsistence economy has been a necessity for these communities for many decades and labour migration to the coastal tobacco plantations has filled this role.

### **1.2.3 Nayarit**

Santiago Ixcuintla is a small agricultural town of 17,000 inhabitants sitting 40 km from the coast and 60km from the foot of the *Sierra Madre*, the mountain range and highlands that are home to Huichol, Cora and Tepehuano communities. The economy revolves entirely around agriculture and this male dominated business is reflected in unequal gender relations and roles that are almost immediately visible (Gonzalez Roman, 2002, Pacheco de Ladrón, 1999). The town is predominantly *mestizo* (Spanish speaking mixed blood population) but over the decades a number of indigenous families have settled there on a permanent basis, many selling traditional Huichol handicrafts to supplement employment in agriculture. Most of the time Santiago is a quiet place that is up before sunrise to make the most of daylight and goes to rest early at the end of

the working day. The town is littered with low grade *hoteles de paso* (literally ‘passing hotels’ where one pays by the hour), and closed door *cantinas* where men drink and pay for women, another indication of the very macho culture that permeates the town. During tobacco harvest the population can almost double and the weekly payments made to migrant workers are a major boost to the local economy. In these months the town comes to life, particularly on Sundays when almost the entire tobacco labouring community comes to town. This is one of the mestizo towns that indigenous workers have come to know well, where male tobacco workers equally frequent the *hoteles de paso*, and *cantinas*, leaving their wives and children parked on the pavement outside, and where a significant proportion of their own and their family’s hard earned income is spent.

The tobacco production system in this area is artisanal, requiring many hours of manual labour. Although the different tasks do not require skill or training, they are performed far more efficiently and neatly by experienced workers. This manual labour has traditionally been performed by indigenous families from the Nayarit and Jalisco highlands who depend both culturally and economically on this annual trip to the coast. The *sarta* (length of threaded tobacco) technique involves hand picking, threading (*ensartando*) and hanging leaves out to dry and requires 150 days labour per hectare, compared to 83 for tomatoes, or 38 for maize (Pacheco de Ladrón, 1999). The fiddly nature of threading tobacco, together with the low level and relatively light weight of leaves, makes this work particularly suitable for the family as a unit of labourers. Tobacco production in this area is largely on *ejidos* (community owned land) and works through the system of contract agriculture, whereby multinational corporations, in this case British American Tobacco and Philip Morris International, supply the seeds and growing instructions and purchase the end product. The *ejidatarios* (farmers with the right to cultivate sections of community owned land) are responsible for employing and paying labourers. Payment is per *sarta*, a string of approximately 2 metres of tobacco. The contract between farmer and tobacco company stipulates the wage rate at which workers will be paid, including an

insurance that covers the cost of their company's investment, but not any investments or costs made by the farmers. There is no accommodation for these workers who sleep, wash, eat and cook on the plantations, next to, underneath and on top of freshly cut tobacco leaves. Despite these poor conditions the set-up of tobacco production works well for the Huichol workers: it gives them the flexibility to come and go to their homelands in the Sierra, provides employment for women and children and they are saved the additional costs of accommodation which, if available, would be deducted from their earnings. Their annual trips to Santiago are also a time to enjoy regular food and access to markets, shops and services and despite sleeping in the open air, on the whole their living conditions on the coast are not worse than the conditions in which they live at home (Talavera, 2003).

#### **1.2.4 Tobacco labour and costumbre**

The mother of macuchi tobacco was Tatei Hara'amara, who was transformed into a woman. Her father was the deer, Kuayumari; the first mara'akame, he showed the Wixaritari how to make macuche [tobacco]. When there was fire, moon and maize, tobacco macuche was born' (Mythological origins of macuche tobacco, in Talavera, 2003).

Tobacco production began in Nayarit in the 1920s, when British American Tobacco (BAT) began operating in Mexico and by the 1930s, along with Philip Morris it actively sought labourers to pick and thread tobacco leaves. By the 1950s the region, then referred to as the Gold Coast, was the largest tobacco growing region in Mexico, renowned for its production of the golden coloured Virginia type tobacco. Despite the global decline in tobacco prices and production, the coast of Nayarit continues to be the most important tobacco growing state in Mexico although these days the ejidos of Santiago have diversified, growing beans, cucumber, jicama and tomatoes alongside tobacco. The region continues to provide the single most important source of income for Huichol migrant labourers, although they come in much smaller numbers than in previous decades. From both a practical and a spiritual perspective, the

tobacco harvest almost perfectly complements the *Wixárika yeyereiya*. Not only does picking season occur at a time of year that does not interfere with the Huichol cycle of fiestas and rituals, tobacco itself has sacred links with their culture and the journey to and stay on the coast provides opportunity to fulfil certain religious obligations.

In his thesis '*The veins of tobacco: Wixaritari migration to the coast of Nayarit*'<sup>2</sup>, Talavera describes how this annual journey is not only an economic strategy but also the possibility of reinforcing costumbres, a 'bridge that communicates different realities' (Talavera, 2003). Until twenty years ago when the first vehicle accessible tracks were carved into the sierra, the Huichol walked everywhere. The journey to Nayarit is no exception to this. From Tuapurie the route to the coast continues to be mainly covered on foot and most jornaleros make the two day walk across the hills and valleys to Jesus Maria, from where they take the daily bus service down to Ruiz and on to Santiago. The route takes them through several sacred sites and making the journey to the coast also enables the migrant workers to fulfil some of their annual obligations to visit sacred sites and leave offerings. The first of these is Cerro del Niño home to the sacred site of Tirikikatzie (Hill of Father Wolf-man), a site frequented by trainee mara'akate in the part of their initiation that requires them to spend several days in isolation from other humans while they attempt to make communication and alliance with Kumukime, the wolf deity (Talavera, 2003, Valadez, 1996). Families on their way to the coast visit Tirikikatzie to protect them on their journey to the coast and so that they return in good health.

Further along the way, at the Mesa del Nayar, near Jesus Maria and just before the descent to Ruiz is Kiemuka, a sacred site dedicated to the mother of Wolf-man. Visiting this site guarantees the continued presence of sacred white tailed deer in the Sierra, as well as the promise of good health. In common with Tirikikatize, Kiemuka and the third sacred site Sakaimuta are sites to which the

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<sup>2</sup> Talavera Duron's thesis (2003), 'Las venas del Tabaco: la migración wirarritari [plural form of Wixárika] en la costa de Nayarit', an ethnography of Huichol migration to the tobacco plantations describes the symbolic, economic and cultural aspects of this phenomena.

wixaritari are often sent to visit in fulfilment of a *manda*, the orders or prescriptions of a mara'akame, usually related to curing an illness or to compensate for a wrongdoing.

The Huichol also have a long standing mythological, historical and economic relationship with the coast of Nayarit itself. *Tatei Hara'amara*, Our Mother the Sea, is the principal provider of life, playing a central role in Huichol Cosmogony. Herself a deity, Hara'amara is the figure to whom the Huichol turn to cure life threatening illnesses and stubborn infertility, to repay debts and ask for forgiveness or good fortune. The tall white rock that stands about 200m from the coast of San Blas, Nayarit's principal but modest seaside resort, is considered the entrance to the Huichol underworld. It is the point where pilgrims and tobacco migrants alike leave their offerings and make their petitions to the sea:

'...this western region, where the Father Sun 'dies' each dusk as he descends into the sea for his journey below ground back to his birthplace in the Land of Dawn, is where the souls of Huichols travel initially after death, to join their relatives in a celebration that includes much drinking and eating peyote, before returning again briefly to their old community for a final farewell ...' (Schaefer and Furst, 1996, p6).

In an exchange of gifts, *Tatei Hara'amara* sends rain clouds to the highlands, providing life to the Huichol world (Baez Jorge, 2009).

For many Huichol, picking tobacco is a means of financing their annual pilgrimage to Hara'amara. Others simply take advantage of their proximity to the sea to leave an offering and ask for good fortune. Few make the journey to Nayarit without paying a visit to their mother the sea and to the seaside, combining a fun day out with ceremony because she is the highest deity, able to grant the most difficult gifts and right the most serious wrongs. So the journey to Santiago is as much a pilgrimage as an economic migration, with the latter also a means of financing the former.

The second point of convergence between the harvest and Huichol costumbre is tobacco itself. *Nicotina Rustica*, known locally as macuche tobacco has long been used by American indigenous groups for ceremonial purposes and the Huichol have cultivated this rougher strain of tobacco for centuries, considering it a ‘sustenance’ of deities (Schaefer and Furst, 1996, Diguet, 1992). Tobacco is also considered a bringer of good fortune so a very small quantity of moist tobacco is tied around the wrist of new-born babies, carried in a special pouch on long journeys and attached to the sacred *muvieri* (a feathered arrow or wand ritually made by the mara’akame). Macuche tobacco is also taken on every peyote pilgrimage and deer hunt and every family group represented in the deer hunt carries a *vainúri*, a feathered arrow with string attached symbolising the ‘trap’ set for the deer and to which a small bundle of tobacco is also tied (Lemaistre, 1996, Myerhoff, 1976). The symbolism of tobacco to the Huichol is present in almost every writing and Pachecho, in ‘*Nomas venimos a malcomer*’, an ethnography of tobacco migration, discusses tobacco in relation to maize, describing how the sowing of maize is intercalated with the cultivation of tobacco, one being the food and the other the ‘breath’ of the gods (Pacheco de Ladrón, 1999). So, unlike picking tomatoes, cucumber or even beans, to work on the tobacco harvest is to be involved in the cultivation of a plant that is native to their culture, for although the Wixárika are skilled agriculturalists they grow a very limited number of crops and only a handful of dedicated families cultivate anything besides maize, beans or tobacco.

### **1.2.5 Living, eating and working**

Living, eating and working on the Nayarit tobacco plantations all happens in exactly the same place, under the same palm shelter and on the same soil. Most migrant agricultural labourers in Mexico have access to some sort of accommodation and the National Agricultural Workers Programme runs a network of hostel type accommodation comprising single rooms with shared washing and cooking facilities, or *galera* accommodation, multi-family rooms that can sleep 20 or more people. Many of these are run by the plantation owners in arrangements that have changed little since colonialism. Other

hostels are run directly by the PRONJAG. In Nayarit the programme runs several groups of hostels for sugar cane workers and tomato pickers, some of which have become semi-permanent residences for indigenous migrants from other states. These insalubrious and overcrowded concrete rooms are paid for on a weekly basis. There is no such accommodation for tobacco pickers in Nayarit. These migrant workers have always slept in the open air beside the plantation that they are working on, save a few years when some of the tobacco corporations provided canvas tents, a handful of which still survive.

Santiago has a tropical climate and with the exception of occasional days during hurricane season in October, it is always hot. Rain falls in the afternoons between June and September with little variation. In fact the tobacco harvest months of January, February, March and April are some of the most pleasant of the year, although by mid-March the heat is difficult to bear and by early May when the last of the tobacco is being harvested, it is impossible to work under the midday sun. Many workers bring a mosquito net which they hang from the beams of their palm shelter; some bring their own tent or enough sheets to erect a tent-like room. The Wixárika are accustomed to sleeping outside, few in the Sierra use anything more than a few blankets as a mattress and their homes are mostly partially open, with no panes in the windows and a smoke hole in the ceiling. When they journey between communities to meetings, fiestas, to visit family or to graze their cattle, they travel very lightly with only a sheet or blanket for bedding. As they do at home, these migrant workers gather wood to cook their food using a variety of ingenious outdoor stoves including a tunnel/hole in the ground, purpose-built stand-alone gratings that they bring with them each year or they cook directly on the fire itself. With cooking, washing and accommodation facilities non-existent, they are able to save as much of their income as possible to take back to the Sierra. Essentially, they are working not only to feed themselves but so that they can fulfil their religious/cultural obligations. This dual purpose of their journey to the coast is complemented by the fact that while away from their homes these workers retain their traditional community roles, with mara'akame called upon to heal

the sick and preside over births. Extended families work together and families that are somehow exiled from their communities retain a distance from other comuneros while on the coast.

The other major advantage of these accommodation arrangements relates to the nature of tobacco harvesting and picking. Tobacco picking is paid as piecework, per sarta, string of threaded tobacco. A couple and their children would typically make between 25 and 40 sartas per day and during the tobacco harvests of 2010 and 2011 these were paid at 9, 10 or 11 pesos each (10 pesos has fluctuated at around 80 cents of a US dollar for the past two years). This compares well to *faena* labouring, agricultural work paid on a daily rate of around 70 pesos, for which workers receive only marginally more than the minimum wage. A family of pickers usually begin work at first light, threading the last of the previous days' tobacco while the morning dew dries and by 9am they will have completed their first pick and be taking a break for *almuerzo*, their first meal of the day. Following breakfast and for the hottest part of the day they sit and thread the tobacco they picked that morning, before starting a second pick sometime after their *comida*, their main meal of the day. After sunset the jornaleros will usually light a kerosene lamp and continue threading, often working well into the night. These migrant labourers work these long hours because they are paid piecework, as opposed to a standard daily rate and they are able to do this because they live and work in exactly the same spot.

The Huichol are skilled artisans who produce very fine and delicate works of art using coloured yarn, weaving intricate designs with a loom attached to the waist or embroidering bright patterns. This incredible manual dexterity is part and parcel of their costumbre, their gods like things done by hand and children learn from a young age to prepare the detailed patterns on gourd bowls, weave the morrales that are used to carry everything and embroider the symbolic patterns on their traditional clothing (Schaefer, 2001). Their artwork which began as offerings to their deities has developed commercially over the past decades and large *cuadros de estambre* (yarn paintings), are now sold for

thousands of dollars at galleries in the USA. With such skills and attention to detail it is unsurprising that the Wixárika are valued labourers, at least by the tobacco producers for whom they work (Talavera, 2003).

The tobacco harvest does not pay well but the simple fact of migrating, receiving payment and being in close proximity to abundant sources of food as opposed to the scarcity that characterises so many of their home communities implies that their months of migration to Nayarit generally have a positive effect on food intake. The tropical climate of Santiago produces large quantities of wild food all year round and many jornaleros fish in nearby water sources, pick papaya, bananas, guayaba, oranges, limes and guamuchil fruits and nip into neighbouring plantations for a few ripe tomatoes. Typically the migrant families who were informants for this study ate eggs, beans and tortillas for breakfast, the tortillas being delivered on a daily basis by their patrón. For their main meal of the day they would eat these same two national staples with the addition of a main dish such as thick '*sopa*' (pasta and vegetable soup), fish they had caught in the river, meat or chicken. At weekends most families literally went to town and ate out, sometimes in the roadside fish stalls, the roast chicken eatery, taco stall or at a cheap cafeteria. On their days off they stock up on crates of eggs, fresh vegetables, stock cubes and other dried foods to see them through the week. Their food intake in the coast contrasts starkly to the meals I shared in the valley community in Taimarita where watery *sopa* is made with half a tomato and an eighth of an onion and animal protein is only available when an animal is sacrificed, a chicken has laid an egg or cheese has been made on a nearby ranch. Dried and tinned foods and fresh veg need to be carried for the long journey down and are used sparingly. Although the migrants sorely missed the warm, fresh, handmade tortillas made from their own sacred corn that forms the bulk of their diet in the sierra, these were compensated for by regular fresh vegetables and animal protein. So the living, working arrangements on tobacco plantations suit the Huichol migrant well and they are able to work at a steady pace for the entire day, resting only to prepare and eat food. This arrangement has obvious implications for health and hygiene and in

terms of their potential for contact with agrochemicals but in many ways it differs little from their routine at home.

### **1.2.6 The Huichol migrant on the coast of Nayarit**

The Wixárika have been migrating to coastal Nayarit for many decades and are now a regular feature of the tobacco harvest. As Talavera and Pacheco point out, their relationship with ejidatarios is one of '*compadrazo*' –a term that translates directly as 'godfatherhood' but which in this case refers to a close almost-family type relationship between employee and employer (notwithstanding the fact that in some cases the patrónes *are* actually asked to become godparents of their worker's children). This mutually beneficial relationship sees Huichol families return year after year to the same patrón who, in turn, lends them blankets, invites them into their homes at weekends, 'celebrates' the end of the harvest with beers and food and, in some cases takes in and educates their children (Talavera, 2003). Although the patrónes mostly spoke warmly of the *huicholitos* who had worked for them over the years and many workers spoke well of their employers, this remains a very unequal relationship, defined by the racist undertones that are characteristic of Santiago's community, for this is a region of blue and green eyed mestizo farmers who are eager to distance themselves from their own indigenous ancestry. As the diminutive form *huicholito* suggests, the mestizo patrón undoubtedly considers his employees to be racially and socially inferior to them, making regular reference to their paganism, lack of hygiene, preference for defecating in the open air and giving birth on plantations since '*asi les gusta*' (that's the way they like it). In the town of Santiago where the workers flock at weekends the Huichol are all too familiar with the institutionalised racism of *Tewarit+a* (non-Huichol territory), accustomed to stepping down from the pavement to give way to a mestizo, standing so that a mestizo may sit, being accused of theft and dishonesty and the open and to a certain extent mutual verbal acknowledgement that these

'indios' somehow officially occupy a lower rank<sup>3</sup>. As Liffman describes in his discussion of the violence inherent in racism 'In the stifling fields and sullen, swaggering towns like Santiago Ixquintla where they go to buy food and drink on weekends, indians are the victims of beatings, robberies, rapes, knifings and shootings by townsmen, cowboys and cops' (Liffman, 2011). This was experienced directly by one of my informants when he was thrown into jail for the night after a taxi driver attempted to charge him 160 pesos (instead of the agreed 50), for the short trip from Santiago to the ejido of Botadero. Indigenous labourers in Santiago are quite simply relegated to an inferior status where racial, physical, verbal and economic abuse are morally and extra-legally sanctioned. This status also characterises and is legitimised by the conditions of their employment, where government, employers and tobacco companies alike distance themselves from responsibility for their wellbeing. This racism is both structural and institutional.

#### *Conclusion: Migration-costumbre-religion*

The annual migration to Santiago appears to represent the interplay of symbolic meanings, traditions and habits that make this journey highly compatible with Wixárika lives and costumbre, suggesting a crossing of signs in the association of tobacco with deities and the coast as an extension of Hara'amara, the bringer of health and life. Pacheco de Ladrón and Talavera provide detailed descriptions of how the Wixárika live on the coast, organise their daily lives and combine their costumbre with economic need in a matter of fact manner, how their employment feeds them and their gods through fiestas (Pacheco de Ladrón, 1999, Talavera, 2003). In contrast, Liffman and Schaefer and Furst, writing as ethnographers of Huichol life in the sierra, refer to the combination of pesticides, migrant working conditions and the Huichol in Nayarit as 'infernal pesticide ridden plantations' describing the 'silent assault on their [Huichol workers'] health, their genes and their very lives' (Liffman, 2011, Schaefer and Furst, 1996). The context to which I was witness during my fieldwork in

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<sup>3</sup> The term 'indio', along with huicholito and 'cora' or 'corita' for an indigenous woman retains its racist overtones and connotations of inferiority.

Santiago was not ‘infernal’. It appeared that over the decades these migrant labourers have reached a work-life balance though which some degree of hardship is endured for the greater needs of economic sufficiency, cultural survival and spiritual wellbeing. From an epidemiological perspective their living and working conditions could be classified as unacceptably risky given the lack of hygiene, exposure to agrochemicals, outdoor sleeping, very long working hours and tasks that probably contribute to a series of musculoskeletal, respiratory and other illnesses. These are conditions that also need to be seen from the context of their home lives that are characterised by scarcity, hard manual labour, perpetual viral and bacterial illnesses, difficult access to medical and health care, extreme cold and extreme heat and from within their costumbre. Many of my informants were full time migrant labourers, unable to fulfil their cultural obligations because of the migrant life they lead, yet their months in Santiago stand apart in that while within Teiwarit+a they are also within the Huichol universe and while unable to assist in many ceremonies on the Sierra, they were able to somehow compensate economically and through ritual on the coast. These interconnected relationships between economic survival and cultural fulfilment will be discussed more fully in chapters 3, 5, 6 and 7.

## **Chapter 2 Methods.**

Field work research for this thesis was conducted between April 2009 and April 2011 in two sites: i) the tobacco growing ejidos surrounding the town of Santiago Ixcuintla, Nayarit State, and ii) the traditional Governorship of Tuapurie/Santa Catarina Cuexcomatitlan, municipality of Mezquitic in Jalisco State. Data was gathered in two stages. The first contact took place in Santigao between January and April 2010 and consisted of identification of the population and basic data gathering with *Tuapuritari*<sup>4</sup> migrant labourers; the second 'follow up' stage took place principally in the governorship of Tuapurie between September 2010 and April 2011, where I followed up on migrants in their home communities and ranchos to gather in-depth data. Some follow-up data was gathered in Santiago during the tobacco harvesting season of 2011 with families whom I had not managed to locate in their homes.

### **2.1 Ethical approval**

Approval for this study was granted by the University College London's Ethical Approval Committee in 2008. Previous to this, approval was granted by the Faculty of Humanities (Facultad de Filosofía y Letras), National Autonomous University of Mexico, the principal academic authority in Mexico. Permission to conduct this research was also requested at a local governmental and community level with the Nayarit state Agricultural Worker's Programme (PRONJAG) and the directorship of the Florece Children's Centres.

In November 2009 this research project was presented at the Tuapuire General Assembly by my assistants Juan Antonio González and Rosa María López (hereafter Juan and Rosa), Tuapuritari from the community of Pueblo Nuevo in representation of myself and the Santa Catarina Health Committee. The couple acted as research assistants and translators for the entire project and accompanied me on most of my subsequent field trips. Tuapurie is resistant to

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<sup>4</sup> Tuapuritari is the Huichol name for people from Tuapurie/Santa Catarina Cuexcomatitlán.

researchers because there is a strong community sense that *teiwari* (non Huichol) researchers profit in many ways from their research through academic publications, salaries, promotion, research funding etc. and often give little back. Since the community feels no benefit from the generation of knowledge unless there is a clear and direct monetary or material gain or exchange, they have little incentive to approve projects and researchers have frequently been denied access.

The community was insistent that approval for this research be tied-in in some way to a project that would directly benefit them and could preferably be given a monetary value. After much discussion we were given permission to proceed and this agreement was decisive when asking for individual consent at later stages. Community approval also turned out to be crucial in terms of people's enthusiasm for the research and many participated on the basis of commitment to their community. As a result of this I subsequently applied and continue to seek funding from different sources to discuss the results of this research with the community and organise an initiative for women's health within the community.

Permission was also sought from the Ministry of Social Development of Nayarit (*Secretaria de Desarrollo Social*) for the use of data from the Florece Children's Centres and in order to work with children in the centres. This permission was provided in writing after a personal interview with the Minister for Social Development in the state capital of Tepic.

It was not appropriate to request a signature or fingerprint approved consent from my Huichol informants. Verbal informed consent was requested individually, usually in Huichol, with each participant during stage one of this research (see below). Written agreements with indigenous people in Mexico can have negative connotations and the Huichol could cite numerous recent cases of land or political rights that have been violated though the abuse of written consent (Liffman, 2011, see discussion pp18-30). Emphasis has been put on the

importance of communal discussion and consent for projects, programmes and research relating to indigenous people in Mexico and in particular the use of informed consent processes that are compatible with their traditional forms of communal decision making (Zolla, 2004). The community of Tuapurie is currently fighting the local government over a forged signature that apparently gave community approval for a highway to be cut through the governorship. The case highlights the contradiction between an official need for an individual signature as a form of consent and the community's insistence that this signature is invalid without communal approval and discussion.

To obtain individual consent, Juan and Rosa explained the aims and objectives of the study and requested verbal permission to carry out the interview. This they did in Huichol using an informed consent guide that we had written together and discussed. Approximately five Tuapuritari refused to participate in any stage and others declined to participate beyond the first round of questions. While it is possible that some did not understand the purpose of the study, this response was possibly also offered in order to avoid a direct refusal. I will return to this problem in the section on limitations.

## **2.2 Data collection and sample identification**

This first stage of field work was planned to coincide with the tobacco harvesting season which runs from January to May every year. The purpose of this stage was to identify and begin to gather data with migrant working families from the governorship of Tuapurie. In 2010 three two week field trips were made to Santiago during the harvest season and a further two trips were made in 2011.

### *Sample identification*

The target population of this study was migrant workers from the governorship of Tuapurie who were working on the tobacco harvest during the 2010 season. I aimed to identify approximately forty five people at the first stage and to interview thirty of these people in depth, during the second stage of research.

Approximately five thousand Cora, Huichol and Tepehuano indigenous workers and their children travelled to the tobacco harvest from their highland homes in Nayarit, Jalisco and Durango states during 2010. There is no official documentation of the demographics of this population from which to extract a sample since their work arrangements are informal and they are not unionised or insured, furthermore they move between plantations every few weeks. Each year the Florece centres compile a record of the children who attend their centres recording the name of their *patrón* (employer) and the location of the plantation on which they are working as well as their names, date of birth and locality (governorship and hamlet) of origin. Data provided by the National Agricultural Workers' Programme (PRONJAG) in 2009 suggested that more than 80% of the children who attended these centres are from Nayarit state<sup>5</sup>. This figure probably under represents the numbers of tobacco migrants from the Huichol communities in Jalisco who for political and practical reasons are less likely to enrol their children in the day centres. The study conducted by Huichols and Pesticides (Díaz Romo, 2002) found that 43% of the indigenous migrants in their sample were from Jalisco state, and about half of these were Tuapuritari while 35% of the sample interviewed in a separate study by Pacheco de Ladrón (Pacheco de Ladrón, 1999) were Huichol from the three municipalities of Jalisco (the author does not state what proportion of these are Tuapuritari). Both of these studies relied on opportunistic sampling.

Based on these figures and observational data a rough estimate would suggest that between 10% and 15% of the approximately 4,500 (adult) workers are

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<sup>5</sup> Figure based on raw data provided by the National Agricultural Workers Programme in May 2009.

Tuapuritari. In 2010, these workers were distributed over approximately 6,000 hectares of tobacco in the municipality of Santiago Ixquintla. If these figures are a good estimate, I could expect at least 450 Tuapuritari adults to have been in Santiago at some time during the 2010 picking season. A further complication to add here in terms of sample identification is that few migrants stay for the entire duration of the season and possibly only half or two thirds are in Santiago at any one time during the picking season. As will be explained in more detail in chapter 3, these workers are distributed throughout the ejidos with one, two and occasionally three families working on each plantation. Because of this complex and informal nature of worker distribution and their continual movement, it was not possible to pre-select a sample or randomise and I opted for an opportunistic sample.

It was my aim to identify as many Tuapuritari workers as possible within the three field visits but actually locating them remained a significant problem. My first attempt to systematically sample the ejido of Amapa, moving from ejido to ejido and enquiring, proved extremely disappointing and time consuming. Although some plantations were situated side by side, others in distant isolated locations. This attempt to cover the regions systematically was also interrupted by adverse weather that displaced migrants from plantations for almost the entire duration of the first trip. In keeping with the flexibility of the opportunistic approach and to take advantage of events as they occurred, I eventually settled on two convenience based procedures to identify my sample. These were i) referral: using participant knowledge of the location of other Tuapuritari to identify other families and ii) reliance on existing data: use of data collected at the start of the season by Florece schools to locate Tuapurie families with young children. While these procedures were successful for rapidly locating Tuapuritari families, they introduced elements of bias, as I explain below.

#### *Chain referral identification*

In 2010 the *Florece* centres did not open until early February and data was not available until March, so sample identification began on my first visit using the referral technique, whereby one informant identifies another. This procedure is particularly useful when populations know each other and are interconnected (Heckathorn, 2002, Salganik and Heckathorn, 2004). Sampling begins with the identification of a set of initial subjects who serve as seeds for an expanding chain of referrals (Heckathorn, 2002). We initially identified families by working through patrónes who generally knew who was working where, with whom and where they were from. We then asked each family if they could identify other Tuapuritari families whom they knew to be working nearby. This chain identification was often broken when we were unable to locate a family or when a family was unable to suggest anyone new, at which point we would return to initial contacts made with employers. In February and March 2010 we identified twenty families and couples or single workers using this referral technique.

The major limitation of this procedure was that it weighted my sample around certain communities. Tuapurie is a close knit community; most young Huichol marry within their governorship and often within their extended families. The whole governorship comes together four times a year for its General Assembly and each Agency meets more regularly. Additionally the three ceremonial centres (Las Latas, Pochotita and Santa Catarina) gather for fiestas. Through family ties and regular communal events these families know each other well but are in most contact with other members of their individual communities. Often several families from one community travelled to the pick together and mostly they knew where other members of their community were working. The largest number of participants in this study are from Taimarita, several of these belonging to the same extended family group, a reflection of my early reliance on chain referral sampling. In his study of Wixaritari migration, Talavera (Talavera, 2003) suggests that a very large number of migrants are from a community called Las Guayabas. In contrast I met no-one from this community but found almost the entire population of Taimarita working on the coast.

On cultural, social and economic levels there is minimal diversity within the governorship, the main difference being ‘sierra’ and ‘barranca’, as I explain in Chapter 3. Therefore the bias towards Taimarita and the northern communities would have had little impact on the types of responses I received. It did, however, considerably facilitate stage two of my research when I needed to follow-up each family in their home. With more time and resources and if I had required a larger sample, I could eventually have reached a broader population using this technique but sampling ended when I had reached approximately 45 families and the tobacco season was drawing to a close.

#### *Use of existing data from Florece centres*

On the second and third trips we followed up on families contacted the previous month and were able to identify further Tuapuritari families using data from the Florece children’s centres. These centres are independent schools and day care establishments co-funded by the tobacco industry and Ministry for Social Development (SEDESOL) for the children of migrant workers. Ideally we would have begun the chain referral process with this data, thus giving ourselves a broader starting point, but the data was not available until March by which time the harvest season was well advanced.

There are three Florece schools in the vicinity of Santiago, each of which provided data on all of the children from Santa Catarina who they had on their registers. Each morning shortly after dawn a number of pick-up trucks set off to gather the children who are enrolled at the centres and the drivers of these routes were able tell us exactly where we would find each family. We followed up on every one of the families identified by the Florece schools as being from Tuapurie. Many of these families were already known to us but some were families who no longer live in the Sierra and reside on a permanent basis in Nayarit. Thus we contacted three families who have lived in Santiago for the past four years or more. Although they identified themselves as Tuapuritari at the point of enrolling their children in the Florece schools, there were a number of key issues that set them apart from the majority of my informants. Most

importantly, they were no longer *comuneros*, signed up members of the community of Tuapurie, and had lost the local rights that they once had. During the second stage of research this became a decisive factor when one of the families refused to be interviewed on the basis that they no longer belonged to the community of Tuapurie. As it transpired, their attitude towards some of the *comuneros* who had been close neighbours of them in the Sierra was negative and they did not want to participate in a study alongside people with whom they were in conflict.

Many families do not use the Florece centres, in particular those who do not send their children to school in the Sierra and those who needed their children to work alongside them. The poorest families are least likely to send their children to the Florece centres. However, the data did enable us to identify a different group of Tuapuritari, those mentioned above, and a scattering of families from other communities such as La Laguna and Santa Catarina, that were less likely to have family links with Taimarita.

The final sample of informants with whom I conducted semi structured interviews included 27 tobacco migrants (24 migrant labourers and 3 permanent migrants) of whom 18 were women and 9 were men. Of the total group of tobacco migrants 21 were from valley communities (Taimarita (11), Pochotita (6), Santa Catarina (1), Cajones (1), Aguila Blanca (1), Las Latas (1)), 3 were from the Sierra towns of Nueva Colonia (2) and Pueblo Nuevo (1) and three originally from Pochotita but were permanent migrants living in or near Santiago. Taimarita, Pochotita, Cajones, Las Latas and Aguila Blanca are valley communities. Pueblo Nuevo and Nueva colonia are Sierra Towns (vehicle accessible), Santa Catarina is the political and religious ‘capital’ of the governorships of the same name (Tuapurie in Huichol) and is also vehicle accessible. Amapa and La Presa are tow of the tobacco producing Ejidos within the Municipality of Santiago, Huejuquilla and Colotlan are a foothills towns and San Miguel is a sierra town in the governorship of San Andres.

Key informants included three medical doctors and two health promoters, a Mara'akame and his son, four tobacco farmers and three project workers (associated with the Huichol Health Committee to whom my research assistants were linked).

Informal conversations with other informants were recorded in my field diary. These may have contributed to my overall understanding of the context and research problem but I make no direct or indirect reference to these in the thesis. Table 1: Informant Information gives name, age, place of origin and status of each of the informants cited in this thesis. Details are given alphabetically so that the table serves as a rapid reference resource when reading quotations.

**Table 1: Informant Information**

Name	Age	Community of origin (rancheria)	ML/KI (key informant role)
Angel	Male, 42	Cajones- Aguila Blanca	ML (migrant labourer)
Angelica	Female, 26	La Presa (Pochotita)	PM (permanent migrant)
Angelina	Female, 31	Taimarita	ML
Anita	Female, 33	Taimarita	ML
Carmen (Doctor)	Female, 39	Guadalajara	KI, medical doctor, NC.
Cecilia	Female, 34	Taimarita	ML
Chaparro (Victor)	Male, age unknown	Amapa	KI, tobacco farmer
Cirilo	Male, 60	Pochotita	ML
Don Antonio (Toño)	Male, 46	Pueblo Nuevo	KI , project leader
Efrian	Male, age unknown	La Presa	KI, tobacco farmer
Elvia	Female, 39	Pochotita	ML
Enrique	Male, 35	Pueblo Nuevo	ML
Ester	Female, 19	Cajones	ML
Estela	Female, 35	Nueva Colonia	ML
Felipa	Female , 56	Taimarita	ML
Gabriela	Female, 53	Pochotita	KI health promoter
Galindo	Male, 56	Santa Catarina	ML
Ha+tsima	Female, 23	Colotlan (San Miguel)	KI, project worker
Ignacio	Male, age unknown	Amapa	KI, tobacco farmer
Inés	Female, 47	Cajones	ML
Jorge	Male, 27	Taimarita	ML
Julio	Male, 37	Taimarita	ML
K+paima	Female, 37	Nueva Colonia	ML
Leocadia	Female, 31	La Presa (Pochotita)	PM
Leonardo	Male, 40	Pochotitia	ML

Name	Age	Community of origin (rancheria)	ML/KI (key informant role)
Lola	Female, 36	Pochotita	ML
Lucia	Female,	Taimarita	ML
Luciano	Male, 34	La Presa (Pochotita)	PM
Manuel (Doctor)	Male, 49	San Andres	KI
Marisela	Female, 28	Nueva Colonia	KI Health promoter
Marta	Female, 68	Taimarita	ML
Maria	Female, 39	Nueva Colonia	ML
Mauricia	Female, 52	Taimarita	ML
Maximo	Male, 39	Taimarita,	ML
Micaela (Doctor)	Female, age unknown	Nueva Colonia	KI, Travelling doctor based in NC.
Olivia	Female, 26	Taimarita	ML
Otilia	Female, 35	Las Latas	ML
Ramon	Male, age unknown	Amapa	KI, tobacco farmer
Ricardo	Male, 19	Pochotitia	KI, son Mara'akame
+tuama	Female, 37	Pueblo Nuevo	KI, project worker
Tutupica	Male, age unknown	Pochotita	KI, mara'akame

### 2.3 Methods

This study used mixed qualitative methods to investigate different aspects of the questions of how indigenous Huichol migrants understand the relationship between pesticides and reproductive health (see Table 3 below). The principal method used was ethnography. This anthropological approach was chosen to explore the wider context and deeper issues associated with people's understanding of pesticides and the body, or as Nader describes it, 'an attempt to understand how the people studied, see and account for their world' (Nader, 2011). In this sense it is an approach to research as well as a method (Reading et al., 2009). Ethnography is in itself a mixed method approach to research and within this concept I used participant observation, recording details in a series of field diaries and in depth interviews. This ongoing ethnographic approach to data collection was complemented during stage one with a short questionnaire and participatory methods that would inform the second stage of research.

**Table 2: Data collection methods**

	<b>Stage one: initial contacts and exploratory research</b>	<b>Stage two: follow-up</b>
Location	Mainly tobacco plantations	Mainly sierra
Time periods	Jan-May 2010 & 2011	April 2010-June 2011
Methods	Observations, recorded in field diary	
	Short answer questionnaire	In-depth interviews using topic guide
	Freelisting	
	Photovoice	

### 2.3.1 Ethnographic methods

#### *Participant observation*

Participant observation aims to gain an in-depth understanding of a relatively small group of people and their practices through intensive involvement with the group and their environment, often for an extended period of time. The method, more than a simple observation of a group of people, implies involvement and participation in the group's activities in order to experience something of how the people of interest live (Reading et al., 2009, Madden, 2010).

Large proportions of my time in the field were dedicated to understanding how the Tuapuritari live-in and understand their world and how this affects their understanding of reproductive health and pesticides. This required me to attend rituals and fiestas, travel to and from some of the most remote valley communities on foot, participate in agricultural activities on the coast and in the sierra and to organise my research activities around the complex context and, at times, almost insurmountable difficulties of *sierra* (highland) and *barranca* (valley) life<sup>6</sup>. As I discuss in detail in Chapter 3, living conditions in the Sierra

<sup>6</sup> As I will describe in more detail in the following chapter, in *Tewarit+a* –the name used to refer to anywhere outside Huichol territory- the Huichol refer to their homeland as 'la sierra', or

are difficult and logistics were complicated most of the time. The journey to some communities required two days travel from the nearest mestizo town with no reliable means of informing people that I would arrive. This inevitably resulted in what could be considered failed missions. One such event occurred when I visited Cajones, a community on the opposite side of the valley. On this occasion my assistants and I were driven from San Andrés to a middle of nowhere spot about an hour's hike from where we believed we would find the sierra home of an informant, only to discover, on arrival, that she had left a month earlier. We had been expecting to sleep at her ranch for the night and our transport back would not return until the following day. These 'failed missions' were in fact a rich source of ethnographic data as I learned not only the realities of sierra living but how this affects people's patterns of migrant labour and their health related decisions. It soon became clear why decisions are made in an instant, planning is virtually impossible, one must always expect the unexpected and how influential the natural environment is over human life and activities. The woman we had arranged to interview was one of the informants whom I had accompanied on numerous occasions to hospital while we were in Santiago. On her way to the coast she had fallen and fractured her wrist, but did not see a doctor until she reached the hospital in Jesús María where they put her arm in plaster. After working for only a few days in Santiago, the strain of picking and threading tobacco began to irritate her arm so she removed the plaster, but soon afterwards began to suffer the consequences of a fractured wrist that had set badly. This woman's story and her hospital visits gave me the insight to understand the tensions between meeting basic needs and attending to health concerns combined with the real difficulties of access when you are a migrant who speaks only very basic Spanish.

While on the coast I also spent many days *conviviendo* (socialising/spending time with others), spending time with my informants on their plantations,

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*j+ritisie* in Wixárika. But once in the Sierra they differentiate between 'sierra', the high mountain plateau regions and 'barranca' the communities that lie at different levels down into the mountain valleys. On the whole the highland plateau or 'sierra' communities are accessible by vehicle while the barranca can only be accessed on foot or animal.

preparing food, threading tobacco, accompanying them to clinics, generally talking informally about life on the coast and in the sierra, making connections between people and communities and learning about the meanings and practicalities of reproduction among migrant families. I could see and understand how these migrants live and why they choose to live this way, particularly in light of their sierra lifestyles. Accompanying them on hospital trips revealed the complexities of accessing health services and I witnessed the racial, social and economic discrimination they suffer in dealings with governmental institutions. In short, these long periods of participant observation helped me to understand the relationships between Tuapuritari and their community, why they make certain decisions relating to health and wellbeing, moreover, what health and what work means to them as a culture and as a community.

#### *In depth interviews*

Delicate issues such as reproduction and maternal health practices along with the unusual topic of pesticides were difficult to access via the informal route of participant observation. So that I could explore further the understanding of pesticides and reproductive health, I conducted more than twenty semi structured, in-depth interviews using an interview guide. The interview checklist (see annex) was initially designed to be conducted on a one to one basis, but this proved difficult. Several of the women I met were not prepared to be interviewed without their husband's consent or presence and in reality the interview often became a three or four way discussion between myself, my research assistant or assistants and the wife and/or husband of each family, sometimes with children or other family members listening-in. In total I conducted 21 in depth interviews, eleven of these with women on their own, five with men alone and five interviews were conducted with the couple (and sometimes other family members). Following up on my informants was more complicated than anticipated, as being migrants they constantly move around spending little time in their homes. My initial aim had been to conduct these interviews in their sierra homes but this was often not possible. The locations of

these interviews is further demonstration of their migrant lives: thirteen interviews were conducted in informants' barranca or sierra homes although the husband was often not home; two interviews took place during a fiesta in Taimarita, while the recently sacrificed cows were being processed; seven interviews were conducted in Sanitago, three during 2010 and four during the 2011 picking seasons- of these three took place on the plantations and four were conducted in public spaces. One interview, with the woman who had not been at her home in Cajones when I visited, was eventually conducted in the plaza of the foothills town of Huejuquilla el Alto.

Interviews were conducted using a checklist which began with questions about births, children, reproductive history and any health problems she/he or the couple had had in relation to reproduction and maternal child health (MCH). No term for 'human reproduction' exists in Huichol, the translation used referred to birth and pregnancy and when translated into Huichol we actually asked about 'health or problems, during or with pregnancies or birth'. Interviewees were then asked what they thought the main problems were *in their communities* in relation to these issues.

The second set of questions asked about what they thought women and men needed to do for a healthy pregnancy and healthy baby and whether they thought there was anything they should avoid doing or do differently during pregnancy. The third section asked specifically about pesticides. We asked this first in a generic sense: did they know whether the use of pesticides presented any health risks? Then we specifically asked whether they thought there was any way that pesticides could affect an unborn child or interfere with the reproductive process. If the answer to this question was positive we then asked how they thought this might happen, *how* pesticides could reach an unborn child and *what* the effects of this might be. This latter part of the interview was contextualised within the use of pesticides in commercial agricultural production since most families who work on the tobacco also work on other crops and within the use of pesticides in the sierra. The final question asked

what people thought the most pressing needs were in terms of reproductive and maternal child health in their communities.

The duration of the interview was between 20 and 50 minutes, depending on the depth of information provided. Most interviews were conducted in Huichol. I would ask the questions first in Spanish then my assistants would translate, often referring back to me for clarification. Responses were given mostly in Huichol and my assistants would translate the answers back to me in Spanish. Although Juan and Rosa provided translation for the majority of my interviews, for some I was supported by my Huichol teacher, Totupica. His cousin Tuunulima, a primary school teacher from Nueva Colonia, also accompanied me on one interview in Nueva Colonia.

With the exception of two, all interviews were recorded using a digital voice recorder. These were then transcribed directly into Spanish on the same day. The transcription/ translations were later checked for accuracy by my Huichol teacher who also accompanied me on some trips, acting as translator for a number of interviews. Translations to Spanish and finally to English retain original grammatical and linguistic inaccuracies.

### **2.3.2 Other stage one methods**

Short answer questionnaires, freelistings and photovoice were used during the first stage of this research as ice-breakers, to inform the second stage tools and as a simple means of gathering basic demographic data about the Tuapuirtari population in Santiago (see annex for questionnaire in Spanish). The data gathered using these methods was not intended to directly address my research questions but an un-invasive means of exploring general concepts of health and wellbeing with informants who knew me little. They also give me pointers in terms of how I should pitch my later research question.

*Short answer questionnaire*

The short answer questionnaire was used to obtain basic demographic information about the Tuapuritari migrant population in Santiago, locate their working sites and identify suitable informants for subsequent stages of research. The questionnaire consisted of three sections, 1) current location and situation: details of where and with whom the person was working and observations on the type and conditions of their accommodation, 2) Origins: who they were, where they were from and who they were travelling with, and 3) Work history: work related information and history including current pay , information on where they slept, obtained food and washed and whether their children attended the Florece day centres. All responses were recorded by hand on separate questionnaires.

### *Freelisting*

Freelisting is a participatory form of data collection that has been successful for exploring sensitive concepts and understanding how these are referred to in other linguistic and cultural setting (Davies, 1999, Ross et al., 2002). This method has also been successfully used for identifying local disease terminology (Peltzer et al., 2006), and for identifying cultural meanings and explanations of illness that are useful to public health and from an ethnographic perspective (Garro, 2000, Cove and Pelto, 1993). A freelisting exercise was used during stage one to gather information on the types of illnesses relating to maternal, child and reproductive health that these migrant workers are familiar with. Participants were asked to name illnesses in four different categories: general illnesses, childhood illnesses, illnesses relating to the process and organs of reproduction and illnesses/conditions relating to pesticides. After each 'list' they were asked to describe the possible causal factors for these illnesses. Responses were recorded by hand as given (in Huichol or Spanish). Many names of 'huichol' illnesses were given, some of which have no translation to Spanish, similarly some terms were given directly in Spanish. Names of huichol illnesses were later discussed to identify meanings and interpretations.

### *Photovoice*

During stage one of this research I also piloted the use of ‘photovoice’ with several family groups and individuals. This method involves asking participants to take a series of photographs with a disposable camera on a specific theme with the aim being to later discuss why specific photos were taken and what they each mean (Bonfil Batalla, 1996, Krieger, 2008). Photovoice has been particularly successful as a tool for generating participant interest and involvement in research, particularly with marginalised groups who are distrustful of the motives of researchers (Castleden et al., 2008, Carlson et al., 2006). In total I distributed cameras to all willing family groups that I contacted during February and March of 2010, with the instructions that they should photograph aspects of their daily life that are related in some way to their health. In total I distributed 8 cameras, mostly to the families with whom I had had most contact.

While these approaches generated little data about my research question they served well as an entrance point to the in-depth stage of research, producing useful data on people’s conceptions of health and wellbeing that would inform the second stage. The short answer questionnaires generated the data on location that I needed for mapping the second stage of my research. Data on Huichol illnesses that were generated using the frelisting exercise was my first insight into the types of illnesses that my informants were familiar with. The list of Huichol illnesses was translated and served as a reference in subsequent discussions. While the results of the frelisting exercise were of varying success in terms of the objective of understanding how informants view the relationship between their migrant life and their health, the process raised the question about causality for the first time when in answer to my question *‘What are the main causes of these illnesses?’* informants would reply *‘I don’t know, you will have to ask the mara’akame’* (see discussion of this in chapter 5). For the photovoice exercise migrants mostly took pictures of the social arrangements of their migration. This enabled me to see aspects of their life on the coast that I would otherwise have been unable to witness. I do not draw on this data in my analysis or discussion and it did not add significant detail to understanding to

my research questions but the photographs did serve to validate my own observations in the field. All of the informants who participated in this exercise seemed to enjoy it and were pleased to be given the photograph thus the exercise also served to help me gain their trust.

### **2.3.3 Data collection -process**

The first stage of data collection consisted largely of sample identification, exploratory research (interviews, photovoice and frelisting) described above, and participant observation. These methods were purposefully rapid and non-invasive and I spent the bulk of my time firstly locating and secondly observing and conversing with participants. Visits to plantations were intercalated with institutional visits to hospitals, the PRONJAG and Florece children's centres. During this stage I also conducted a smaller number of short interviews with pesticide sellers, asking what they knew about the risks of pesticides and in particular how they might affect women's health. Since I expected sellers to be well informed this data proved useful as a marker against which to read the knowledge and understandings of informants and their employers, but the exercise was not intended to inform my research questions and for this reason it is not included in my data analysis.

My research assistants and I were based in Santiago for the whole of stage one and were usually accompanied by a guide who knew the ejidos and patrónes well and was able to help us locate specific plantations.

The bulk of my ethnographic data was gathered during the follow-up period. This second stage of this research consisted of visiting the contacts I had made in Santiago, in their communities and ranchos of origin and the purpose of this stage was to know the homelands and homes of these migrant workers so that I could explore the Wixárika world view, study how sierra living effected their understandings of reproductive health in the context of migration and how they conceived of the use and effects of pesticides both on the coast and at home. The people/couples I interviewed for stage two were distributed across several

different communities within Tuapurie: Nueva Colonia (2), Pueblo Nuevo (1) and Santa Catarina (2)- all accessible in vehicle, and the valley communities of Las Latas (1), Taimarita (7), Yakapista/El Roble (Taimarita) (3), Cajones (2) and Pochotita (3). As I explain in Chapter 3, in reality the Wixárika do not live in communities but in extended family ranchos or *kiekari*, small groups of one roomed houses usually arranged in a circle along with a shared kitchen and *xixiki* -the families' sacred house. Some families live completely alone in a *kie* (single house ranch). Nueva Colonia and Pueblo Nuevo are the two largest communities in Tuapurie and many families have a small house (*ki*) which they use when 'in town' and family ranch (*kie or kiekari*) somewhere down the barranca which they use for ceremonial purposes and when they are cultivating or grazing their animals. Most of my interviewees had given me details of how to reach them in their *kie/kekari*, as this is where they spend most of their time when in the sierra and stage two consisted of a series of two to three week trips to the sierra within which I travelled from one *kie/kekari* to another on foot, mule and public transport.

Tuapurie is divided by a long valley referred to as the *barranca*. Taimarita is located at the lowest point of this valley, fifteen minutes uphill from the river of the same name. At the highest point of the sierra to one side lies Pueblo Nuevo, accessible by an extremely unreliable thrice weekly community bus service that takes about six hours to travel 80km (See Figure 1: Map of study region). At the highest point of the sierra to the other side of the barranca is Nueva Colonia, served by a slightly more reliable daily bus service that takes around four hours to travel 70km. From Pueblo Nuevo one walks to Pochotita and Santa Catarina while from Nueva Colonia one can walk down to Taimarita, Yakapista/El Roble and Las Latas, (Tuapuritari walk everywhere. I tried to reduce the distances I would need to cover on foot to a minimum). Cajones, located on a plateau facing the barranca of Taimarita was easier to reach from the neighbouring governorship of San Andrés. Thus my field trips were divided by the barranca and I made two trips to either side and one to San Andrés. Juan and Rosa

accompanied me on the trips that I took from Pueblo Nuevo and San Andrés and I was assisted by Totupica, my Huichol teacher, on the trips from Nueva Colonia.

The logistics of planning these trips were always stressful and very time consuming. Travel arrangements were expensive, complicated and fraught with uncertainty. Community bus services travel to and from Huejuquilla, the foothills town in the highlands of Jalisco State from where one ‘jumps off’ to the sierra and the town which the Wixárika frequent if they need to buy medicine, deliver a baby by c-section or travel on to any larger towns. Bus services are generally unpredictable. While most of the time they leave late or not at all, on the day the clocks went back one hour the bus to Pueblo Nuevo left Huejuquilla ‘on time’, one hour early, with my backpack and provisions on board while I was nearby waiting for the time to pass. On this occasion I was fortunate to be with a young Huichol friend who managed to persuade an acquaintance to drive me at top speed to catch the bus, which had left nearly half an hour earlier. Anecdotes relating to these journeys abound and on this particular field trip I kept a record of each time the bus stopped, the reasons for stopping and the period of time we waited. These included the driver stocking up his supply of cold beer, the starter engine falling off, a scheduled half hour beer and toilet stop, one of the back tyres flying off, the minibus overheating and waiting for the driver to return with cold water from the waterfall to cool the engine down, allowing animals to pass and the routine stop in Tenzompa, the small mestizo town one hour from Huejuquilla, where local women get on the bus to sell homemade food.

Suffice to say that there were usually numerous delays on each journey and it was necessary to make provision for unforeseen circumstances as these inevitably occurred. These logistical feats were in themselves a very rich source of ethnographic data. An example of this was the invitation I was given to a fiesta being organised by several of my informants in Taimarita, the date of which had shifted several times over a period of two months. Witnessing and participating in the attention to detail and accuracy that the process of

organising these fiestas involved really brought home to me the intensity of belief. Until then I had naively assumed that Wixárika fiestas were more about maintaining tradition and custom than about genuine belief in their power of the ritual. During the fiesta I had planned to conduct three interviews but as the event progressed and the preparation for killing of seven cows consumed day after day I also began to realise how profoundly important these events were, for Huichol health and wellbeing and how insignificant to them my research project was.

The ethnography of my second stage of field work provided multiple sources of data, one of which was the actual interviews, another the casual conversations held with the many informants who shared their homes with me and accompanied me on foot to hidden kie and a third, being with and observing people. The participation and observation in what to the Wixárika are routine events and circumstances have multiple and profound meanings in terms of my interpretation of other sources of data.

## **2.4 Reflexivity**

Ethnography is not informed by scientific principles that seek objective and generalizable results but gains its validity through the construction of thoughtful and appropriate methodologies, systematic gathering and interrogation of data and the thoughtful presentation of material (Madden, 2010, p24). Central to this process is reflexivity, ‘turning back on oneself, a process of self-reference’ (Davies, 1999, p4). This essentially refers to the awareness of the influence that the ethnographer has on the study, the people studied, selection of topics and the processes of data collection and writing-up fieldwork. The starting point of this reflexivity is an appreciation of one’s own positionality. To this study I bring a multidisciplinary background in public health and social sciences that motivates me to seek data and conclusions that are both theoretical and applied, a point to which I will return in chapter 4. Having lived for many years in Mexico and with a longstanding concern for the

country's indigenous people I bring a politically and socially motivated interest in the Huichol, one defined by my knowledge that this population has been served centuries of injustice and exploitation. From a theoretical perspective my academic training was influenced by feminist critical theory, hence I seek to understand the underlying, distal causes and influences while at the same time identify explanations that can be addressed through policy and programmes. Thus my own position is multiple: I seek to critically analyse the influences on Huichol understandings of reproductive health and pesticides while also identifying realistic practical solutions to improve their wellbeing.

When I began my fieldwork in the sierra the governorship's ban on pesticides had recently been lifted. While outwardly this might suggest that pesticides had become a political issue, this was not in fact not the case, and I did not encounter strong or politicized opinions for or against the ban. Even so, in terms of this issue I was cautious to situate myself in a neutral position and did not discuss the ban. I could see the need for pesticides in the dry arid sierra communities and for pest control in the fertile tropical valley but was also aware of their effect on drinking water and the potential for their misuse and mishandling leading to intoxications. Although Patricia Diaz and the Huichols and Pesticides NGO had been my entrance point to this issue, I distanced myself from her while working in the field, stating only that I knew her and her organisation. Patricia had in fact been 'imprisoned' in the community for several hours on her previous visit for supposedly arriving 'uninvited' to an important religious fiesta (according to her version of the story the 'friend' who had invited her refused to admit that he had done so until the inebriated Governor who had imprisoned, her actually threatened to have her thrown out). I was aware that her involvement with the community had become political in various ways. In addition to her pesticide activism and moral attitude towards the chemicals she had paid for the studies of several Huichol medical students, a favour that had also tainted her reputation through generating envy. Involving oneself in internal sierra politics would have earned me a one way ticket home and for this reason I also avoided, where possible,

discussions about gender equality (see discussion of this issue in chapter 6). While the use of pesticides was not itself a sensitive issue in the sierra, asking questions about reproductive health was delicate. Although I approached this cautiously, previous events in the community had left their mark. In 1985 a book titled 'Violence, drugs and sex among the Huichol' was published by the prestigious National Institute of Anthropology and History (INAH). The author, Miguel Palfox Vargas, had been one of the first rural teachers to work in the sierra and on his return he wrote this book. In doing so he dirtied not only his own name, but that of the INAH and anthropology itself. As Schaefer states in her ethnography of Wixarika women, '...this book is a very slanted version of Huichol life and intends to draw its readers into the sensationalist topics...' Schaefer does not refer to his work because of 'the questionable reliability of his text and his complete disregard for discretion as well as moral and ethical responsibilities as a researcher. Literature such as his serves only to perpetuate prejudice and misunderstanding about Wixarika culture'. The book, which I came across in a library of the UNAM, gives a sexually explicit description of a scene with a young Huichol girl, part of a storyline in which several named individuals and families are linked through extramarital relationships. The case of this book was retold to me on numerous occasions in the Sierra by means of an explanation for why anthropologists, in particular, are disliked.

Thus I was fully aware that the community had reason to be suspicious of me. Not only did they not know me, but they had reason to distrust me. This distrust may in part explain some of the silences that I received in response to my research questions. While, as I mention at the beginning of this chapter, I was cautious about not aligning myself with government or any group that the community considered their 'enemy', the simple fact of being a teiwari and asking questions raised suspicion. This would inevitably impact upon the data that I was able to gather.

## 2.5 Limitations

The first important limitation of my data is that this is limited to and biased by the people I interviewed, a selection influenced by my own and my informant's positionality within the sierra. While I maintained good contact with health workers and anthropologists while working in the sierra, and many of my informants identified me with these groups, my principal link became the Huichol Health Council to whom my research assistants Juan and Rosa were attached. This is essentially a community based non-governmental organisation supported by the Regional Institute of Public Health based at the University of Guadalajara. Through this group I negotiated community consent and while on the coast my assistants initiated discussion with potential participants under the banner of the 'Huichol Health Committee'. How people viewed this group was important in terms of whether or not people consented to participate and the details my informants were prepared to provide was influenced by who we were and where we were placed within the community. I was also assisted in the second stage of my research by my Huichol teacher, Totupica, whose 'banner' is his well respected family including the head teacher of Nueva Colonia's primary school. This, combined with his own training in animal husbandry enabled him to elicit deeper and more complex information than Juan and Rosa. Although Totupica did not accompany me to the coast for the initial sample selection, he influenced the fact that I worked more intensively with informants from the barranca community of Taimarita where his mother was born and members of his extended family continue to live.

Both stages of this research presented a series of logistical and practical limitations that strongly influenced decisions I made regarding data collection, sample selection and research methods used. The Wixárika are an indigenous group, to this day considered to be one the least acculturated or *mestizado* of all native Mexican communities. This issue is discussed in more detail in the following chapter, but of concern here are the limitations attached to working with a very non-western culture and a community of people who have lived

through centuries of ethnocide, exploitation and political subjugation. Madden, in ‘Being Ethnographic’, his guide to the Theory and Practice of Ethnography, discusses a series of problems associated with ethnographic research with non-western cultures, most of which I experienced in the course of my fieldwork (Madden, 2010). I have divided these problems into issues associated with i) language and culture, 2) politics and privacy issues and 3) practical and logistical.

### **2.5.1 Language and culture**

I began learning Huichol in 2009 during the formative stage of this research. Wixárika belongs to the Uto-Maya family of native American languages (Iturrioz Leza, 2006). The language is relatively isolated, sharing a proportion of vocabulary with the neighbouring Cora and to a lesser extent Tepehuano communities but incomprehensible to other Mexican indigenous groups. Non-Huichol scholars began ‘writing’ the language during the 1980s, around the time that western education systems arrived in the sierra and there are now a handful of linguistic studies (Santos Garcia, 2008, Iturrioz Leza and Ramírez de la Cruz, 2012, Iturrioz Leza, 2006) none of which use the Tuapurie branch of Wixárika. In spite of scholarly research and development the language has remained essential oral and is not used in a written form within their communities. Basic education should be bilingual but Huichol children never really learn the written form of Wixárika: once they learn to read and write they do this in Spanish which is the written language that is used by Huichol authorities and at General Assembly, although the oral language is very much alive. Wixárika has an exceedingly complicated and distinct language structure making it very difficult to learn; for example, objects have a number of different forms depending on where they are located, adjectives such as ‘tall’ or ‘low’ have different forms depending on the objects they are describing, there is not a clear cut division of tenses and the sentence structure and vocabulary are completely different from either Spanish or English. This is before we add in the complications of a different world view where corners, the colour brown and trees do not exist: there are of course no natural ‘corners’ in the sierra where

homes were originally oval shaped, the colour brown is covered by diverse shades of greens, blues and yellows and the Wixárika know the native word for every type of tree that exists so they have no need for a generic form. Totupica, a recent graduate of veterinary studies at the National University of Mexico (UNAM), was a keen educator and had taught written Wixárika as a bilingual primary school teacher before he began his degree, but we had very little to go by in terms of linguistic and grammatical aids. By the time I began fieldwork I could use basic sentences and pick out the theme of a conversation but mostly I did not follow details of what was being said, making me heavily reliant on translators and my interviewees' basic use of Spanish.

### *Translation*

Most of the migrants I worked with spoke at least some basic Spanish: about half spoke the language relatively well and some, including one of my most valuable informants, were almost completely monolingual. Most of the time I was accompanied by either Juan and Rosa or Totupica and although most of my informants made an effort to communicate with me in Spanish some of the time and I was able to conduct a small number of interviews entirely in Spanish, the majority of my research was conducted through one of my translators. Thus the issue and problem of translation was omnipresent. While Totupica is completely bilingual, could translate with a very high degree of accuracy and understood the finer details, aims and objectives of my research, this was not the case with Juan and Rosa. My research assistants finished secondary school in the *telesecundaria* (rural secondary school system taught principally through television programmes) of Pueblo Nuevo and their Spanish is considerably less accurate and articulate than mine. When we began working together I spent considerable time discussing my research with them, talking about the issues I was researching and teaching them about maternal child health (MCH), but their knowledge of these issues remained weak. We discussed the translation of concepts such as 'reproductive health' and MCH in detail and they did become skilled at explaining these issues in Wixárika, but I suspect that there was always a degree of discrepancy between what I asked in Spanish and their

translation to Huichol, a suspicion that was confirmed when I had their written translations checked by Totupica. This discrepancy was in part due to the absence of vocabulary. The Huichol of Tuapurie has no direct translation for many parts of the anatomy that are used in the process of reproduction which are not considered vulgar. Thus there is no word for vagina or penis, fallopian tubes, ovaries, testicles or sexual intercourse. To some extent these can be referred to by describing their use and it was possible to describe the uterus as the 'place where the baby grows', there is a generalised concept of the 'place the baby comes out of', but this does not differentiate between vagina, cervix or any other part of the female sexual anatomy. There are no specific terms for spermatozoa, ovum or embryo although these could be described in terms of their role as human seeds and the beginnings of life. This was a problem I discussed at length with Totupica and which he in turn, cautiously, discussed with fellow Tuapuritari. I was in fact given a copy of a manual of Huichol for medical use that had been written by a (non-Huichol) team working in San Andrés. This contained a series of words for sexual organs but both my research assistants and Totupica agreed that it was unacceptable to use these words in Tuapurie.

When it came to the transcription of my interviews at first I worked directly with Juan and Rosa. I had instructed them to translate the interviews to me verbally word for word while I typed them up. Sometimes they worked alone first, writing down the Spanish version which they recited back to me later on and we checked with the audio recording. I insisted and clarified each time that I needed a word for word translation of everything that was said. I took their word for it that the translations had been exact but asked Totupica to check the transcriptions for accuracy. As it turned out, not only had my assistants shortened virtually every answer, providing an edited version of what people were saying but they had also completely omitted many sections of conversation. The final transcripts of interview were almost twice as long as the original versions. It became clear to me that neither Juan or Rosa fully understood what the purpose of this research was and in fact the concept of

'research' was to some extent strange to them. This was an issue that I contemplated on many occasions, only to reach the conclusion that while they were not skilled translators, from a political perspective they had played a crucial role and at the time there was no-one better placed or more skilled who was able to replace them.

### *Language and world view*

The Huichol language developed within the confines of the sierra and just as there is no word for 'corner', there is no native vocabulary for any item that originates outside the sierra, from food and clothing items to technology, political roles and systems. There are a number of words in Huichol that, over time, have been incorporated into their language from Spanish and have become *huicholised* over centuries, clear examples of these are the words for cow, horse and donkey, *waka*, *cawayo* and *purito* in Huichol and *vaca*, *caballo* and *burro* or *burrito* in Spanish. Conversely, there are many names for different types of grazing grass and grass at certain times of year, for many different stages of corn growth and types of rain. Essentially Wixárika reflects a very different world view, social relationships and interactions with a very particular environment and world that includes spirits of dead ancestors, sacred animals and plants, as I will explain in the following chapters. It is also an extremely dynamic language that is currently in the process of rapidly incorporating Spanish and even English terms. These changes mirror the cultural processes that the sierra is experiencing as every year greater numbers of young Wixárika chose to study outside the Sierra and go on to obtain university degrees, set up home in the foothills towns of Huejuquilla, Colotlan and Mezquitic or migrate to the cities of Guadalajara, Zacatecas, Tepic, Mexico and El Paso, Texas. Tuapurie lives an existential conflict with itself and its people, torn between maintaining its powerful traditions and lifestyle, retaining their children who have qualified as lawyers, nurses and engineers and controlling the continual exchange of goods, values, services and culture that flow into and out of their community. As a teiwari researcher there was suspicion that I would, on the one hand, somehow steal some of this cultural capital and on the other, introduce ideas

into people's heads, thus contributing to an acceleration of this potentially destructive aspect of cultural dynamism. Thus I was a potential threat and one that people did not really understand or trust.

In the course of my research a number of other cultural/ linguistic complications came to light that were highly relevant to the topics of this study. *Uaye* is the Huichol term for medicine. The same word is also used for pesticides. Thus one ingests uaye or puts it on a sprained muscle, uaye is used to inoculate children and uaye is spread on fields to eradicate pests. The generic nature of uaye leads one to wonder to what extent this term influences the way each type of uaye is understood, particularly when some forms of uaye are curative and others are highly toxic. The use of uaye for pesticides can be explained by the fact that these uaye 'cure' crops of disease -pests. Yet here I am interested in understanding pesticides as harmful. I will discuss these linguistic problems in further detail in the following chapters.

#### *Forms of communication*

The other key communication problems related more generally to the manner of speaking or, more precisely, asking questions. Madden retells a conversation between Evans-Pritchard (EP) and Cuol, one of his informants, cited in *The Nuer* in which not only does Cuol not seem to tune into EP's form of asking questions but positively appears to avoid answering and leads EP down a completely different avenue of conversation using what the author describes as 'skilful deflections and counter-questions' demonstrating 'concern about the ultimate use of the information' (Madden, 2010, p69). The author goes on to describe how during his fieldwork he found that 'direct questions can be considered rude and discomforting in many social settings'. These are all concerns that I faced very directly in the process of my research. My questions were frequently received with silence. A silence that reflected many and multiple concerns on the part of my respondents: an uncertainty about why I wanted this information and what I might do with it, a discomfort at sharing information with someone they knew little or not well enough, an unwillingness to share information with

me in front of others and not feeling in any way compelled to answer. While I always endeavoured to conduct interviews in spaces where we would not be interrupted, more often than not this was not possible. 'Private space' is simply not conceived of in the same way by the Huichol. In the sierra, space is communal, homes are mostly inhabited by extended families and it is inconceivable to ask someone not to listen in, or to leave because we are holding a 'private' conversation. While my interviews mostly did not attract large number of onlookers, conducting an entire interview in private was more a matter of luck and chance than planning. Furthermore, simply asking for a private space to conduct an interview would itself have awakened a series of other concerns. In common with the issue of requesting written consent, taking Huichol people into a private space to talk to them alone is attached to a series of negative connotations regarding manipulation, coercion, corruption, use of force and intimidation to obtain information, signatures or votes. Usually I settled for seeking a quiet time and location where we were less likely to be interrupted, often in people's houses or patios. The interviews I conducted in Santiago took place in a variety of spaces including the homes of employers, a quiet *comedor* (canteen) or the plantation itself.

As is usually the case with ethnographic research I adapted my forms of question as the interviews progressed, being guided by my research assistants as to how to or how *not* to ask certain questions. It soon became clear that certain forms of question came across as intimidating. For example when I asked 'why' women had not been to ante-natal appointments at the health clinic or 'why' they had decided not to seek help from a medical doctor this was frequently taken as an incrimination and Huichol women and men are accustomed to being told off and intimidated by health workers. I also became accustomed to the multiple means of '*sabe*' a term that translates directly from Spanish as 'to know' or '(he/she) knows' but frequently implies an unwillingness to respond. On one occasion the teenage daughter of one of my informants responded with silence when I asked her what her name was. After asking for a second time I turned to her father and asked him his daughter's

name, to which he retorted ‘sabe’. On this occasion we joked about the possibility that neither father nor daughter knew the girl’s name, but generally ‘sabe’ was a conversation stopper, abruptly ending conversations. In a general sense the Huichol are uneasy with direct questions and do not feel morally or socially obliged to respond. It is not considered rude to simply ignore someone’s question or request for information, least of all when this person is a teiwari. The interview dynamic simply had to adapt to and incorporate these ways.

### **2.5.2 Politics and privacy**

Obtaining community permission or consent to work in Santa Catarina required that I first approach intermediaries, cultural mediators who knew people within the political structure of Tuapurie and secondly, agree to a series of conditions. In this sense it was also necessary to make political and strategic decisions regarding which teiwari groups I worked with during my field work and both anthropologists and government health workers are treated with suspicion. The issue of cultural theft is omnipresent, enshrined in the belief that the Wixárika have intensely rich culture and traditions that others wish to exploit. There is clearly some truth in these concerns and my problem was how to negotiate around them so that I could safely and ethically gather data.

#### *Political correctness*

In spite of approval of my project by the General Assembly I was constantly on trial and at times felt under surveillance, particularly when visiting ceremonial centres and during fiestas. My final visit to the valley community of Taimarita was to attend a fiesta being organised by several of my informants and which was attended by many people I had interviewed. I had been personally invited by one of the organisers and I was accompanied by Totupica whose own family were also participating. The rhythm, as with all Huichol fiestas, was extremely intense. The scene was stunning, set in the depths of a deep green valley with clear blue skies and mountains towering above, held among a circle of adobe huts, coloured with the bright patterns and shapes of Huichol traditional dress

and adorned with layers of intricately handmade offerings. I was anxious to know whether I would be allowed to enter the *xixiki* (ceremonial house) where most of the offerings were displayed and where the ceremony would take place, or take photographs. Entering the *xixiki* proved to be more straightforward than I had expected and I was quickly invited in soon after the ceremony started. On the very first day I asked my host whether I could take photographs. Being unsure, she decided that it would be best to ask Maximo, also one of my informants and the leader of the ceremony, but neither could Maximo give me an answer, suggesting I consult the *Agente*, administrative leader of the community. The *Agente* replied that he would need to ask the elders. Two days later and after some drinking the husband of my host approached me and told me that earlier that day, around the fire, the elders had discussed whether it would be alright for me to take photographs. They had agreed that it would be, so long as I did not use a video recorder, so 'go ahead, take as many photos as you like' he told me. I was in fact asked if I wouldn't mind taking some photos inside the *xixiki*.

It was not until I received the second or revised translation of my interviews that much of what my informants said and thought about me came to light. My assistants had played a politically sensitive role, electing not to tell me what my informants had said about me in Huichol during the interview –quite rightly playing on the team of their community rather than mine. During the second stage of interviews some of my informants had commented, in Huichol, that they did not know why I wanted this information, thought that they had already told me all these things, weren't really sure if they wanted to talk to me and that they had spoken with others about this. One woman commented how, while she was on the coast, several fellow Tuapuritari had refused to talk to me as they didn't know what I wanted or who I was and didn't really trust me. During data collection I explained, repeated and sought different words to describe the purpose and objectives of my research, usually mediated through one of my assistants. Some of my informants said how they thought this was really important, that there were many health problems in the sierra and it was

good that someone was concerned about them and wanted to do something. Many confessed that they didn't know if they could be of any help as they didn't really know about these things but that they would tell me what they could. Some began their interview on a negative tone which I did not learn about until later.

Treading with extreme caution was also necessary in the sierra and I worked at all times on the principle that it was better to stay put than to advance. At times people surprised me with their openness, on other occasions I was uncomfortable and unsure whether I was welcome. While certainly I took fewer photographs and asked fewer questions than I would have liked, probably this was the only politically and ethically correct way of working.

### **2.5.3 Practical and logistical**

Many of the practical and logistical problems that this fieldwork evoked have been described above. The issue of transportation and movement within the sierra was always difficult. I lost count of the number of buses that broke down somewhere en route and working with sierra time and uncertainty was foreboding, always giving me the impression that something was going to go wrong, which it usually did. But these were only some of my logistical problems. Other issues also affected the complications of data collection, ultimately limiting what was going to be feasible and how much I would accomplish.

After completing stage one of my research I mapped the locations of my informants and assessed the feasibility of actually being able to follow them up in the sierra. The study conducted by Huichols and Pesticides (Díaz Romo, 2002) managed to follow-up fewer than half of their baseline participants and the first decision I made, for practical reasons, was only to follow-up families when there was more than one informant living in the same community. I also excluded a number of informants on the basis of limited initial contact and finally I excluded several families from a difficult to reach community after I had

been advised that these were 'permanent' migrants who rarely return to their homes.

Another key deciding factor in the planning of my second stage was the central fact that all of my informants are migrant labourers and therefore most of them spend large proportions of the year working away from the sierra. There is a clear pattern to the year of Wixárika migrant labourers. When the tobacco harvest finishes in April or May some head briefly south to Michoacán to pick melons then they must return to their communities to prepare their land for sowing. This period is intercalated with a series of rituals and fiestas related to the agricultural cycle which continue until the end of the summer. June to September is rainy season. During this time the sierra is difficult to navigate, buses are less reliable, many vehicle and foot routes become impassable, one of these being the stepping stone river crossing to Taimarita where the community is cut off for some time every summer. By September when the rains begin to subside, migrants begin to head off again. By the second week of November they are back in the sierra as it is time to pick their maize so they are in the fields, often an hour or two's walk from their home. Then in January or sometimes as early as December, wishing to catch the end of the coffee picking season, once more they head off to Nayarit. This cycle of migration, agriculture and ritual left me with few weeks of the year within which I actually had a good chance of finding my informants in their homes and they themselves had warned me of this. Sometimes I found the whole family, often only the wife and sometimes no one at all was home.

There are no hotels in Tuapurie save a couple of grubby rooms for rent near the bus stop in Nueva Colonia that opens onto a patio full of vicious dogs. This lack of accommodation meant that mostly I did not know where I was going to stay, with the exception of Pueblo Nuevo where I was always accommodated in the purpose built project house run by Juan's family. It was necessary to travel fully equipped with bedding and food and I needed to be prepared to walk long distances: Taimarita is a six hour hike down into the valley, growing hotter and

more humid as you descend. Into my logistics I needed to organise the purchase of food in Huejuquilla and to carry large quantities of cash -paying someone to drive you in or out of the sierra in an emergency does not come cheap- as well as carry clothes for two climates, the sub-zero temperatures of the sierra at night and the sweltering heat of the valley during the day. There were also smaller potential threats to be accommodated mentally or logically; the lack of any form of communication or medical care in the valley communities, sleeping in close vicinity of Durango scorpions, black widow spiders and less life threatening beasts such as the omnipresent rat and tlacuache, not to mention several members of the canine family.

None of these practical complications were insurmountable. I quickly realised that things would rarely go as planned, that I needed to seize opportunities when they arose, always allow plenty of time and prepare a contingency plan. The final limitation to my fieldwork and one which affected both my trips to Nayarit and to the Sierra was the sudden increase in drugs related violence in the area. Organised crime and the violence that goes with it have been on the increase in Mexico since around 2005. By 2010 when I began stage one of this research drugs related violence was an everyday occurrence which had long since begun so spill south into more central and southern states. Nayarit and Jalisco had always been on amber alert. In April 2011 after a clash between armed forces and drugs militia close to Santiago left 30 dead, violence increased dramatically. There were numerous confrontations involving bespoke armoured vehicles in the foothills communities of Mezquitic and Colotlán, and cartel militia seized control of the access highway from Fresnillo as well as roads throughout the state of Zacatecas. Throughout the region schools and government offices were closed and soon afterwards the University of Guadalajara announced that it would cease all activities in the region for foreseeable future. These events effectively drew a line under my data collection trips bringing my field data collection to a close.

## **Chapter 3 Context.**

The two contexts that this study spans are physically close but culturally quite distant. The Sierra Madre Occidental, home to the Huichol as well as Cora and Tepehuano communities, is one of Mexico's most stubbornly indigenous enclaves, boasting a social geography termed 'a region of refuge' and 'deep Mexico' by distinguished Mexican anthropologists Gonzalo Aguirre Beltrán and Guillermo Bonfil Batalla (Bonfil Batalla, 1996, Aguirre Beltrán, 1991) in recognition of the cultural, social, historical and geographical particularities that set these communities apart from mestizo Mexico. In contrast, Santiago Ixquintla is a typical rural agricultural town still forging its own identity through a continual process of mestizaje as the local population shift between their humble peasant origins, annual cycles of migration to southern USA and constant interactions with both indigenous migrant workers and their own more cosmopolitan family members who have fled to the cities of Guadalajara, Mexico, Juárez and the 'other side' of the US border in search of opportunity.

The Wixárika have their homes in the Sierra, but the people who are the focus of this study are migrant agricultural labourers who spend a large proportion of their year working in different regions of Mexico, mostly only returning to their homelands to sow their *milpa* (cornfield) and participate in ceremonies. The purpose of gathering data in both contexts was to understand how the Huichol cosmovisión or world view and their experience as migrants shapes and influences their understanding of pesticides and reproductive health. While the migrant experience and context of living and working on tobacco plantations in Nayarit clearly influences their understanding of these issues, it is mediated through a very different lifeworld marked by a history of exploitation, territorial conflict, ethnocide and poverty and shaped by traditions and customs that revolve around agriculture and religious meaning, shared with a community of spiritual ancestors, sacred animals and a geography of deities.

### **3.1 Framework for the determinants of reproductive health**

In this chapter I will describe both these contexts and the factors which potentially influence both their reproductive health outcomes and their understanding of these. These are organised in terms of a framework for the determinants of health understandings and draw on both public health and medical anthropology, broadly divided into the ‘proximal’, ‘intermediate’ and ‘distal’ (Krieger, 2008, Reading et al., 2009) influencing factors. These determinants are all situated within a framework of structural violence, a position that describes how social arrangements and structures affect people unequally, constrain agency and discriminate against marginalised groups. Structural violence emphasises the historical and political nature of institutionalised social arrangements, placing emphasis on colonialism, race and historical power structures that, to use Farmers words, *put people in harm’s way* (Farmer, 2006, p30). In this chapter I will focus on the contextual factors that put the Huichol people in harm’s way as well as the cultural, historical and social factors that continue to shape their beliefs and understandings about health.

There is a general consensus in public health on the ‘proximal’, mainly individual level, factors that influence reproductive health outcomes and that the ordering of these differs between contexts and populations. Most research agrees that education and knowledge, family economy or socioeconomic level, place of residence (rural/urban) and individual behaviours are important proximal determinants (Bhatia and Cleland, 1995, D’Souza et al., 2011). At this level I am also placing two key determinants that are central to this population and which I will explore in greater depth: i) Huichol ethnomedicine, this cultural knowledge about wellbeing is present to some extent in every cultural group, but plays a more important role among indigenous people where a deeper level of medical pluralism usually exists (Aguirre Beltrán, 1994a, Campos, 1992, Littlewood, 2007); and ii) the context of tobacco farming in Nayarit.

Some authors talk only of ‘proximal’ and ‘distal’ while others also use the term ‘intermediate’. This middle level refers to social and community factors such as gender, culture and beliefs, spirituality and environment. These elements are central to frameworks that seek to understand indigenous people’s health because they generally live within a subculture of national society. Numerous studies discuss the importance of spiritual wellbeing to indigenous people (Koenig, 2007, Durie, 2004, Williams and Sternthal, 2007) and intertwined with culture and spirituality among indigenous people are the role and status of women. Gender is a determining factor on multiple levels since women’s bodies are the principal space of reproduction and they are the agents of knowledge about this within a family, transmitting cultural and gender specific information about biological and cultural reproduction to future generations. For Farmer gender is an ‘axis’ of structural violence, an institutionalised form of inequality within societies and cultures that compounds other factors (Farmer, 2005). The environment and geography also operate in multiple ways since these, for indigenous people, have a deep rooted relationship with their culture and identity and through these channels with their wellbeing. They also have a direct impact on these lives because indigenous people live in such close contact with the physical environment, both as migrant workers and in their homes. overlapping with and influencing proximal factors such as working conditions and housing.

The distal determinants are national and international events and structures. Since the population of interest is an indigenous group it is useful to draw on critical medical anthropology and studies of minority group health to define these. Brown (in Singer) refers to ‘social relations of exploitation’, as the ‘macroparasitic’ causes of health while Reading and Wein talk of colonialism, racism, social exclusion and self-determination (Singer, 1990, p182-3), (Reading et al., 2009). These are echoed by Durie who has researched the determinants of

Maori health and cites the history of colonisation leading to a pattern of 'loss of culture, loss of voice, loss of population and loss of dignity' (Durie, 2004).

### *A context of structural violence*

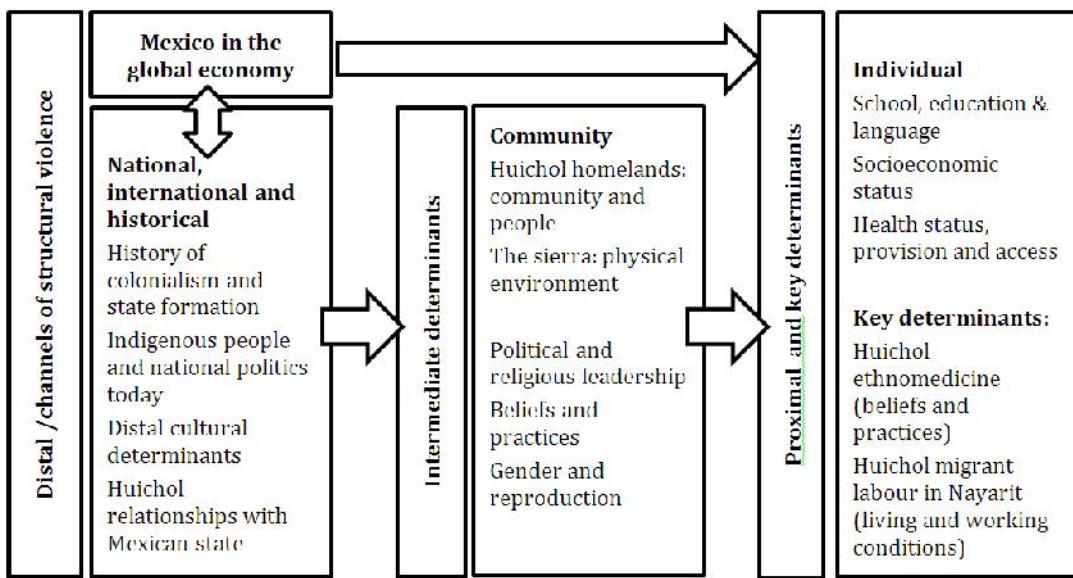
How these 'distal' factors influence the proximal factors and in turn health is encapsulated in the concept of Structural Violence. Singer approaches this distal level from the world economic system, suggesting that the 'macro level political economy' is inseparable from micro-level factors. His approach, like that of Scheper Hughes and Farmer is to understand health within 'the larger political and economic forces that pattern interpersonal relationships, shape social behaviour, generate social meaning and condition collective experience' (Singer 1990 p181, Farmer, 2005, Farmer, 2001, Farmer et al., 2006, Scheper-Hughes, 1992). I will discuss the concept of structural violence as a tool for understanding how these distal national and international institutions and relationships affect the individual in more depth in Chapter 4. Here the relevance is its position in a framework for explaining how distal national and international political and social relations and institutions that affect people's understanding of reproductive health.

A starting point for understanding the context of structural violence within which the Huichol live and work, is the history of exploitation and oppression to which this and all Mexican indigenous groups have been victim since the Spanish Conquest. Their current social and economic relationships with the state are historically determined and have become *structural* in the form of institutions and power relationships through which indigenous communities relate to mestizo Mexico on all levels, a relationship mostly characterised by extreme inequality. This unequal and racist structure was legitimised by the conquest, became institutionalised at independence and compounded under neoliberal policies of recent decades. Whilst recent socio-political events have had some positive impact, the culture of exploitation and racism remains. It is

knitted into the state structure and social fabric through welfare hand-outs, agricultural working conditions, health and education provision.

Structural violence is evident on all levels. As is illustrated below, these structural injustices are mediated through gender, culture, community relationships, geography and environment, the intermediate determinants of health understandings. They also directly affect the proximal or individual determinants: general health status, education, socio economic status and place of residence. This chapter will begin by looking at structural and distal factors, the national situation and history of the Huichol people.

**Figure 3: Framework for the determinants of understandings about pesticides reproductive / maternal child health**



### 3.2 Distal determinants: Mexico and the context of structural violence

#### 3.2.1 Criollos, mestizos, Indians and the formation of Mexico

It is a tall order to briefly describe Mexico. This Latin American giant, the largest Spanish speaking country in the world with nearly 110 million inhabitants, is one of the most culturally and geographically diverse nations on

earth. As unequal as it is diverse, Mexico is characterised by contrasts and extremes where in the suburbs of Mexico City and Monterrey extreme poverty exists, often within metres of extreme wealth. Ultra-modern architecture in the Santa Fe business district of Mexico City, an area inhabited largely by the descendants of white Europeans, is juxtaposed with corrugated iron shacks, precariously balanced on the crumbling rock faces only a few meters away, where migrants from poor rural and indigenous regions of Mexico are trying to make a new life.

In 1492 when Cristobal Colón and his shipmates equivocally stumbled across an island of what is now the Bahamas on their search for a sea route to India (thus the origin of the term ‘indians’ to refer to America’s native people), Mexico was home to a population of approximately 11 million. Thanks to fertile land, a tropical climate, the domestication of maize and strong political and social organisation, central and southern Mexico had seen the rise of the Mayan and Aztec empires and the Aztec capital of Tenochtitlán had become one of the largest cities in the world (Díaz Del Castillo et al., 1844). However it took the Spanish only 3 years to conquer Mexico (1519-1521), and before the 16th century was over, the native population had been decimated to an estimated 2.5 million (Thomas, 2004). The people who escaped massacre, disease, enslavement and forced integration mostly survived by fleeing to mountains, forests and deserts in search of safer lands. In the process many ethnic groups divided or journeyed in separate directions. Some settled in close vicinity to other groups where they shared mountain ranges and forests. Fishing peoples moved to the hills, people who lived on the plains fled to deserts and as they migrated, they met others along the way. These were the ancestors of Mexico’s sixty two contemporary indigenous groups. The persecution and ethnocide that they suffered during the conquest and subsequent centuries of colonialism explain why these people who once thrived in the finest and some would argue, most advanced civilizations of their time in the world, came to inhabit the most remote and unfertile geographies of Mexico, regions that today are barely able

to support even a subsistence economy [see for example (Aguirre Beltrán, 1991, Bartolomé, 1997)].

Mexico eventually gained its independence from Spain, alongside most of Latin America, in 1810 and was ruled for the first 100 years by *criollos*, the second and subsequent generations of Spanish immigrants, as a dictatorship. One hundred years later, in 1910, this post-colonial regime was overthrown by a peasant uprising lead by revolutionaries Emiliano Zapata and Pancho Villa and the modern constitutional republican state was born. One of the major challenges of this new republic was the formation of a shared identity and thus post-revolutionary Mexico drew up a plan for Mexican cultural unity based on the mestizo. This was a model that did not contemplate the survival of the nation's indigenous populations as separate cultural groups. The plans for creating a national identity in fact drew heavily on pride in the great Aztec and Mayan civilizations and the idea of Mesoamerica as the historic interconnected cultural region that gave origin to today's Mexicans. However, as has been recognised in Mexican anthropology, this pride in ancient cultures is at variance with a contempt for surviving indigenous peoples, as if these latter groups were unrelated to the former (Cordova, 1977, Baez Jorge, 2009). Effectively the concept of a national identity did not include the survival of indigenous groups but the formation of a mestizo nation through the incorporation of these *indians*, a term with connotations of racial inferiority, into the Spanish speaking working classes.

The post-revolutionary period also saw wide-scale redistribution of land and the creation of communally owned ejidos that were the starting motors of Mexico's inward orientated model of development, guiding the economy through to the 1980s. Between 1929 and 2000 the country was governed by what became known as the 'perfect dictatorship' (Vargas Llosa, 1991). One single political party, the Partido Revolucionario Institucional (PRI), ruled Mexico for seventy years. For five of these seven decades, aided by income from a newly nationalised oil industry, the country saw continual growth and

development, generating resources for the formation of state run social security institutions and the network of Ministry of Health hospitals and health centres. These decades of modernisation and development also saw a period of rapid population growth reaching a total fertility rate (TFR) of 7.5 at its peak in 1965, a time when the national population was increasing by 3.5% year on year (Martinez, 2000). Between 1930 and 1980 the population of Mexico grew from 20 to 64 million, doubling in size from 34 to 68 million in the 1960s and 70s (Tuiran, 2002). Yet this high fertility rate only tells half the story for it masks the expansion of a huge urban-rural divide in terms of population and development. The agricultural state of Nayarit has one of the highest fertility rates in the country and the town of Santiago Ixcuintla is characteristic of a trend for very large families where, during the 1960s it was not uncommon for women to give birth to more than fifteen children (Lopez, 1989).

By the 1980s Import Substitution Industrialisation was grinding to a halt and under pressure from an unserviceable foreign debt, that culminated in the 1982 'debt crisis' the PRI, by then under the dictatorship of IMF Structural Adjustment Policies, turned abruptly to Neoliberalism, a political ideology the country has followed ever since (Babb, 2001, Gledhill, 1995).

### **3.2.2 Indigenous people and national politics**

"One day I tried to convince them to live somewhere else, where the land was good. "Let's leave here" I said. "We can find somewhere else. The government will help us".

They listened to me without batting an eyelid, looking at me from the depths of their eyes from which only a tiny light shone out.

"You say the government will help us teacher? Do you know the government?..."

And, you know, they are right. That man only remembers their existence when one of their boys has done something wrong down there. Then he sends for him from Luvina and they kill him. Other than that he doesn't know they exist".

Juan Rulfo. *Luvina* 1953.

When Rulfo wrote these lines, he could not have imagined that they would continue to so precisely describe the relationship between indigenous people and the Mexican state, sixty years later. Mexico is home to approximately 13 million indigenous people speaking sixty-two languages, making this one of the most ethnically diverse nations in the world. Most of Mexico's indigenous population continue to live in isolated regions that are poorly communicated and difficult to access and this geographic, cultural and social isolation from mestizo Mexico is reflected in far higher fertility and mortality rates that are more than double the national averages, even in rural areas (Comision Nacional para el Desarrollo de los Pueblos Indigenas, 2012, Comision Nacional para el Desarrollo de Pueblos Indigenas, 2010). The majority of these groups live in areas of 'extremely high marginalisation' (a government category based on income) and poorer all round health and educational indicators. Maternal mortality in Mexico which averages MMR 62.8/100,000 on a national level is twice as high in rural compared to urban areas and many times higher among indigenous people than the mestizo poor (Freyermuth, 2009, Observatorio Mortalidad Materna, 2012). Ethnicity specific statistics do not exist, but maternal mortality is highest in the three states with largest indigenous populations, reaching an MMR of 138/100,000, more than double the national average, in the state of Guerrero. The National Population Council estimates that indigenous women are three times more likely to die of maternal causes than mestizo women (Observatorio Mortalidad Materna, 2010). Infant mortality is also highest among indigenous groups, according to the United National Development Programme (2010 data), nearly twice as high among indigenous communities, averaging 17 deaths/1000 nationally and 28 in indigenous communities (Garcia Chong, 2010, Zolla, 2007).

There is a plethora of anthropological literature examining the reasons behind the extremely high marginalisation and poor health indicators among Mexico's indigenous people (Lenkersdorf, 1996, Bartolomé, 1997, Rovira, 2002, Freyermuth Enciso, 2003), although this was perhaps best articulated by the

discourse of the indigenous Zapatista movement in their first declaration to the Mexican government.

'We are a product of 500 years of struggle: first against slavery, then during the War of Independence against Spain led by insurgents, then to avoid being absorbed by North American imperialism, then to promulgate our constitution and expel the French empire from our soil, and later the dictatorship of Porfirio Diaz denied us the just application of the Reform laws and the people rebelled and leaders like Villa and Zapata emerged, poor men just like us. We have been denied the most elemental preparation so they can use us as cannon fodder and pillage the wealth of our country. They don't care that we have nothing, absolutely nothing, not even a roof over our heads, no land, no work, no health care, no food nor education. Nor are we able to freely and democratically elect our political representatives, nor is there independence from foreigners, nor is there peace nor justice for ourselves and our children. But today, we say ENOUGH IS ENOUGH'. (Ejército Zapatista de Liberación, 1994)

The Zapatista Army of National Liberation (Ejercito Zapatista de Liberacion Nacional, EZLN) that emerged on 1<sup>st</sup> January 1994 in the state of Chiapas, historically Mexico's poorest state, sparked a nationwide resurgence of indigenous movements and armed rebellions and widespread intellectual and political debate about the nation's indigenous people (Neil, 1998, Turok, 1998) (and see for example Revista Chiapas between 1996 and 2000). The EZLN had a deep and far reaching effect on indigenous communities, triggering violence, political change and a redefinition of indigenous identity on a national level. In the aftermath of the armed rebellion this was characterised by counter insurgency warfare and the partnership of indigenous leaders with respected intellectuals that resonated internationally. High level articulation of the indigenous cause in Mexico, parallel to growing militarization and counter insurgency warfare in the southern state of Chiapas saw a reorientation of identities as ethnic groups throughout the country adopted a new-found pride in their indigineity, turning the previously derogatory term *indio* into a label to be proud of (Bartolomé, 1998, Regino Montes, 1999).

These intellectual, military and paramilitary interventions in Chiapas continued throughout the 1990s, the remainder of the PRIs years in office. When in 2000, after many decades of fraudulent elections, the PRI was eventually forced to relinquish its grip on power, this was not driven by a call for social and economic equality, but a rejection of the corruption, authoritarianism and political repression that the PRI had come to symbolise (Gutmann, 2007). While this political change saw an end to the dictatorship, it did not bring social improvements. The National Action Party (PAN) who have held the presidency ever since, brought a further turn to the conservative right, driving neoliberal free-market economics, foreign ownership, privatisation and the establishment of unqualified business style management into governmental institutions on the basis of a clientelistic political philosophy that differs little in practice from the PRI's barefaced corruption (Meyer, 2005)<sup>7</sup>.

When the PAN came to power, the 'indigenous problem' was at the top of the political agenda and the party quickly and significantly changed the official attitude to 'development' for indigenous communities. This sideways step saw a movement away from straightforward state-led *assistencialismo* (welfareism/charity) development towards a more capitalist concept of development: economically exploiting indigenous communities with the aim of making these financially viable. These changes took place largely through the transformation of what was the Instituto Nacional Indigenista (INI), into the Comisión Nacional para el Desarrollo de los Pueblos Indígenas (the National Commission for the Development of Indigenous People, CDI). In contrast to the INI's role of providing solidarity programmes, promoting indigenous culture, the CDI would focus on developing these communities economically, in a sense a return to the 1920s integrationist policies that saw the indigenous future as mestizo. This capitalist approach to the 'indigenous problem' works in unison with the PAN's clientelistic version of Neoliberalism, the underlying motive

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<sup>7</sup> At the time of this research Mexico was governed by Felipe Calderón for the National Action Party. By the time of printing the PRI had returned to power under a young Enrique Peña Nieto, a clear return to old style governance. It has yet to be seen what changes this will bring for Indigenous Mexico.

being to promote the economic exploitation of indigenous people and their lands to make way for private capitalist investment. For the Huichol of Jalisco this has materialised in the form of tourism development, the construction of highways and communications infrastructure. Essentially, the CDI aims to integrate Mexico's indigenous communities economically, ignoring their cultural specificity. A turn away from the more anthropologically focused INI. Funding has increased for small business projects and access to education outside the sierra while being cut back for community development (Fajardo, 2003). In true free market fashion the PAN intends to deal with the *el problema indígena*: poverty and marginalisation leading to social unrest, by incorporating these communities into the margins of the national economy and working classes rather than enabling endogenous community development.

### **3.2.3 Huichol communities and mestizo society**

About half of the Wixárika population live in just over four thousand square kilometres of what is legally considered their territory, indigenous communities and ejidos, both communal forms of land tenure, although the ceremonial territory over which they wish to possess rights and concessions is vast, stretching from Wixikuta to Hara'amara (Neurath, 2003b). In the 1990s Mexico signed up to ILO convention 169 'The rights of indigenous and tribal peoples', which grants indigenous people limited political autonomy. Included in this treaty are cultural rights, such as the right to consume and transport the hallucinogenic peyote cactus, and territorial agreements that grant them rights over most natural resources in their territory. Díaz Polanco defines autonomy as 'a special regime that configures its own government for certain member communities which thus choose authorities who are part of the collectivity, exercise legally attributed powers and have minimal capacities to legislate their internal life and administer their affairs' (Díaz Polanco, 1996). They also have a degree of sovereignty over law and order within their territory and can impose their own forms of justice over many domestic conflicts and crimes, excluding

murder<sup>8</sup>. Polygamy is endorsed and incest is tolerated while those who attempt to practice evangelical religions or are considered to be profiteering from the community or its resources are likely to be exiled and lose their status of *comunero* (Pacheco de Ladrón, 2002). This semi-autonomy is extremely problematic from a gender perspective. Crimes such as rape are grey areas. Women are violated too frequently yet rape is rarely recognised within the community, a reflection of their position within Huichol society. A Wixárika women would not dare and possibly would not be permitted by their influential male (father or husband) to take their complaint to the police (Lira, 2013).

The Huichol community has on-going and at times never ending land disputes with local cattle farmers and ejidatarios (Liffman, 2011). It is not only the borders of their territory that are disputed but in recent years the imposition of Federal government infrastructure, notably electricity supplies and highways. Of particular prominence is the planned construction of a highway that would connect Nayarit with Jalisco passing through the governorships of San Sebastian and Santa Catarina. In the latter of these communities authorisation for the construction of this highway was obtained through bribery, circumnavigating the official Huichol decision making process of the General Assembly. While San Sebastian has now approved the highway this has been halted on the borders of Santa Catarina and the case continues at the International Court of Human Rights (Ojarasca, 2007, Godoy, 2007) . Effectively, the state and its representatives consistently push the boundaries of Huichol territory and autonomy, possessions that the Huichol unceasingly defend. In April 2010 on their return from the peyote hunt a group of peyoteros from Santa Catarina were stopped, arrested and fined by municipal police for picking and transporting an illegal substance. Fortunately the group were armed with mobile phones and immediately contacted activists in Mexico City and Guadalajara who mobilised legal support. Within a matter of hours the

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<sup>8</sup> There is no policing of the sierra, this is a role taken on locally by topiles (an unpaid role within the traditional government). State police are called in occasionally but usually only when the crime involves a non Huichol.

peyoteros were on their way (Vera, 2007). On this occasion the municipal police were unfortunate, the group of peyoteros were none other than some of the highest ranking mara'akate from Las Latas/ Ker+wita, possibly the most celebrated, protected and traditional community in the sierra. Other less well connected groups may not have been so lucky.

Reports of this nature abound for affronts of cultural, communal, territorial and human rights are on-going and as a result the Wixárika are antagonistic towards any representations of the state within their territory. Government authorities are required to use the platform of the General Assembly for any issues that need to be discussed with any of the four communities. These issues are dealt with swiftly and the representatives are despatched forthwith so that the Assembly can get on with discussing internal issues without eavesdroppers. Tuapurie takes its autonomy seriously using its authority to control what goes on within its boundaries, often to the very limits of legality.

### **3.2.4 Distal cultural determinants: written and unwritten Huichol history**

Indigenous folklore, as opposed to culture, continues to be an important tourism selling point but only inasmuch as it does not impede free market economics. In this sense the Huichol are one of Mexico's most poignant ethnic groups: prized for the continuity of their ancestral traditions but forgotten in terms of health and social welfare. This contradiction between cultural value and social neglect is played out in social history and reinforced by the structuralist focus of anthropologies that have dominated ethnographic research of this group. The Huichol have probably existed as a separate ethnic group since the mid 6th century (Weigand, 2000). In the 500 or so years that have passed since they gathered, separated or merged, the language they now speak has become largely unintelligible to their neighbours. The Gran Nayar displays all the characteristics of what the Aguirre Beltran classically termed a 'region of refuge', a geographically and politically remote, inaccessible and at times inhospitable location, which by its very nature offered protection, security

and a place of refuge for its displaced inhabitants (Aguirre Beltrán, 1991). That said, whether the Sierra Madre Occidental was actually a place of refuge for the Huichol, or whether the Wixárika are decedents of people who are indigenous to these mountains, is an issue still debated by historians and anthropologists of the region (Furst, 1966, Neurath, 2002, Weigand, 2000, Liffman, 2011).

The debate about origins to a certain extent reflects differing cultural-political approaches to the study of Huichol history. The more archeologically based perspective (Weigand, 2000, Liffman, 2011, Fajardo Santana, 2007, Neurath, 2002) focuses largely on physical findings and is coupled with a belief in the Huichol people's unfailing ability to adapt and change in constant exchange with close and distant cultural neighbours, while basically preserving their cultural matrix. The contrasting perspective is mainly driven by the study of myths (Myerhoff, 1976, Furst, 1966, Schaefer and Furst, 1996). The link between myth, historical-mythological figures/deities and historical events is entirely believable and seems in fact to explain some key Huichol traditions.

The archaeological-cultural perspective does not seek to establish a precise geocultural origin but rather works on the hypothesis that the Huichol ethnic group is a far reaching mixture of past and present native Mexican peoples. The Tatuutsima Museum in Huejuquilla el Alto charts the history of prehispanic settlements in the north of Jalisco, a region known as Chalchihuita (and the people as Chalchihuiteños), describing how early populations abandoned the sacred Cerro del Huistle as long as 2,000 years ago, in favour of the Sierra, which the curators describe as 'a region of refuge par excellence, [and] of successful cultural resistance'. The journey through Chalchihuita history goes on to describe how the Sierra became a passage to the north as various indigenous groups travelled through on their journeys to places as far away as Arizona, each leaving behind and travelling on with elements of their own and Chalchihuita culture and land. Both Neurath and Weigand take as given that the Huichol are descendants of Chalchihuiteños making reference to archaeological findings that date back to before the conquest (Neurath, 2002,

Weigand, 2000) . In his chapter on prehispanic historical formations of the region, Neurath describes how ‘open to interaction with the outside, [the Huichol] have jealously conserved their land and traditions’ (Neurath 2002 P61). He emphasizes how the Sierra cultures cannot be understood without considering their vicinity to the coast, being a net importer of basic products, one of the most significant being salt. This assertion would seem to be supported by present day practices and the spiritual importance of the coast to the Wixárika, for whom the Pacific Ocean forms one of the five cardinal points of their culture.

In contrast to the predominantly archaeological version of events, a group of North American anthropologists identify one clear historical origin, largely through the analysis of mythological places, people and stories. This version claims that the Huichol are most likely direct decedents of the Guachichil (citing also a likeness between the names Huichol and Guachichil) who migrated from the desert of San Luis Potosi sometime in the early 16th Century, possibly fleeing in the aftermath of the Conquest (Diguet, 1992, Schaefer and Furst, 1996). This version is upheld in part by the annual pilgrimages to the desert of San Luis to gather the sacred hallucinogenic cactus bud, peyote. Central to this convincing mythological-historical composition is the continued importance of the deified ancestor Great Grandfather Deertail (Maxa Kwaxí) to Huichol culture. Through the analysis of myths and revision of historical documents Myerhoff and later Furst claim that Maxa Kwaxí is in actual fact the present day mythological appendage of Majakuagy, the legendary historical person who led the Wixárika from Wixikuta (the sacred peyote hunting ground in the desert of San Luis Potosi State) to their current home in the Sierra. Rather than emphasising their ability to adapt and change, this perspective sees the Huichol as a culture under siege (Schaefer and Furst, 1996), toying with the idea that this indigenous community must be preserved in the museum-like sense. This mythological-historical legend gives sustenance to the present day cultural

importance of peyote, not native to the Sierra, just as Neurath's emphasis on the key role of the coast is evident in present day Huichol society.

These different ethno-historical and cultural-political perspectives do not necessarily contradict and are possibly both true. There is incontrovertible archaeological evidence that people have inhabited the Sierra for more than a millennium. It is also quite plausible that at some point after the conquest, a small group of Indians seeking refuge from Spanish bloodletting or hostile natives journeyed from or through the desert eventually finding a safe haven in the Sierra Madre Occidental, where they went on to mix with the ancestors of the people who are today known as the Huichol, or Wixárika, giving sustenance to both historical angles.

The importance of this debate lies more in the points of convergence than the disagreements, since the determining factors are issues of perspective rather than fact. Fortunately most Huichol ethnohistorians and anthropologists do agree on three key points:

- (i) There is no evidence that the Huichol existed as a separate cultural and linguistic group before the conquest.
- (ii) The Wixárika share cultural similarities with actually existing indigenous groups of Mesoamerican origin such as Nahuatl groups of Central Mexico, with ancient Mesoamerican cultures such as the Chichimecs, and with northern 'aridamerican' present day indigenous groups such as their close neighbours the Tepehuans and Tarahumara and the more distant Hohokam, Mogollon and Anasazi of the U.S. Southwest. These origins continue to be reflected in present-day Huichol myths and practices and there is widespread agreement that they form what Neurath refers to as a 'cultural bridge' between Mesoamerica and the U.S. Southwest (Schaefer and Furst, 1996, Neurath and Bahr, 2005).

(iii) Finally, over the centuries the Sierra Madre Occidental has been a region of refuge for escaped slaves, wanderers, criminals and people persecuted for different reasons. There is evidence that some were West Africans escaped from enslavement on the coastal sugar plantations, others were from neighbouring indigenous communities escaping attack by hostile groups, and some were Spanish and Criollos who are responsible for the sprinkling of green eyes across the sierra (Furst, 1966). The Huichol have also been in continual contact with mestizo Mexico, a contact at times bellicose, mostly politically antagonistic but also including relatively peaceful trading relations since their time began.

The debate about Huichol origins emphasizes, in my view, a central predicament in the study of these people and their culture, and one which explains the paucity of research on social and health related issues: the predominance of the symbolic focus of academic research about the Huichol over and above social research. Far more is known about Huichol ritual and (Shelton, 1987) myth than about the socio-economic, in fact, as I discuss below, there is very little research on their wellbeing. This issue is taken up in a general sense by Singer in his paper proposing the need for a Critical Medical Anthropology where he criticises this overemphasis on anthropology, suggesting that 'Staleness grows from concentration on symbolic and ritual elements as if rituals and symbols, or perhaps values and beliefs constitute society, independent of a political-economic content' (Singer, 1990, P179). Anthropologists of the Huichol argue that for one to understand contemporary Huichol society, including their wellbeing and health, it is necessary to first understand the symbolic aspects of their culture because Wixárika society is so intricately interwoven with myth and ritual that these elements are inseparable from, for example, contemporary health beliefs and practices (Lira, 2013, Casillas Romo, 2000, Furst, 1967). It is to these elements, the intermediary determinants, that I will now turn.

### **3.3 Intermediate determinants: community and culture, beliefs, spirituality, environment.**

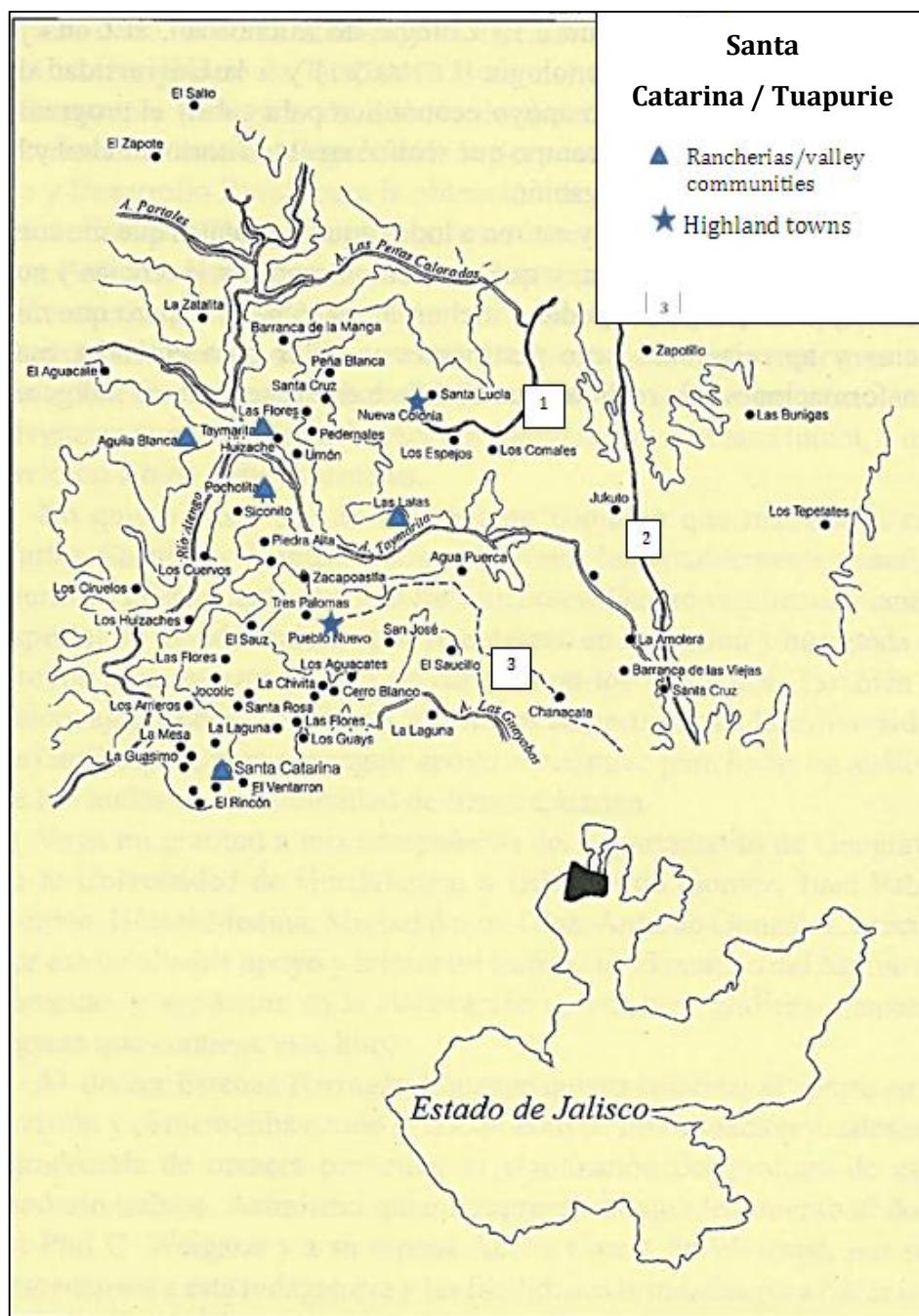
The middle or intermediate level of determinants refers principally to the Huichol community the physical, social and cultural environment that Huichol Indians inhabit. These homelands are the Huichol habitus, 'systems of durable, transposable dispositions that ensure cultural, social and structural continuity' (Bourdieu, 1977, P72).

#### **3.3.1 Huichol communities and physical environment**

Huichol territory is mostly high up in the Sierra and to this day remains accessible only by *brecha* (gravel covered single track roads), light aircraft or footpath, although paved roads are advancing into the governorships of San Andrés and San Sebastian. Daily or thrice weekly transport links now run to and from larger pueblos referred to as the bureaucratic or administrative centres (Pueblo Nuevo and Nueva Colonia), but the natural geography of many small settlements will always prevent access by vehicle or possibly even installation of electricity, putting obvious limits on provision of services (Morales Rodríguez, 2004). Traditionally the Huichol do not live in communities, but in *rancherias* (kiekari)- extended family units around a shared ceremonial patio ((Neurath, 2002). Politically Santa Catarina is divided into sixteen *agencias* (political divisions/ agencies), each administered by an *agente*. The yearlong post of *agente* is an unpaid community position, with responsibility for keeping a register of people and activities as well as gathering the annual financial contribution that must be made by every male *comunero* (official community member) and each second or subsequent wife of a *comunero*. Five of the sixteen agencies in Santa Catarina are accessible by dirt track from the last mestizo town of Huejuquilla (Pueblo Nuevo, Celoso, Santa Catarina, Nueva Colonia and Chonacata), six are *barranca* or valley communities (Taimarita, Pochotita, Pedernales, Las Latas, Soconita and Santa Cruz) two are barranca communities accessible by track from San Andres on the other side of the canyon (La Laguna and Cajones) and three are little more than pasture with only a scattering of

houses (Agua Zarca, Las Guayabas and Canarita). Pochitita, Las Latas and Santa Catarina are the governorship's ceremonial centres where annual agricultural ceremonies are held and Santa Catarina is the most important of these, seat of the traditional government and a central sacred site for the entire Huichol territory due to its position directly above Tea'cata, the 'heart' or central cardinal point of Huichol territory (Neurath, 2002, Torres and Barragán López, 2000).

**Figure 4: Study localities, Tuapuire, adapted from Torres 2000**



### **3.3.2 Political and religious leadership**

Huichol governorships have two forms of leadership: political and religious. Politically Tuapurie is administered by the traditional governor, an unpaid post that is decided upon every year in January. He is supported by a 'second' governor, a chief of communal property, another of land, a secretary, chief of security and a series of other lesser posts including *topiles*, who are responsible for order and security. These posts are elected by a council of elders made up of senior mara'akate and other respected community elders and it is rare for any of them to be held by women. The governor and his second are the points of contact outside the governorship and they represent the community outside the sierra (Torres and Barragán López, 2000).

Alongside but separate from the political administration are the religious or spiritual hierarchies, of which there are three in Tuapuire, one for each ceremonial centre or *Tukipa* (Anguiano Fernández, 2011, Neurath, 2000b). Each Tukipa is organised by a group of *jicareros* (literally 'holders of the jicara' a gourd bowl that represents one of the centre's *kakauyari* /deities), a number of mara'akate and the *peyoteros*, (a group of mara'akate, jicareros and other key personalities who are responsible for gathering *peyote* the sacred and hallucinogenic cactus plant, from Wixikuta in the desert of San Luis Potosí). The posts of jicarero and peyotero each last for five years during which period each representative is required to attend all ceremonies and is assigned a house in the ceremonial centre . As with the political posts there is no financial remuneration, but jicareros have huge responsibilities in the organisation of the annual cycle of rituals/fiestas for which they are also financially responsible. Each governorship has access to pot of money administered by the CDI that can be used towards cultural activities and this covers some of the costs of organising ceremonies. The large shortfall must be gathered, personally borrowed or otherwise generated by the jicarero who is responsible for organising each fiesta. It is not uncommon to be given consecutive posts as jicarero, sometimes totalling fifteen years, during which time they are tied to

their Tukipa, making it impossible for them to work in any employment other than short periods of migrant labour or handicrafts (for complete descriptions of Huichol political structure see Neurath, 2000).

### **3.3.3 El costumbre Huichol, 'Practices and beliefs '**

The mestizo Spanish word '*costumbre*', literally translated as 'custom', is the term used in Mexico to refer the particular set of practices and beliefs around which the individual and collective lives of Huichol and other indigenous groups are organised (Bartolomé, 1997). Referring directly to the Huichol, Fajardo conceptualises the term as 'a platform of practices that transcend the habitus, order and explain social and individual activities, integrating the [geographically] disperse organisation of families, their ceremonies, the production of certain foods, relations of power and authority in a framework of knowledge where myth merges with nature' (Fajardo Santana, 2007, p48).

Costumbre does not have a translation into Wixárika since it is a generic concept that only exists to describe specific group characteristics of the non-mestizo, practices and beliefs that the Huichol simply refer to as *wixárika yeyerieya*, 'the Wixárika way'. Nevertheless the Huichol themselves commonly use the word when speaking with teiwari to make reference in a general sense to their culture, beliefs and practices (Torres and Barragán López, 2000). The term itself has no role in communication between the Wixárika. El Costumbre is uniform across the governorship. What varies considerably is the degree to which individuals, communities and families believe in, practice and dedicate themselves to it. Young Wixárika studying outside the sierra will hold a very different idea about the importance of costumbre, to their parents. While the cultural matrix, symbolism and meanings vary little, adherence to these varies widely, a fact that is commonly ignored by ethnographers of ritual. The 'Gran Nayar' research programme coordinated by the (Mexican) National Institute of Anthropology and History (INAH) which currently dominates studies of the region is a good example of this perspective (Neurath, 2002, Jáuregui, 2003,

Kindl, 2003). These ethnographies tell us that Huichol life, culture and the meaning of their existence is intricately interwoven and utterly inseparable from their system of beliefs which are in turn firmly rooted in centuries of sacred events, deities and rituals. The Huichol system of beliefs that I describe in the following pages clearly plays a role in understandings of reproductive health and health seeking behaviour, potentially on both proximal and intermediate levels. How and to what extent it determines understandings and behaviour will be explored as part of this research.

In Latin American Spanish the term *cosmovisión* is used to refer to the world view of indigenous groups precisely because, in contrast to western or Anglophone views, the world of these groups encompasses not only nature and human society but also supernatural and sacred realms: the cosmos (Neurath, 2000a, Lenkersdorf, 1996). The Huichol live among spirits and commune with deceased ancestors, these deities 'live in their homes' (Fajardo Santana, 2007, p182). In the Huichol world there is no separation between the natural and the supernatural, just as nature and society are also one realm and the present day and mythical past merge into one during ritual encounters. These are not empty statements but a pragmatic reality for a fully trained mara'akame has learned to communicate with sacred animals such as wolves and deer and he is the spirit medium through which uninitiated Huichol have a direct line of communication with their deities (Neurath, 2000a, Valadez, 1996). During ceremonies mythical and present time merge and ritual actions are carried out with intricate precision as each one is an intensely meaningful point of contact with the supernatural (González Sobrino, 2008). Hanging out sweet *tostadas* (dried maize tortillas) and forming intricate wax figures on the side of a gourd bowl are not simple symbolic processes but genuine acts of communing. Just as one would not set the table for a guest who is not coming to dinner, nor do the Huichol hang their offerings for an imaginary set of dead ancestors.

Huichol deities or gods, referred to collectively as *kakau'yarixi* (singular – *kakau'yari*) mostly have their homes in diverse points within the sierra. The homes of many important *kakau'yarixi* are the sacred sites and natural resources from which they also take their names. Thus each separate lake, water hole, mountain, river and the sea (Hara'mara) is a god and plants such as maize (Niwetsika), peyote (Hikuri) and the psychotropic Kieri are also deified. There are also deities with a role in the process of reproduction and for women (Aitsarika), gods for harvest times, gods with particular roles in Huichol life, such as the supreme god of day, gods of the rainy season and the rain, the Guardian Spirit/Deer God Kuayumári. Finally, there is Tanana and Tatata, Our Mother and Our Father, associated with the mestizo symbol the Virgin of Guadalupe and with Jesus Christ himself, the points of syncretism in wixárika religion (Schaefer, 2001, Schaefer and Furst, 1996, Fajardo Santana, 2007, Pacheco de Ladrón, 1999).

### *Fiesta and ritual*

In her ethnography 'To eat and to feed the gods' Fajardo describes the reciprocal nature of the relationship between the wixárika and their deities and its role within the production and consumption of maize (Fajardo Santana, 2007). At the centre of this reciprocity is the fiesta, the time when foods and crafts prepared by every member of the community that represent in some way the union between gods and people are offered to the gods. Produced from the most sacred forms of maize and precious first fruits or local natural objects, as that is how the gods prefer them, foods and handcrafted items such as bowls, arrows, *morrales* (hand woven bags) and woven or painted pictures are ceremoniously laid out as offerings. The ultimate gift and point of unity is the sacrifice of a live animal, firstly a deer before the fiesta, and later, during the ritual, a bull or goat. In death the soul of each animal passes on to the supernatural realm, penetrating what González Sobrino refers to as a 'frontier between lived reality and the sacred' (González Sobrino, 2008, p97). The blood that is collected during sacrifice is distributed among fiesta participants, each of

whom uses the sacred liquid to scatter upon their offerings, candles and body in a ritual process that Fajardo refers to as ‘feeding the gods’.

The Huichol fiesta comprises ceremony, ritual and party. Each year a cycle of ‘mitote’ agricultural fiestas are held in every ceremonial centre in Huichol territory (Neurath, 2002). The term *mitote* refers to a particular form of symbolic dance that takes place around a central fire in the patio of the ceremonial centre and is a ritual common to many indigenous groups of Mesoamerican origin (Neurath, 2002). For the Huichol these fiestas include *Hikuri Neixa* (dance of the peyote), the *Fiesta del Venado* (deer fiesta), *Fiesta del Elote* (toasted maize fiesta) and *Namawita Neixa* (maize sowing fiesta) which occur at key moments of the agricultural cycle. Comuneros are expected to take part in each mitote fiesta as part of fulfilment. Of interest to this research is the relevance that these fiestas have for wellbeing, because it is through participation in these events that the Wixárika ensure a year of good health, abundant maize and fertility. During each of these fiestas the protagonists, usually jicareros acting out the role of deities, retrace the five cardinal points of the Huichol world. These points mark out the five most sacred sites of Huichol territory: to the west is Hara'amara, the sea, a specific point on the coast of Nayarit, to the east is Wixikuta, in the desert of San Luis Potosi, to the north a point near where the river Chapalagana meets the states of Durango and Zacatecas, to the south a point in the Guayabas river, near the pueblo of Santa Catarina and in the centre, Aitsarika, near the most sacred site of Te'akata. Each of these five points is both a deity and a sacred site and five is the Huichol number. Everything sacred, including the numerical system itself<sup>9</sup>, is in multiples of five: five days for a deer hunt, five years of practice to become a mara'akame, children must be presented to the deities every year until they are five, five years is the term for a jicarero, every five years the roof of the Tukipa xiriki must be replaced and there are five sacred varieties of maize,

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<sup>9</sup> The Huichol count (in Wixárika) in multiples of five as opposed to ten.

representative of the five female children of Niwetsika (Neurath, 2000b, Neurath, 2009).

This set of agricultural fiestas must happen every year between certain dates or meteorological/astrological events (before the first rain, in relation to the full moon etc). Outside of this cycle the Wixárika also hold an undetermined number of individual or family level fiestas. These events usually respond to an individual or family need to appease or please a particular deity or deities and do not share the cosmic sequence of a mitote, although they do follow strict ritual.

### *Gender and reproduction*

Little has been written about gender relationships among the Huichol and this is a subject that is difficult to broach on a community level. Teiwari who work in the sierra must strike a difficult balance with their Huichol colleagues, treading with extreme caution so not to upset the delicate relationships that their work and presence in the sierra rest upon. Possibly the concern for women and gender inequalities has been one of the principal victims of this dilemma. While some have studied the role of women in ritual (Schaefer, 2001, Lira, 2013), and others have described the social/religious role of women (Pacheco de Ladrón, 1999, Pacheco de Ladrón, 2002) none have discussed gender inequality. A clear absence among the Huichol is the role of a traditional birth attendant, the female figure of authority in most other Mexican indigenous cultures (Castro et al., 2000, Osorio, 1990, Castro, 2000). While older women garner greater authority and often occupy religious roles such as jicarero, no women sit on the 'elders committee' of Tuapurie and they have no political representation within the structure of the traditional government. Fajardo explains how it became necessary to involve men in a Cervical Cancer campaign in order that women attend the meetings and she found that husbands were on the whole concerned and protective of their wives, wishing to understand what they could do to help their partners avoid a painful death from cancer (Fajardo, 2006). The author

points to the fact that the nature of sexual relationships between Huichol makes them particularly vulnerable to sexually transmitted infections, the main cause of the high rate of cervical cancer found among this population (Fajardo, 2006), but the prevention campaign focused on timely detection rather than the promotion of safe sex.

Reproduction is the Huichol women's *raison d'être*: they live for biological reproduction (Fajardo Santana, 2007, Pacheco de Ladrón, 2002). Pacheco de Ladrón talks about the expropriation of the woman's body when referring to the fact that a Huichol woman possesses a body which does not belong to her (Pacheco de Ladrón, 2002 p37). The author describes the 'fact that the female body is conceived of as property of the man and as a vehicle for prolonging this property through procreation'. Although some women do use modern contraception and more and more women in the sierra communities choose to have fewer children, this has traditionally been left to nature (Morales Rodríguez, 2004), or as is frequently the case of the women in this study, is determined by patterns of migration.

Sexuality and sexual relationships are a very central element of Huichol culture in a complex way. Neurath describes Namawita Neixa (maize sowing fiesta) as a 'celebration of sexuality' and documents the symbolic representation of intercourse during the ceremony itself, which he refers to as the 'inter-marriage of maize and man', as occurred during the myth of creation (Neurath, 2003a). Sexuality, sexual relationships, marriage and maize, in its sacred form, are woven in and out of myth, costumbre and daily life but the first two of these are topics rarely discussed. Infidelities are often an issue of community conflict, at times resolved by the community itself. Nevertheless there is little discussion of these issues on a personal and individual level and, crucially, women and men know very little about either sexually transmitted infections or biological reproduction (Fajardo, 2006, Morales Rodríguez, 2004). Unlike the women of most other Mexican indigenous cultures, Wixárika women are not accompanied in the process of reproduction by a traditional birth attendant and knowledge of

reproduction and birth are not handed down from generation to generation orally, either via the maternal line or the presence in the community of a woman with this training.

We know that Huichol women marry young, and sexual relationships begin at an early age. Some girls are symbolically married in early childhood and handed over to their husbands with the beginning of menarche or even before (Pacheco de Ladrón, 2002, Mata Torres, 1982). Polygamy is culturally acceptable, and although it is less frequent among younger Huichol it is usual to find elders, particularly shamans, with more than one wife (Schaefer, 2001). Neither age nor consanguinity are impediments to marriage and it is acceptable for older men to marry young girls. According to Pacheco de Ladrón, children belong to their fathers until they are married off, when they become property of their husbands suggesting that women are generally seen as appendages of a male: at first as a daughter or wife and later as a mother (Pacheco de Ladrón, 2002). Alongside polygamy, extramarital relations are to a certain extent *expected*, they are the norm as opposed to the exception, so much so that certain rituals demand publicly admitting infidelities or abstaining from them. Women, reproduction and sexuality have a complex and at times contradictory social and symbolic role in Huichol society and costumbre (Jáuregui, 2003). Their importance as the source of reproduction, a central theme in Huichol as in Mesoamerican mythology and costumbre, is counteracted by their social and economic dependency and their subjugated role within the family and community. As in wider Mexican society it is very common for women to bring up children alone, for while polygamy permits the maintenance of two or more wives, it is equally or more common for men to simply abandon their wives and children in favour of another woman or alcohol.

### **3.4 Proximal/individual determinants**

This level of determinants is greatly influenced by both distal and intermediate factors. This knowledge, these practices, their living and working

conditions are ultimately shaped by immersion in a Huichol community and the unequal manner of insertion into a national and international political economy. Central to this thesis are two key issues which, because of their importance to my research question, I consider ‘proximal determinants’. These are i)Huichol ethnomedicine and ii) the context of migrant labouring in Nayarit. I will explore these here in more detail.

### **3.4.1 Schools, language, education and socioeconomic status**

Sierra schools are a hybrid of cultures and types of education. Bilingual schooling in Mexico is provided by poorer trained and lower grade teachers than that of mainstream primary education and has always consisted of what mestizo Mexico thinks indigenous populations ought to know, rather than an education to sustain indigenous communities (Coronado Suzán, 1992, Durin, 2005, Corona, 2008). It does not teach endogenous Huichol knowledge or history, but provides children with the information they will need to survive outside, rather than inside, their communities. Historically, indigenous teachers were known as ‘bilingual cultural promoters’, their principal role being to teach Castilian Spanish to indigenous children. These rural teachers are typically secondary school graduates with a short basic training provided by the Ministry of Education. The first Huichol schools *only* taught Castilian Spanish and there were no educational materials in Huichol, because no-one wrote Huichol. The current focus, inspired by the *pro-indigenist* policies of the 1950s, 60s and 70s has moved on and indigenous schools should now run a bilingual curriculum where, in theory, children learn to read and write in their native language as well as Castilian (Varese, 1983). In practice very few Wixárika are able to read and write in their own language .

In 2007 5,745 children attended bilingual primary schools in Jalisco state, the majority of these Huichol speaking. Eight hundred and twenty nine children attended school on a boarding basis, in hostels run by the CDI. Around one third (34%), of children of primary school age in the municipality of Mezquitic do not

attend school, ranging from only 11% in Pueblo Nuevo and 12% in Nueva Colonia to 72% of children in Taimarita. Non-school attendance is slightly higher for girls than for boys (32% of boys do not attend compared to 36% of girls). These attendance rates suggest a gender specific increase in school attendance for girls in recent years as the average number of years of schooling for the localities where informants are from were 2.5 years for women and 5.4 years for men, ranging from 0.5 years for women and 2.9 years for men in Taimarita to 4.3 years for women and 7.8 years for men in Nueva Colonia. Municipal data for Mezquitic gives an illiteracy rate of 42% among its indigenous population, 57% among women and 26% among men, slightly higher than among the only marginally less poor mestizo population whose literacy rate is 32.7% (Instituto Nacional de Estadística y Geografía, 2005). These figures are in stark contrast to the national literacy rate of 93.4% (adults) and 98% primary school enrolment (Statistics, 2011). Only 605 of the 11,450 indigenous inhabitants of Mezquitic have finished primary school and 504 have finished secondary school (Instituto Nacional de Estadística y Geografía, 2005). These figures are considerably lower than those for the non-indigenous population, where more than a quarter (1,174/4,224) have finished primary and 960/4,224 have finished secondary school (72).

The training and the educational direction of bilingual teachers has gradually improved, but it continues to face two major structural problems: teaching quality and poverty. Firstly, educational standards are very poor because teachers are drawn from a small pool of Huichol students who are themselves mostly poorly trained and educated. Secondly, teaching materials and curriculum are poor. The SEP (Ministry of Education) designed the first and only school language teaching materials in Huichol in 1983. The book *Ne tertwame Warrarika: mi libro de Huichol-primer grado* (My book of Huichol for first grade), and its accompanying teachers' book, stands as the official version of Huichol spelling and grammar, unaltered since it was written 25 years ago (Valdés Gallegos, 1983). The remainder of their class time should be spent

following the national curriculum, for which they are provided with the same text books as every other child in the country. Allowances are not made for the fact that they must learn another culture as well as a new language (Coronado Suzán, 1992).

Finally, Huichol language teaching is still very undeveloped and confusing. *Ne tertwame Warrarika* was written by Valdez Gallegos, a mestizo linguist who developed the early written form of Huichol based on Spanish language structures. Spelling is based on Spanish pronunciation and Indo-European verb structures have been imposed on this Uto-mayan language. It is unsurprising then that several versions of Huichol have since emerged (Santos Garcia, 2008, Iturrioz Leza, 2006). *Wixárika* is not a written language and the Huichol themselves do not use the written form, consequentially the language lacks a unified spelling and until the Huichol themselves take the study of their own language to a higher level, this is unlikely to change. Perfecting one's reading and writing in Huichol is of little use to people who do not have a tradition of writing their own language and it continues to be the case that one must learn and perfect Spanish to improve their educational and employment opportunities later on (Corona, 2008).

The material and economic poverty of teachers, communities and pupils is also great. Families are unable to support their children's education. Children from the more remote communities and rancherias where there are no schools, attend in the larger towns on a weekly boarding basis. Many families adjust to this by delaying sending their children to school until they are seven, eight or older, when they consider them old enough to cope alone (Fajardo Santana, 2007). This delay factor is determinant for some children, particularly girls, who by this age have assumed the responsibility of younger siblings and taken on significant domestic tasks within the extended family, as is evident in statistics such as those presented above for Taimarita (Instituto Nacional de Estadística y Geografía, 2005). Some, particularly girls, for this reason never attend school, or do so for a much reduced length of time. Finally, community and family

responsibilities as well as subsistence and remunerated activities all interfere with a full-time education. Many children attend the annual tobacco harvest with their families for up to 4 months and this can take priority over school attendance (Durin, 2005).

### *Socioeconomic status*

That the Wixárika are one of the most highly marginalised communities in Mexico has already been discussed and is supported by available data on education and health. There are no data specific to this ethnic group on their average monthly income. Indicators of Socio Economic Status (SES) for Mezquitic tell us that only 9% the indigenous population of this municipality have medical insurance, implying that 91% are not in official (public or private) employment. 92% have homes with dirt floors and less than 6% have a home with a drainage system while just over 12% have electricity. In 2005 only 4.5% of Mezquitic Huichols owned televisions, 2.7% fridges and only 0.4% of indigenous households had computers (CDI, 2012)<sup>10</sup>.

The entire region is classified as 'highly marginalised' by the government development agency SEDESOL, meaning every family in the region is theoretically entitled to conditional cash transfer payments (CDI, 2012). The amount received by each family is dependent on the number of children attending school and their level of education (primary or secondary) and there is a separate payment for people of 60 years or over. For many families this payment constitutes their entire monetary income. The national minimum wage is currently 59 pesos (£3) per day, giving a monthly wage of around £70. According to data produced by the CDI 25% of indigenous people (nationally) have no earnings whatsoever, 56% earn up to two minimum wages per month and 19% earn more than two minimum wages (CDI, 2009). The per capital income for Mexico was US\$13,900 (£8,787) in 2010(Central Intelligence

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<sup>10</sup> These figures will have changed since 2005 thanks to the arrival of electricity in several large sierra towns and the PAN's 'Piso Firme' programme which brought concrete floors to houses in even the most inaccessible communities.

Agency, 2012), £732 per calendar month, although this figure is mired by extreme inequality<sup>11</sup>. Alternative, weighted, analysis suggests that the median monthly income is around half this figure, at 8,605 pesos (£430 per month) and the average income for agricultural workers, at 775 pesos per month (£38), is considerably less than the minimum wage (Instituto Nacional de Estadística y Geografía, 2005). Given these figures and data on other indicators, it would be reasonable to suggest an average monthly income among the Huichol of around 500 pesos (£25) which is less than the average income of agricultural workers. To this calculation we must add that the migrant workers who are the focus of this study are the poorest of the Huichol and have consistently lower levels of education and fewer occupational opportunities since they are mostly from the most isolated rancherías.

### **3.4.2 Health status, provision and access**

When the Plan Huicot initiated in 1966, one medical doctor covered the entire Huichol speaking region. Dr. Campos made regular visits to the four largest communities, spending 4 or 5 days in each locality (Benítez, 1968). A health promoter who could administer basic medicines in his absence was appointed for each of these communities. By the end of the 1970s there were 10 clinics in the Sierra although these were poorly stocked and largely staffed by trainee doctors (Fajardo Santana, 2007). Vaccination coverage continued to be incomplete and in 1990 the Huichol region had the highest Infant Mortality Rate (IMR) in Mexico, which stood at 100/1,000 live births, nearly twice as high as the mean IMR among indigenous populations at the time (Fernandez Ham, 1993).

In 1989-1990 two separate measles epidemics took the lives of 420 Huichols in Jalisco State alone, representing almost 4% of the total population of 11,000<sup>12</sup> *Jalisciene* Huichols and more than 5% of total measles related mortality in

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<sup>11</sup> According to World Bank data, Mexico has a GINI coefficient of .48.

<sup>12</sup> Quoting figures given in Santos et al for Huichol population. Note that these differ from figures given in other sources.

Mexico during the epidemic (Santos et al., 2004, Andersson, 1992). High mortality rates among indigenous communities were blamed on poor quality vaccinations (possibly inadequate cold storage and transportation), low immunization coverage, already high rates of malnutrition and deaths from treatable secondary diseases such as diarrhoea and pneumonia. Following these epidemics, teams of medical researchers were sent to the sierra where they found many communities in a perpetual state of malnutrition. Since the 1990s health services in the sierra have forged ahead with national objectives based on highly medicalised concepts of prevention and cure. Clinics and medical staff are controlled by targets (number of births attended, IUDs inserted, vaccinations given) and welfare handouts via Oportunidades are dependent on health checks, family planning talks and school attendance (Cruz et al., 2006). Approaches to health care in indigenous communities are quantified and must be brought into line with national service provision. Programmes which address the *specific* health needs of the Sierra population are few and underfunded. There are now 12 clinics on the Jalisco side of the sierra in almost every hamlet a '*Casa de la Salud*'. The larger clinics are now mostly staffed by a full-time and a fully qualified doctor and nurse as well as a medical school graduate and a travelling doctor who makes visits to the outlying hamlets (Morales Rodríguez, 2004).

However, this official information tells us surprisingly little about the quality of health provision in the Sierra or about the health status of people. Service and care in clinics varies enormously depending on the dedication of medical staff but also on availability of medicines, distance and transport links to hospitals as well as the attitude of each individual community to their clinic (Morales Rodríguez, 2004). Geography and politics continue to play a huge role in the health of the Wixárika, a situation well illustrated by state policy on the release of antidotes for deadly arthropod attacks. In the Sierra you never carelessly lift a stone or put your boots on without first looking inside because few clinics are provided with sufficient stock of the antidotes for black widow spider bites or

*Durango* scorpion (*Centruroides suffusus*) venom. As Fajardo documents in her ethnography of nutrition, deaths from Scorpion stings have historically constituted one of the principal causes of infant death (Fajardo Santana, 2007). Research with Huichol people on health and health seeking behaviour from a biomedical perspective is scarce and there is a lack of epidemiological or survey data that looks specifically at the Wixárika ethnic group. A literature search of peer reviewed papers using Medline and the Web of Knowledge identified only three papers that discuss the health status of the Huichol. One of these is a 1993 study by Fernandez Ham which found the Huichol to have the highest rate of infant mortality among all indigenous groups in Mexico, marginally higher than that of the Tarahumara Indians with whom the Huichol share their mountain range (Fernandez Ham, 1993). These findings coincide with Municipal data gathered by the National Institute of Geography and Statistics (INEGI) in 2005 which gives the highest national rates of Infant Mortality to the Huichol municipalities of Mezquitic, Jalisco (77/1,000) and the Tarahumara municipality of Batopilas, Chihuahua (79/1,000). These two indigenous regions, located to the south and north of the Sierra Madre mountain range are two of only four Mexican regions (all indigenous) classified as 'level 1' for infant mortality, with between 72 and 107 infant deaths per 1,000 live births (Instituto Nacional de Estadística y Geografía, 2005)<sup>13</sup>.

Beyond data on infant mortality, there are no up to date statistics available that relate specifically to the Huichol population. Blanco et al who surveyed 349 Huichol families in 1991 found a maternal mortality ratio of 2,403/100,000 live births (5 maternal deaths/ 208 live births) (Blanco Muñoz et al., 1994). There is no recent data with which to corroborate these statistics but in the course of my fieldwork I learned anecdotally of three women who had died in childbirth in the sierra in 2010. One of these deaths occurred during an important fiesta at only a few metres distance from the ceremony. Mexico is under intense international pressure to reduce maternal mortality rates in rural

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<sup>13</sup> Data for Mezquitic and Batopilas municipalities include a small proportion of non-indigenous population.

and indigenous areas and it is now government policy to individually investigate each death by sending a team of assessors to the home of the woman who died. As a result of these recent deaths the group of clinics coordinated by the Sanitary Jurisdiction of Colotlán, which covers all three Jalician governorships, were subject to a period of intense investigation and warnings (pers com. Dr. Huerta, ). It is beyond the scope of this chapter and thesis to discuss in depth the reasons for this very high mortality. As in other regions of high maternal mortality the proximal determining issue is almost certainly that women do not seek help at the time of childbirth, be this because of distance, as was the case of the health promoter, or for more complex personal and cultural reasons, as was the case of the woman who died during a fiesta, both situations compounded by the tradition of giving birth alone (Freyermuth, 2009).

Three other studies have looked at health and wellbeing from different angles, all conducted by medical doctors who were residents or working in the Sierra for considerable periods. Morales Rodriguez conducted a cross-sectional study of 265 women of reproductive age across all three Jalician governorships focussing on practices relating to maternal health (Morales Rodríguez, 2004). The average age at which women become sexually active was 15 years and mean age of first pregnancy 17.9 years. He found that 36% of women had miscarried a pregnancy and 24% of women had experienced the death of at least one child under the age of 5. Just over half of the women he interviewed had knowledge of contraception with the highest proportion (38%) making reference to contraceptive pills although only 9% of the women interviewed were actually using contraceptives. The mean number of pregnancies per woman was 5.6, a mean that includes women in the full range of their reproductive years. Only 3% of women interviewed had ever delivered by caesarean section and the majority of births were at home or in the home of a family member. Thirty three percent of babies were delivered with the help of their maternal grandmother, 20% with help from their father, 18% with help from their paternal grandmother and 21% with help from a doctor. Only 18% of

women said they had given birth in a local clinic and 7% in hospitals. The author analysed these results within the geopolitical context of the sierra, correlating data with access to services and transport. Of the 167 localities visited during the survey, only 13 had health clinics.

Both Fajardo (Fajardo Santana, 2007) and Crocker et al studied the problem of malnutrition (Crocker Sagastume et al., 2004). Fajardo, who set up the Nutritional Attention Centre in Tuxpan during the mid 1990s, writes as an anthropologist describing the problem of malnutrition within its cultural context. In contrast, Crocker et al conducted a three year study of nutrition in Santa Catarina, using an intercultural research design. While Fajardo cites geopolitical circumstances as the cause of increased malnutrition, Crocker et al. emphasise the loss of traditional diversity in their diet. Fajardo also worked on developing the Cervical Cancer screening campaigns and this research gives valuable insights into Huichol sexual practices (Fajardo, 2006). The high rates of cervical cancer are put down to high risk behaviour: early sexual initiation, multiple partners, general lack of sexual hygiene and a high incidence of other sexually transmitted infections. The health status of Huichol people is characteristic of a highly marginalised rural population. What differentiates them is how they understand their health. To this I will now turn.

### **3.5 Key proximal determinants**

#### **3.5.1 Huichol conceptions of health and illness**

In common with many other non-western cultures, the Huichol understanding of illness is interwoven with a system of beliefs. The mara'akame being the religious authority within the community uses his political and supernatural powers to ensure reproduction of and adherence to this system. Yet for two generations western medicine has gradually penetrated the Sierra and for many young families, this is now their first option in terms of health care. Little ethnographic research has been conducted on Huichol conceptions

of health and illness or their present day relevance and what we do know must continually be questioned since this is an area of Huichol life that is changing rapidly.

The western concept of health, which if we use the WHO definition refers to ‘... a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity’<sup>14</sup> has no equivalent in Huichol. The same can also be said about ‘wellbeing’, since these two terms refer to a particular state of being (being well, being healthy) that is not conceptualised as such in Wixárika. The words ‘*ayr+ ane*’ refer to a general ‘feel well’ and describe how one feels at a certain point in time, but do not indicate a general state of health and the phrase ‘*a tukari ke ane*’ which literally translates as ‘how is your day’ asks about your spiritual wellbeing, whether or not you have fulfilled all the necessary rituals and ceremonies that you need for good health. To talk about health and health related behaviour one must refer directly to *kwiniya* (illness or sickness), to the absence of kwiniya, or practices related to avoiding and preventing different types of kwiniya (Pers Com, Candelario, Huichol Language Teacher).

To discuss the issue of health in relation to the Wixárika it is necessary first to separate and then to merge its two parts. The sickness aspect, based around specific, largely physiological illnesses and disease on a largely individual level, and the wellbeing aspect, that is served by the social and spiritual arena of Huichol life and has connotations beyond the individual, into communal, natural and supernatural realms of life. Together these two parts are the reason for almost all Huichol ritual and both are intricately interwoven with their costumbre.

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<sup>14</sup> Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948.

### *The Mara'akame*

It is clear in literature that the traditional Wixárika conception of illness/well-being is woven into their systems of magical-religious beliefs, played out in their costumbre and is an ordering factor of their daily life. The threat of illness ensures fulfilment of the costumbre and the mara'akame, Huichol healer and spiritual leader or shaman, ensures the continued interplay between costumbre and well-being for only he can identify the cause of an illness and only he can preside the ritual that will lead to a cure or prevent further ills<sup>15</sup>. The figure of the mara'akame is central to illness, costumbre and wellbeing, both religion and medical practice revolve around them. Mara'akate are the community's spiritual authorities and leaders, holders of the maximum knowledge about deities, ritual, myth and the sacred (Furst, 2007, Fajardo Santana, 2007). Often referred to in Mexican Spanish as *cantador* (singer), a mara'akame literally sings the words of chants and myths necessary to each ceremony, usually for several days and nights, while the ritual is played out. In this role as ceremonial leader mara'akate are the focus of attention as through them as intermediaries the community speaks to deities. During rituals the mara'akame's body becomes a communication channel to the deities and with the help of peyote, incense, fasting and chanting mara'akate transport themselves to another realm (Furst, 2007, Rossi, 1995). It is in this role as communicator that the mara'akame also becomes a healer, since through him, deities cure illnesses.

Like many other Amerindian shaman, mara'akate learn to see and heal through dreams. *Nierika* (to see or the gift of vision) is what it means to be a Huichol shaman (Neurath and Bahr, 2005). Dreams are his principal channels of communication with deities and considered an 'objective' proof of cause 'he dreamed it so it must be true' (Fajardo Santana, 2007). In this dream he may see a series of linked events involving several people (for example, a grandfather who did not complete his full five year initiation rituals has blighted his daughter throughout her life and caused a specific illness in his grandson) or a

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<sup>15</sup> Mara'akate can be male or female but the majority are male.

single cause and consequence (such as failure to attend a certain ceremony leading to a fractured wrist). Whichever is the case, Fajardo suggests that the mara'akame seeks a logical correlation between a mundane event such as a fractured wrist and a framework of coherent beliefs. He will then carry out a healing which often culminates in his 'sucking' out the offending or impure object, such as a grain of corn or a flower. In complex cases a mara'akame will abstain from eating salt or drinking before conducting a healing, since these abstinences heighten their powers of communication (Zingg, 2004). Finally, he will usually recommend a series of actions. In the above example the grandson may be told he must complete his grandfather's missing initiation years, the mother could be asked to visit a sacred site with a particular offering and the whole family could be told to hold a fiesta in honour of a specific deity before the period of 'darkness' or 'night time' ends<sup>16</sup> (Neurath, 2002). It is understood that the mara'akame himself does not cure illness, he is simply the body through which deities are able to deliver their healing powers. This position of communicator and intermediary with deities grants him power within the community and for these reasons they are both feared and highly respected (Fajardo Santana, 2007).

### **3.5.2 Huichol illnesses**

In his *Mythical Nosology of a Community* Casillas Romo (Casillas Romo, 2000) identifies some sixty Wixárika illnesses which he classifies according to western categories. Using his professional knowledge as a medical doctor he attempts to define them in biomedical terms, although these translations are mostly vague and only half appear to have an equivalent. Thus we have 14 'disorders of the digestive tract' (illnesses of the spleen, thyroid, oesophagus and stomach including diarrhoea, vomiting and blood in the stool), 5 diseases of the respiratory tract (from whooping cough to colds and mucus), 8 skin diseases (ranging from dandruff and head lice to smallpox and measles), 5 urinary

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<sup>16</sup> The Wixárika year is divided into night and day. For only three months during July, August and September the region is in 'darkness' as it is night time. The remainder of the year is daytime.

disorders (possibly all refer to infection), 5 behavioural disorders (including the 'loss of soul' which can result in death), 8 nutritional disorders (mostly different types of malnutrition), 5 obstetrical-gynaecological disorders (from infertility, miscarriage and breech birth to pains and menstruation itself) and 10 miscellaneous disorders including epilepsy, conjunctivitis and venereal diseases. As a general rule, if the illness has a name in Huichol it can be cured by a mara'akame, although what the Wixárika refer to as illnesses of the costumbre or 'Huichol illnesses' includes diseases that have certainly emerged through contact with mestizo populations, such as whooping cough, measles and smallpox. For many decades malnutrition was the leading cause of childhood mortality and the author lists 18 conditions associated with either malnutrition or some form of gastrointestinal infection. These continue to be the most common illnesses.

There is no mention of cancer, heart disease, diabetes, dementia or other non-infectious, lifestyle related illnesses common in western societies, although these certainly exist. Mara'akate cannot cure mestizo illnesses, they may offer an explanation or a *motive*, such as non-fulfilment but they know that these are outside their 'group' (Casillas Romo, 2000). There is discrepancy between authors about whether or not diseases of western origin that have been around for several centuries, such as measles and whooping cough, can be cured by a mara'akame. Vasquez Castellanos describes these as 'foreign illnesses' that cannot be treated while Casillas Romo describes the healing rites associated with them (Casillas Romo, 2000, Vázquez Castellanos, 1992). The latter of these authors in fact re-tells the story of how a mara'akame cured '*etsá* sickness' (small pox) by vaccinating children with a tiny drop of puss from an infected person (Casillas Romo, 1996). This story appears to be based on a myth that was first recorded by Zingg in 1934 and has since been cited by other authors (Baez Jorge, 1996, Furst, 2007). This myth is indicative both of how events are transformed and retold through oral transmission over decades and centuries and of how external events and beliefs are incorporated into Huichol mythology

as their own. Whether or not illnesses such as these can be cured by mara'akate, it seems to be the case that the division between what is referred to locally as a *mal de aquí* (an 'illness from here' or a Huichol illness) and a 'foreign illness' lies in the cause and the cure, as opposed to the nature of the illness itself. Over time beliefs about illnesses change as does the behaviour of a disease. The skills and knowledge of mara'akate are highly dynamic, more so because of the oral nature of knowledge and learning. Illnesses that were once thought of as foreign are incorporated into the local group of illnesses and knowledge adapts to these changing circumstances.

### **3.5.3 Cause, cure and prevention of illness**

According to traditional Huichol belief all illnesses, as well as turns of bad luck, accidents or other unfortunate incidents can be traced back to one of three supernatural route causes: 1) Non-fulfilment of the costumbre/religious failings, 2) transgression against specific gods /falling out of favour with an animal or other god probably due to a rupture in the relationship of reciprocity between a person and god, or 3) witchcraft or black magic/ intentional harm by a skilled or part trained shaman.

There is significant variation between the healing processes of one mara'akame and another, suggesting that contrary to the writing of Perrin and Castellanos, there is not one standard form of Huichol medicine or one standard cure for each illness (Perrin, 1994, Vázquez Castellanos, 1992). Since mara'akate learn to heal through dreams and supernatural experience, each learning process is individual, guided by a different deity. As with many writings about Wixárika people and ritual, it is rare to find two mara'akate with the same version of events, two identical versions of a myth or two identical healing procedures, such is the nature of a people whose history and medicine are passed on orally and in praxis from one generation to another. Mara'akate jealously guard their skill and it takes time, patience and money to persuade a well-respected shaman to share

his knowledge. Thus it is rare to find writing based on the testimonies of more than one mara'akame and often the informant is no longer an 'active' shaman<sup>17</sup>. Unlike western medicine where there are clearly established details of causality, illness and curative processes with which most medical doctors would agree, such as a guide to Wixárika illnesses cannot exist.

### 3.5.4 Causality

#### *Faltas al Costumbre*

Understanding the relationship between illness, causality and cure requires a different logic to that used in our understanding of western medicine and one that is best illustrated in relation to a route cause. The first of these, 'faltas al costumbre', or non-fulfilment of the set of annual and five yearly agricultural and religious rites and rituals, covers the majority of illness events. A child may be diagnosed with *maxariya*, 'illness of the deer'. This is a serious state of malnutrition that can lead to death. There are other names for this same illness, or slightly different versions of it, such as *ik+riya* (illness of maize), *atac+xiya* (illness of the lizard) and *temuxiya* (illness of the toad); and it is associated with children under the age of three. In the example, through a dream the mara'akame identifies that the cause of maxariya in a particular child lies in the failure of the child's parents to attend the pilgrimage to Wixikuta and perform the important '*Hikuri Neixa*' ceremony on returning to their community. As part of the healing process the mara'akame 'sucks' a deer bone out of the sick child's head, the very crown of its head, then applies the moist leaves of a local plant known for its soothing properties to the child's abdomen. The child's parents are then required to correct their transgression by making the pilgrimage to Wixikuta and performing the accompanying rituals, including sacrificing a deer

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<sup>17</sup> Furst (1967), in his 'Huichol Concept of the Soul', and Eger Valadez (1996) in her account of inter species communication rely exclusively on interviews with Ramon Medina, a mara'akame (originally from San Sebastian) who lived on the outskirts of Guadalajara during the 1960s and 70s. Casillas Romo bases his descriptions of illnesses on interviews with one mara'akame, Daniél Villa, also from the community of San Andrés Cohamiata.

and bringing its sacred blood to the ceremony. Thus, the cause –failure to fulfil an important religious ritual- is also the cure. The child will become well again once the parents fulfil this ritual (Casillas Romo, 2000, Vázquez Castellanos, 1992).

### *Offending the gods*

Offending or falling out of favour with a specific deity or the return of a dead (deified) ancestor is the second cause of illness. Deities can directly place an object in the body, causing illness, or make an alliance with an animal god and in this way cause illness. The cause-cure relationship works on the same logic to that of *faltas al costumbre* and the patient must in some way make up for the offence they have caused, as may be the case if, for example, a three year old child is stung by a scorpion. Scorpion stings are extremely common in the Sierra, particularly so in the valley communities and the pale coloured *Durango* scorpions are most feared. Before the roll-out of antidotes via casas de salud this was also the leading cause of child mortality in many communities (Fajardo Santana, 2007). It has been common knowledge for some time that small children must receive the antidote immediately to avoid possible death or, in the case of older children and adults, alleviate several days of extreme pain and fever. It is also accepted that scorpions do not bite without reason: they are directed by deities and dependent on them. There is a reason for the sting and it may happen again if this is not corrected. To cure the sting a mara'akame will communicate with deities to find out why the scorpion stung this particular child. It is possible that the deity *Párikute*, Owner of Animals, was offended and sent the scorpion to punish the transgressor (Furst, 2007). Again the cure is linked to the cause, and the patient or his parents must perform a ceremony and make a pilgrimage or sacrifice, whichever is thought to please the offended Párikute, since this sting was a warning and other misfortune will occur if it is not heeded.

### *Witchcraft*

An angry god sometimes uses a poisoned arrow to introduce an illness into a person and will remove this arrow only when a sacrifice has been made (Furst, 2007). This technique is also the preferred strategy of *brujos* (witches), shamans or part trained shamans who use black magic to punish or harm. Here the cause-cure relationship no longer operates, since the patient has been purposefully harmed, not necessarily as a result of any transgression on their part. In principle, witchcraft as a *cause* of illness is identified by shamans but not easily prevented or cured. It can be the cause of serious illnesses and death and is often associated with the psychotropic plant *Kieri* (*Solandra Grandiflora*), but it does not share the same cause-cure logic as the previous two route causes (Yasumoto, 1996). Mara'akate have a good knowledge of medicinal plants, knowledge that they do not share with lay Huichol. As well as being used as a form of contraception, to cure minor ills or swelling and bring down fever they are also used in witchcraft and mara'akate or witches use them with skill to cause harm.

Witchcraft is blamed for bad things that happen to a family or community and unexplained deaths are often put down to some form of black magic. A family or an individual may take on the task of retaliation themselves, or through a mara'akame and when alcohol and jealousy are added these family and personal vendettas can result in violence or murder. Despite the intensely communal nature of their lives, the Wixárika are also surprisingly individualistic. Wealth is shared only within the immediate family and it is very often the extended families who are the most jealous. Having a teiwari benefactor or enrichment through contacts with mestizos is frequently the cause of such jealousy, often leading to intra-community and intra-family conflict. Acts of witchcraft are commonly put down to jealousy and comments of this nature made in passing can spark accusations and vendettas. Since mara'akate are known to have the knowledge to conduct black magic they are frequently blamed and the battle over an act of witchcraft against a third person

can become a spiritual battle between two mara'akate (Benítez, 1972, Fajardo Santana, 2007).

Ramon Medina, the mara'akame cited by several American and Mexican Anthropologists (Myerhoff, Furst, Eger Valadez and the Mexican anthropologists Salomon Nahmad all of whom refer to him in Schaefer and Furst (1996) and Fernando Benítez) was shot dead by his cousin. Both had been drinking after a family fiesta, they began to argue, and his cousin opened fire. This may have been a simple case of alcohol and violence, of which there are many, but when the victim is also a mara'akame there is always suspicion that somewhere down the line witchcraft was involved. In many situations the doubt will remain, but where witchcraft results in death, the victim can make accusations from beyond the grave. On the fifth day after death the mara'akame presides over a *kawewiene*<sup>18</sup>, during which he speaks with the dead and relates their words back to family and close friends, including the reason for their death. This is the opportunity for victims or the mara'akame to point the finger.

### 3.5.5 Prevention and cure

The close vicinity of medicine with religion not only provokes the healer to resort to prayer, spell and chant to guide the diagnosis and cure, but the majority of them assert that their role as healer is that of an intermediary, because the sickness is really cured by gods or deities (Zolla, 2005).

Curative processes for traditional Huichol illnesses are virtually unchanged since they were first documented by Lumholtz more than 100 years ago (Reed, 1972, Lumholtz, 1902). These usually consist of three elements: i) the *limpia* or cleansing a physical procedure performed directly in relation to the body by a mara'akame, ii) the sacrifice, pilgrimage and offerings to deities and iii) the ceremony or fiesta.

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<sup>18</sup> The dead are buried in the community *campo santo* (graveyard) within 24 hours of their death. The *kawewiene* ritual combines séance with funeral rites and takes place in the family *xixiki* five days after death.

### *Limpia*

Illness is often described as a consequence of impurity where the sick person is contaminated or 'ritually impure' usually because they are guilty of some form of transgression (Furst, 1972, Zingg, 2004, Fajardo Santana, 2007). In this context the patients are a source of danger for themselves and their relatives until they have been 'cleaned' or purified. The concept of a limpia in Huichol culture is concurrent with many other descriptions of traditional healing throughout past and contemporary Mesoamerican cultures (Zolla, 2005, López Austin, 1980). The procedure itself refers to the removal of spiritual impurities so it is the spirit not the body that is the focus of the cleansing. Among the Huichol these include blowing, sucking, rubbing, use of incense or smoke breathed onto places of pain, wind (through arrows), water from sacred places and a variety of medicinal plants or animals. They usually culminate in the removal of an 'impurity', a small symbolic object that has been placed in the patient's body by the offended deity. Thus after rubbing and blowing the mara'akame may suck the patient's chest to remove a grain of maize, a stone or a seed or use his wand to extract a kieri flower or cactus thorn from the head (Furst, 1972, Zingg, 2004). The constants to this ritual are song or chanting and the use of a muvieri. During the limpia the shaman is literally engaged in a spiritual battle with the offended deity or witch and to increase his powers for particularly difficult cases he may fast and abstain from drinking water or putting salt on his food.

Mara'akate are also known for their unique and intricate knowledge of medicinal plants that are native to Huichol territories, the most valued of which is peyote, the hallucinogenic cactus. These are used in the limpia and can also be effective, for reducing pain or curing open wounds (Casillas Romo, 2000).

### *Prescription*

The second element of any curative process is the prescription, the actions that the patient or other family member must carry out in order to spiritually clean

themselves which usually include a sacrifice, visit to a sacred site and some form of offering. The mara'akame will give very precise instructions of how this must be done. As with the cause, the prescription for this cure is also brought to the mara'akame in a dream. Fajardo describes the prescription given to 'Carlos' by a female mara'akame (Fajardo Santana, 2007, p170):

'I have to dream to see what is wrong with you, I will tell you tomorrow. The next day she said that I was going to find a small deer, one with its antlers just beginning to show. I should kill it, make my arrows and wet them with its blood, to take them to such and such a place. But you are going to do it, she said, if not you will die... I prepared myself for five days and went out to look for the deer, I took all my things: water, gourds, sacred arrows and I arrived to a place to wait for it. But after many nights I didn't see any. I was going to go back but a man arrived and he told me 'you need a decorated gourd'. I prepared it, and that night, from where I was close by the fire I saw something move, it looked like a small deer. Could it be? I thought. I fired a shot and felt I had hit it, something fell, it came out jumping and fell. It was a small deer like the one the woman had told me about. I wet my arrows in its blood and went to Tea'kata and to all the places I had been told. That was how I was cured... '

In this prescription the sacrifice, the offering and the pilgrimages are clear. Deer blood is a common sacrifice and this same blood is gathered in sacred gourds to be used at the fiesta. The deer itself is usually eaten there and then, where it is killed, prepared over the open fire or in an earth oven heated by stones. The blood has important ceremonial properties and must be gathered with strict and specific ritual if it is to be used ceremonially. The prescription cited above is complex: 'Carlos' is asked to visit Tea'kata, the most sacred of Huichol sites and to hunt and sacrifice a deer. The sacred site will depend on which deity has been offended, since each deity has its own sacred site. Tea'kata is a complex of cave shrines which house (or housed) the remains of several deified ancestors, possibly including 'Great Grandfather Deertail' (Furst, 1996). As well as the blood of a sacrificed animal the offering may include other artefacts such as a decorated gourd, food, drink and other small items.

The final element of curative-preventive ritual is the fiesta, which is inseparable from the sacrifice that must precede it. The family or individual fiesta usually takes place in an extended family patio, with the ‘ceremony’ itself taking place in the family xiriki . All fiestas begin with the ceremonial lighting Tatewari, Great Grandfather fire, in the centre of the patio, followed by ritual chanting, lighting of candles and offerings then the sacrifice of one or more animals, usually a cow (González Sobrino, 2008). These curative fiestas, together with the annual cycle of mitote fiestas are the centre of Huichol community, social and religious life. They are the time when the Wixárika commune with their deities who live in the rivers, caves, mountains and houses and this takes precedence over all other needs, financial or otherwise. The role of fiestas is discussed in more depth in the following chapters.

### **3.5.6 Prevention**

Why would one invest in improving ‘health’ in a biomedical sense when they can deal with the root cause? Illness prevention forms part of this same circle of fiestas, interaction and reciprocity with deities and fulfilment of the costumbre. An illness is a warning, a sign that the delicate balance of reciprocity between people and their gods has been broken or neglected, a rupture in the harmonious relationship between sacred and humane that must be corrected (Neurath, 2002). Threat of illness is the means by which deities ensure fulfilment and through illness Wixárika gods express their disagreement in relation to the behaviour of women and men, in this sense it is also a form of punishment.

Fulfilment requires discipline and sacrifice and the higher up the religious hierarchy you are, the greater the discipline and sacrifice (Neurath, 2000a). For lay Huichol who do not hold a religious charge, discipline is largely confined to participation in the annual cycle of fiestas and the ceremonial growing, caring for and harvesting of maize. Growing each of the five sacred types of maize (red, blue, white, yellow and multicoloured) is the basis of this discipline and the

antecedent to participation in fiestas, since a large number of these are directly related to the production of maize (Neurath, 2009). In addition there are certain events such as the peyote pilgrimage, deer hunts and community responsibilities that they may be requested or required to attend as well as ensuring fulfilment for their children, specifically that they attend the annual fiesta del tambor.

Good health is dependent upon growing maize and participating in all the related fiestas: *Fiesta de la siembra*, (Initiation of the agricultural cycle and preparation of land), *Fiesta del toro* (when maize is beginning to grow to ensure good health and life and a good harvest), *Tiempo de los elotes* (harvest/time of maize corns when thanks are given for the products of the land) and *Fiesta del Elote* (close of the agricultural cycle) are all fiestas specifically related to the agricultural cycle (see González Sobrino for complete detail on the Huichol cycle of fiestas (González Sobrino, 2008). Growing maize and attending these fiestas is *sine qua non* for ensuring well being and preventing illness. Failure to grow maize is not only a serious falta al costumbre, but is also punished on a political level and comuneros lose certain rights within the community if they do not grow maize.

### **3.5.7 The context of migrant labouring in Nayarit**

As I describe in chapter 1 (1.2.2), what migrant worker's know about pesticide harm is in large part informed by their own experiences of exposure and the second key determinant of Huichol understandings about pesticides and r/mch is the context of their lives as migrants: the tobacco plantations on which they live and work, the conditions under which they are employed and their relationship with the town, the coast and its people, through whom their experiences of exposure are mediated.

In contrast to the agricultural plantations of Sonora and Sinaloa in northern Mexico, very little has been written about tobacco farming in Nayarit or about the town itself, on which to base a review of ‘what is known’ about this context (as given above for the Huichol Homelands). Consequentially my knowledge of this region is almost entirely formed of my own observations during fieldwork and during previous exploratory visits made in 2006 and 2009. This data was largely recorded in a series of ‘fieldwork reports’ and field diaries and is described in detail in the ‘Background’ section of the thesis (1.2).

### **3.5.8 Conclusion: Huichol migrants on the margins of the state**

The participants in this study are mostly from valley communities. These small and often very distant hamlets are among the most marginalised communities in Mexico where there are barely any jobs, schools, health clinics, food shops, communications or roads. Spaces described by Liffman as submerged in a ‘deep hot canyon’ (Liffman, 2011 p181). Among the Huichol, one of the poorest and most isolated groups in Mexico, these migrant labourers are *the* most marginalised. As the author discusses in depth in ‘Huichol territory and the Mexican Nation’, the Wixárika homelands and the Huichol themselves exist somewhere on the ‘margins of the state’ (Liffman, 2011 p173. The semi-autonomous status of their communities provides them with the protection of a pseudo-sovereignty, wherein they exercise a high level of authority over any teiwari on their land. To an extent they reproduce this in Teiwarit+a, existing as exiled foreigners living by their own rules. On the coast of Nayarit they closely replicate their life in the Sierra, reinforcing social hierarchies and roles, replicating rituals, viewed as they are in their homelands as somewhere on the cusp of magical and savage and relegated to the fringes of the law’s protection.

This lack of social, moral or legal protection along with the importing of Wixárika habits and costumbre is what has maintained and nurtured the living and working conditions of Huichol migrants on the coast. The one exception to this relationship is the relatively recent arrival of the *Florece* children’s centres.

These day schools for the children of migrant workers have come about thanks to a long campaign by the NGO Huichol and Pesticides, spearheaded by the activist Patricia Díaz Romo and supported by the then ARIC (Tobacco producers union) leader, Federico Langarica. While these schools do provide a relatively good standard of care during a few hours of the day they are effectively a piecemeal effort by government and industry (now almost entirely funded by BAT) to clean the image of tobacco farming without having to alter production practices (such as the use of pesticides), pay higher prices to producer and workers or invest in sufficient infrastructure to house the annual population of migrants. Once again, a case of the indigenous migrant worker on the margin, unsupported by the government agency that was established to support them.

On the coast the distal, intermediate and proximal influences on health overlap and entwine as a socially, racially and politically marginalised group bring their culture and customs, social and community relations into contact with the living and working environment of this particular migration. The former (distal) factors compound and permit the effect of the latter (proximal), mediated through a specific cultural and social dynamic, the intermediate factors.

The Huichol costumbre that I have described as the ‘particular set of practices and beliefs around which individual and community life is organised’ is also the principal determinant of the way in which this ethnic group understand and negotiate their wellbeing and health. This unwritten, dynamic religious and cultural *modus operandi* is inextricably intertwined with Wixárika medicine and explanatory models of health and illness. In chapter 5 I explore and discuss Huichol understanding of health and medicine, seeing this as the lens through which proximal, distal and intermediate factors that I describe in this chapter are seen to affect wellbeing. How these elements are played out and weighed up by the migrant workers in relation to reproductive health and pesticides is the subject of chapters, 6 and 7.



## **Chapter 4 Knowledge about health and pesticides: an interpositional theoretical approach.**

As I state in the first chapter of this thesis, my position as a researcher is firmly based on a multidisciplinary training. This has in turn influenced the manner in which I approach understanding and interpretation of phenomena and, like Kleinman when he comments that 'the gap between experience and biology' cannot be filled with one type of knowledge alone (Kleinman, 1995), and Farmer who is critical of how 'each of the socio-medical sciences –medical anthropology, medical sociology, health economics and so on- tends to stake out its specific turf (Farmer, 2001), I believe that there is not one single valid interpretation of reality, rather this is always comprised of multiple and varied phenomena and influences.

The frontier between public health and anthropology is a contested space, seeking an understanding of illness and affliction that is both applied and theoretical and satisfies both anthropologists and biomedics. Throughout the duration of my PhD research I have sought to find the missing piece that connects these two disciplines and enabled them to meet in the middle. Not only are the two disciplines thematically different, their approach to research and the writing of it are opposing, whereas a public health approach attempts to address specific research questions, an anthropological approach is inductive and allows itself to be driven by a flexible set of aims. The particular methodological position I have taken also combines these two approaches for while I seek to answer specific questions, I have taken an anthropological approach to doing this.

The purpose of bringing together these two disciplines is not only to generate an interdisciplinary understanding, but also so that they are able to critically inform each other –anthropology is able to highlight where public health is missing the point while public health sheds a critical light on the pitfalls of

overtly theoretical or relativist anthropological interpretations that are not problem focussed. Thus the theoretical approaches that I will outline below present a spectrum of positions that are useful for explaining the question of how Huichol migrant labourers understand the risks of pesticide exposure on their reproductive health. Rather than constituting opposing or alternative interpretations of the issue, they are proposed as *complementary* positions, generating a *multi-layered understanding* of my research questions. As becomes evident in chapter 5, 6 and 7, some of these positions are more useful for interpreting certain aspects, but together they highlight the importance of different elements not only to an understanding of how the Huichol have constructed their knowledge about pesticides but also to how these affect their wellbeing.

Thus, I introduce this chapter with a discussion of the question of risk. Although I will not use this as an analytical approach, it is useful to emphasize the multiple factors that do come into play in the construction of perceptions of risk and why this cannot be explained from a purely scientific or public health position. I then briefly and critically review the usefulness of the relevance and limitations of the Health Beliefs Model (HBM) as a public health approach to investigating knowledge and beliefs about pesticide harm. I will then discuss different positions within classical and critical Medical Anthropology that are useful, or interpreting the knowledge/beliefs and practices of indigenous migrant workers regarding their own reproductive health.

#### **4.1 Indigenous health and pesticide risk: is structural violence implicit?**

In previous chapters I have described the context and evidence of the two central problems that this thesis addresses: indigenous health (in this case the health of Huichol people) and pesticide risk (and its effects on reproductive health). I do not intend to make the actual *meanings and interpretations* of these concepts central themes within this thesis, but before entering into the

discussion about how to understand the overlap between these two problems I will briefly present them conceptually.

'Indigenous people's concept of health and survival is both a collective and an individual intergenerational continuum encompassing a holistic perspective that incorporates four distinct shared dimensions of life. These dimensions are the spiritual, the intellectual, the physical and the emotional. Linking these four fundamental dimensions, health and survival manifest themselves on multiple levels, where the past, present and future co-exist. (WHO declaration on health and survival of indigenous people 1999)'.

The Maori author Mason Durie, has written about understandings of health and illness at the 'interface between science and indigenous knowledge' (Durie, 2004, p1138). From this perspective he analyses the commonalities of indigenous people's understanding of health across the world and the elements that contribute to their conception of wellbeing and health. As stated in the WHO declaration on health and survival of indigenous people (above), central elements of this understanding and the elements that differentiate indigenous from biomedical interpretations of health are predominantly those of culture and spirituality. Culture refers not only to the symbolic and traditional aspects of indigenous lives but also their relationship with the environment and community, issues that are key aspects of their identity and central to the theme of pesticides and migrant agricultural work.

Indigenous cultures worldwide are unified by shared experiences of dispossession and colonisation. As Durie writes, 'a common pattern emerged [among indigenous cultures]: loss of culture, loss of land, loss of voice, loss of population, loss of dignity loss of health and wellbeing'. This perspective shares undertones with Paul Farmer's discussion of how structural violence, 'social struggles -economic, political, legal, religious, and cultural- that stop individuals and societies from reaching their full potential' must form part of any understanding of health and illness (Farmer et al., 2006 p1686). Durie

discusses indigenous health and illness from an analysis of the *contextual* factors that affect the Maori of New Zealand while Farmer describes how the social arrangements that constitute structural violence in Haiti *put individuals and populations in harm's way*. The author defines these arrangements as *structural* because they are embedded in the political and economic organisation of our social world and as *violent* because they cause injury or illness to people. A similar perspective is proposed by Menéndez who analyses how histories of colonialism and racism, aspects that he refers to as the 'denied aspects of culture' need to be brought into discussions about wellbeing as key determining factors of ill health and violence against the body (Menéndez, 2009, Menéndez, 2002).

The continued importance of spirituality within indigenous health also needs some explanation so as to avoid it being reduced to what Farmer refers to as an 'alibi' for poor health (Farmer, 2005). For indigenous cultures, where spirituality continues to form a central aspect of life and social order, 'Religion involves beliefs and practices related to the sacred, where the sacred is defined as god [or gods], the numinous [mystical or supernatural] or ultimate truth' (Koenig, 2007, p45). In his short essay on religion, spirituality and medicine Koenig emphasises the need to define spirituality by its *connectedness to the sacred*, thus setting it apart from religious forms which have ceased to commune in any way with the sacred realm. The Huichol are clear about this, as the Xauxeme, head-teacher of Nueva Colonia Primary School explained to me 'we are not religious, we are spiritual'. Williams and Sternthal define spirituality as 'an individual's attempt to find meaning in life' while Eckersley explains it as a 'deeply intuitive (...) sense of connectedness to the world in which we live' ...[the] 'broadest and deepest sense of connectedness', descriptions which emphasise the depth of spirituality in terms of its influence on people's lives (Eckersley, 2007 p54, Williams and Sternthal, 2007 p47). Citing Tacey, Eckersley (2007, p54) in fact suggests that 'secular societies have not understood its meaning', a position that is sustained by Zolla, Aguirre Beltrán

and others in their writings about some first studies of healthcare in the indigenous regions of Mexico (Zolla, 1988, Mellado et al., 1989, Aguirre Beltrán, 1994b).

For the Huichol there is little separation between spirituality and culture, these are intricately bound together, both giving meaning to experience (Eckersley, 2007). These cultural and religious dimensions operate alongside the particular historical, social, economic and political factors mentioned above and that are encapsulated in the concept of structural violence, generating an experience of health that is specific to indigenous people. At least in the case of Mexican indigenous people, this is an experience of health that combines the intensely spiritual nature of life and existence with a history of extreme exploitation and marginalisation.

Using this conceptualisation of indigenous health I will argue that Huichol are *more at risk from the effects of pesticides than other migrant workers* because political, economic, socio-historical and legal factors that are *specific* to them put them *particularly in the way of harm*. Structural factors define the specific and possibly unique nature of the working and living situation and exposures that Huichol migrant workers experience in Nayarit. This structural interpretation of health is complemented by a growing body of literature on the concept of lay understandings of risk in relation to modern environmental threats such as pesticides (Slovic, 1987, Blok et al., 2008, Wynne, 2004, Jensen and Blok, 2008). While mostly conducted in developed countries and over a range of environmental issues, the descriptions of 'lay understandings' of risk given in these discussions are equally relevant to indigenous and Huichol people, particularly the analysis of Jensen et al and Wynne in their descriptions of the epistemologies of risk among lay people exposed to pesticides.

The prolonged low level exposure to pesticides, described in Chapter 3, experienced by the indigenous workers in this study is not the type of exposure that pesticide manufacturers expect, assess or measure. Literature on pesticide

harm would suggest that it is unusual anywhere for workers to be directly exposed to pesticide residue 24/7. In short, the *nature* of risk that these workers are exposed to is not one that is contemplated by the people Wynne refers to as 'experts' (Wynne, 2004). This research oversight, omission or bias may in part explain an ambivalent attitude of workers to information that they have acquired about pesticide risk. Blok et al suggest that the 'expert based environmental risk regulation is, [...] widely believed to suffer from a lack of public understanding and legitimacy' (Blok et al., 2008, p189). This distrust in scientific information on pesticide risk is well illustrated by Wynne who suggests that the 'public', (people who are exposed to and affected by pesticides), have lost a sense of trust in 'experts' (category that includes manufacturers, scientists and policy makers) because they do not see, detect or talk about the risks that *directly affect them*, the workers and the farmers (Wynne, 2004 pages 60-61 & 70). The author goes on to suggest that 'experts' only make reference to *detectable risk* in what he refers to as the 'reductionist framing', that relies on the hierarchy of 'objectivising' scientific language while neglecting the social elements of risk and 'real world conditions', that have little to do with controlled laboratory experiments. In agreement with Jensen, Wynne suggests that the problem with 'expert knowledge' is that it believes itself to be objective and culture free when, in reality, scientific understanding of pesticide risk also corresponds to 'particular cultural and epistemic principles, the objectivising perspective of scientific knowledge'. Several of the studies that I cite in chapter 1 conclude that a lack of evidence or inconclusive evidence does not imply that there is no risk (Wigle et al., 2008, Garcia, 1998). Wynne takes this a step further and suggests that the mechanisms, approaches and risk assessments used by the group that he refers to as 'experts' and in particular those conducted by manufacturers and official health safety or environmental bodies are only designed to detect narrow and specific types of harm. Real world conditions are diverse and different.

In their analysis of risks in childbirth, Kaufert and O'Neil contrast epidemiologists' statistical conception of risk with Inuit social and individual understanding (Kaufert and O'Neil, 1993, p48-9). The authors cite a discussion about the risk of maternal and infant mortality among Inuit of Eskimo Point, where a physician uses mortality statistics to argue for the universal evacuation of pregnant women. In the exchange an Inuit woman appears unwilling to appreciate this risk, given as 20/1,000<sup>19</sup>, responding that she doesn't 'think it's quite as risky as they think it is'. The woman speaks from her own experience telling how she has had fourteen children on her own and has never seen any of them dying. Her conception of risk is based primarily on her own personal and community experience but is also rooted in a traditional way of life in which people have survived in a 'harsh and dangerous world by their own competence and self-reliance'. Risk, the authors conclude, is 'accepted as part of the reality of northern life'. In contrast these women see the statistical version of risk as a theoretical construct, unrelated to their lived experience and 'lacking local validity'. Wynne, Kaufert and O'Neil emphasize how very differently cultures see and conceive of risk. The Inuit women do not see risk, they see their right to continue living their traditional way of life, of which death is also part. Frankenberg takes this a step further to suggest that risk is actually a *moral* choice. In 'Risk: anthropological and epidemiological narratives of prevention', the author writes 'people in Bavaria or the USA who argue that the law and the police should be involved in preventing the spread of AIDS on the grounds of social good, still oppose gun control to reduce homicide. Even while supporting the war against drugs they do not advocate laws to control the intake of food and tobacco to curb the continuing epidemics of lung cancer and ischemic heart disease' (Frankenberg, 1993, p228). Citing Douglas, he concludes that 'the well-advertised risk generally turns out to be concerned with legitimating moral principles' (Frankenberg 1993, p236). According to Frankenberg, moral, social and political choices are always involved in discussion about risks to the individual body. For the Inuit and the Huichol these moral, social and political

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<sup>19</sup> From the text it is unclear whether the 'risk' of 20/1,000 appears to refer to joint infant and maternal risk, ie the risk of either a mother or child dying, or only to infant mortality.

choices are heavily influenced by their preference for maintaining key aspects of their traditional lifestyles, while for an 'expert' in pesticide risk, these choices may be influenced by politics and economics.

So how do we expect these conundrums to influence what indigenous workers know about pesticide risk? As I mention in chapter 1, it has been suggested that lay people possess a much broader understanding of risk than do experts. They 'would be employing their full range of senses, including not only their eyes nose and mouth but also experiences, memories and moral convictions, to make sense of pesticide risks' (Jensen and Blok, 2008, p769) and, they 'They mix together, as a matter of course, certain scientific issues with broader social, ecological and moral commitments.' (Blok et al., 2008, p201). Here Block and Jensen coincide with others (such as Wynne) who suggest that how people understand pesticide risk is influenced by a wide range of factors, that these may not be science based and will have been influenced by their specific experience of exposure and their need and their moral and social context. I will discuss what this contexts and needs may be in Chapter 7. I would also suggest that what Block refers to from within an illustrated western society as commitments, for the Huichol implies needs.

The perception of vulnerability or risk and the belief about whether actions to prevent harm would be effective will be discussed in this chapter in relation to the Health Beliefs Model in the first instance. Other factors that may contribute to this understanding are their own illness representations (Huichol ethno-medicine/ medical culture and understandings of illness) and their epistemology of health and illness, (the nosological categories that they use to understand illness causality), an approach dealt with by the 'meaning centred' or interpretative branch of medical anthropology. Finally, to these interpretations I will add the perspective of critical medical anthropology, a branch of this discipline that is also responsible for deploying the concept of structural violence as socio-historical interpretation of causality. In the context of Huichol tobacco workers, this could include an understanding of structural

inequalities, from the ethnocide that has characterised the Mexican nation's relationship with its indigenous populations since the Spanish conquest to the specific type of exposures that they experience, exposures that fall outside the usual parameters of risk assessment and that are possibly unique.

## **Theoretical approaches for exploring indigenous health and pesticides**

### **4.2 The Health Beliefs Model and beliefs about pesticide harm**

The Health Beliefs Model is concerned with understanding why, or why not, a person undertakes a recommended health related action. This model particularly focuses on preventive actions taken in the absence of compelling symptoms or a 'person's desire to avoid a specific disease threat' (Becker et al., 1978). By health behaviour I refer to 'Any activity undertaken by an individual, regardless of actual or perceived health status, for the purpose of promoting, protecting or maintaining health, whether or not such behaviour is objectively effective towards that end' (Nutbeam, 1998, p355). Implicit in this definition is the purposeful nature of the action, being something that is consciously done to improve or protect one's health. The model, originally developed to help understand patient adherence to health regimes, focusses on explaining and predicting behaviour directed to prevention and is grounded in 'a well-established body' of psychological theories of behaviour (Becker et al., 1977, p349).

The philosophy behind this model is that belief determines behaviour (Dein, 2007), thus knowing about peoples beliefs (about health) is, theoretically, central to understanding why people behave in determined ways when faced with illness or the threat of illness. Poss refers to the HBM as an 'expectancy model', one that proposes that 'behaviour depends on how much an individual values a particular goal'- for example their health, and whether they judge that a particular action will achieve this goal (Poss, 2001). Thus the person must feel

that they are actually vulnerable to this problem (perceived vulnerability) - in this case to the threat of illness or ill health from pesticides, whether they think this problem is serious (perceived severity), whether they feel that any preventive action will be beneficial to reducing this threat (perceived benefit) and that there will not be insurmountable barriers to achieving this (perceived barriers).

As I explain in chapter 1, the purpose of including this model, in keeping with my interpositional approach to addressing my research question, is to critically evaluate the importance of beliefs about risk/vulnerability (perceived risk) to knowledge and behaviour regarding pesticides. While, as I have stated throughout this thesis, I am working on the assumption that knowledge (in this case about pesticide risk) does not necessarily lead to behaviour (in this case preventative behaviour), it remains unclear whether there is a perception of risk (about pesticides), and what impact this may have on behaviour. Thus I will make critical reference to the model in my discussions of beliefs. This will serve firstly to assess its value as a public health approach to understanding pesticide risk among indigenous population and secondly as a counterpoint to anthropological explanations, to bring in to question the nature of both belief and risk as theoretical constructs.

The HBM model is essentially positivist, based on the premise that people behave in what others might perceive as irrational or unreasoned manners because they hold certain, sometimes considered equivocal, beliefs about health and illness prevention (Poss, 2001, p2). From an anthropological perspective this empiricist approach to health and people's understanding of health is problematic because, as Dein suggests, it 'fails to cast light on cultural differences in illness behaviour'(Dein, 2007, p40). Herein lies the primary concern with using this model to understand indigenous beliefs about health. As I state at the beginning of this chapter, indigenous people's beliefs and understandings about health are wider than the biomedical concept, encompassing the concepts of culture and spirituality as well as historical and

broader social understandings that biomedical models do not contemplate - systems of beliefs that are different conceptually and in praxis.

A second problem with this model and a point which had wider implications than those which presents for the model itself, is the question of 'belief' as a concept that is dichotomous to 'knowledge'. This is a central discussion to anthropology and is particularly relevant to applied studies in public health, where 'belief' is commonly seen as referring to popular or lay understandings and knowledge to the scientific knowledge, that which for the positivist, is true knowledge (Good, 1994a). In this the dominant position, the scientific method of inquiry is what Good refers to as the 'arbiter' between knowledge and belief. For the empiricist, 'beliefs' are relegated to the cultural realm, to little more than localised ideas. The HBM works on the theory that beliefs are often equivocal and that these can be changed, possibly through the acquisition of knowledge. My position, and one which is widely held in meaning centred anthropology is that beliefs and knowledge are not contrasting terms because essentially each is culturally produced and understood. Pelto and Pelto examine this dichotomy proposing that:

'All people, whether biomedically trained health professionals or rural villagers, have cultural belief systems about the causes of sickness and possible remedial measures. The belief systems of health professionals are supported by substantial empirical evidence, but they are beliefs all the same; and the beliefs are constantly revised in the light of new information. In our view, the failure to recognize this, and the tendency to distinguish beliefs and knowledge based on their "truth value" has often complicated and confused the examination of relationships between belief/knowledge and behaviour' (Pelto, 1997, p148).

The position defined here is that we should not seek to judge whether particular beliefs are correct or incorrect on the basis of their 'truth value', or their empirical base. Beliefs about what is good for our health are also mostly based on empirical experience and like the beliefs that are generated using the scientific method, these are also constantly updated in the light of the

accumulation of experiences. This is a problem to which I will also turn in Chapters 5, and 7, in relations to womens' knowledge about reproductive health.

The purpose of this thesis is to attempt to bridge the epistemological gap in understandings and in this sense the value that established approaches such as the HBM could bring to the question of '*how do indigenous (Huichol) people understand the risks of pesticides?*' is firstly, as an initial attempt to assess whether their particular set of beliefs *do influence their health behaviour* and secondly, as an indicator of their perception of risk (in relation to pesticides). Thus of my data I will ask whether this (Western) model of belief is actually of relevance to the Huichol people and whether, as is believed to be the case in Western contexts, these beliefs influence behaviour. Secondly, as an indicator of *risk perception* elements of this model may indicate to what extent this group of migrant workers feel vulnerable to pesticides and whether they feel that they can do anything about it.

As I explain in the remainder of this chapter, anthropological theory will be used to explore and explain specific beliefs, knowledge and experiences in more depth.

### **4.3 Medical anthropology**

In 1975 Horacio Fabrega wrote an article for Science defining the need for an 'ethnomedical science' which 'embraces theoretical concerns that are relevant both to the social and medical sciences' (Fabrega, 1975, p974). It was during this decade that medical anthropology as a separate discipline really took shape, driven by theorists such as George Foster, Murray Last and Arthur Kleinman, and 1977 saw the emergence of the medical anthropology, the first journal to focus specifically on this field of study.

In Mexico, medical anthropology as a specific field of study emerged at a time when national (governmental) health providers<sup>20</sup> were expanding service provision into indigenous and rural regions, thus the discipline was able to develop in direct partnership with new medical contexts that posed particular cultural challenges. Pioneering works of anthropologists such as Aguirre Beltrán and Fernando Benítez (Aguirre Beltrán, 1994b, Benítez) responded to the growing need to understand the beliefs and practices of the country's many indigenous groups for the purpose of improving and facilitating provision of health services. These early ethnographies were followed by the applied research of medical anthropologists such as Zolla and Menéndez who worked in the field as both anthropologists and public health practitioners, writing from the experience of direct involvement with rural health programmes (Zolla, 1988, Menéndez, 1992). In more recent decades Mexican medical anthropology has developed further theoretically, particularly in a critical sense and very much reflecting the experiences of anthropologists working within the wider health sector (Menéndez, 2009, Castro, 2000, Freyermuth Enciso, 2003). The strength of Medical Anthropology in Mexico, at least in terms of the field that corresponds to non-western medical systems, is that it has principally developed in response to the challenge on its own doorstep: meeting the health needs of a large indigenous population that has lagged behind in health terms since colonial times. This has required as a first step understanding illness representations, secondly interpreting these and finally taking a critical look.

In the following sections I describe three approaches within Medical Anthropology that are useful for understanding health and health seeking behaviour, particularly in this context, and how they add to our understanding of health and beliefs through consideration of wider cultural, structural and epistemological factors. In keeping with the interpositional nature of this thesis these three approaches are seen as generating different layers of

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<sup>20</sup> The Instituto Mexicano de Seguridad Social (IMSS) for employees in the private sector, the Secretaría de Salud (SSa) for the uninsured and Instituto de Seguridad y Servicios Sociales de Trabajadores del Estado (ISSSTE) for government employees.

understanding: rather than offering opposing interpretations they provide complementary perspectives that fit together to form a wider and deeper understanding of how this knowledge about health is generated and acted upon than public health is able to offer.

#### **4.3.1 Illness representations: concepts for understanding traditional medical systems**

Early studies of other medical systems lead to the development of what is referred to by Good as the ‘empirical’ paradigm, the idea that western biomedicine constitutes the rational concept of disease and illness and that other, traditional medical practices are beliefs (Good, 1994a). It is these beliefs that were seen to contribute to the reasons for ill health among non-western populations, beliefs that need to be understood so that biomedicine is better able to serve these populations. Medical anthropology has moved on epistemologically since classical empiricist texts such as ‘Witchcraft, Oracles and Magic among the Azande’ were written (Evans-Pritchard, 1972). However, as I mentioned earlier in relation to the HBM, criticism remains within the interpretative and critical branches of medical anthropology that the empirical and clinical paradigms and the knowledge/belief dichotomy continue to underlie a large amount of research about ‘traditional’ medical cultures (Kleinman, 1995).

The interpretative approach in medical anthropology that emerged as a critique of these empirical perspectives is based largely around the idea of sickness, illness and disease as social constructions. Along these lines it has developed a series of theories that essentially deal with the meanings and interpretations, or as Kleinman states, theories ‘...concerned with describing, comparing and determining the biosocial consequences of the webs of cultural and personal beliefs and values within which sickness is organised as a human experience (Kleinman, 1981).’ Essentially this approach is based on the premise that illness and disease, more than biological phenomena are *representations* that are given

different meanings by different cultural groups. As Menéndez suggests: 'social groups have the need to construct social and collective meanings relating to (...) their illnesses' (Menéndez, 1994). Writing from the Mexican context, this author describes how the processes of 'health/illness/therapy' continue to be one of the areas of life within which the greatest numbers of symbols and collective representations are structured. Thus, in structural terms, in each society these processes assume representations and practices to understand, confront and if possible, resolve the incidence and consequences generated by sickness. These processes have developed, along with meanings, within a historical context through which the causal factors, the treatment and the meanings of the disease are *constructed*.

Medical anthropology differentiates between illness and disease as different ways of explaining sickness. The term 'disease' refers to the malfunctioning or maladaptation of biological and psychological processes, while 'illness' signifies the experience and societal reaction to disease, the way the sick person, his family and his social network perceive, label, explain, valuate and respond to disease (Kleinman, 1978a) . Menéndez refers to illness as the *collective meaning* associated with the disease. Sickness, then, is the socially recognised behaviour of sick people, the kind of behaviour which would be socially unacceptable if it were not that some means of exculpation -based on disease- is provided. In this sense, sickness is seen as a form of social deviance, but one that is acceptable because it is attributed to 'some agency beyond the sick person's will' (Menéndez, 1994). Thus, within the social meanings of sickness 'symptoms' become 'signs', because they are expressed, elicited, and perceived in *socially acquired ways* (Young, 1976).

The meaning centred approach to sickness, illness and disease refers to these terms as social constructions in a cross cultural sense. In the words of Last 'each ethnicity carries within itself not only its own specific illnesses, but also its own cures' (Last, 1981, p6) . He describes this as an 'ethno ecological theory' within which 'medicine is being seen not so much as a medical system but as part of

the necessary cultural camouflage, like clothing and food, that enables one to survive, preferably unnoticed, in a diverse society'. Kleinman has developed these concepts through the cross cultural analysis of medical systems, in particular comparisons between traditional and biomedical medical systems (Kleinman, 1981, Kleinman, 1978a).

In the context of the meaning centred approach Murray Last, asks the question, 'is there such a thing as a Traditional Medical System?', putting emphasis on the idea of some sort of a coherent and defined structure as opposed to a group of beliefs (Last, 1981, p7). In the course of his essay on this topic the author attempts to justify his theory that such a system no longer exists, based on the assumption that a Traditional Medical System would need to integrate 1) a group of practitioners, all of whom clearly adhere to a common consistent body of theory and base their practice on the logic deriving from that theory, 2) patient recognition of the existence of such a group of practitioners and such a consistent body of theory and, while they may not be able to give an account of this theory they accept its logic as valid and 3) that the theory is held to explain and treat most illnesses that people experience. He also considers it 'out of the question' that traditional medicine could have a 'single comprehensive system to account for all illness', and that 'even a coherent set of ideas embedded in the language or implicit in people's actions has now disappeared'. Central to Last's theory is that biomedicine has undermined the cohesion of what in the past may have been 'systems', to such an extent that these no longer comply with his criteria, a premise that he illustrates with the example of the medical culture of the Malumfashia area of Nigeria. Whether or not 'traditional medical systems' exists may simply be an issue of perspective. For Menéndez there is no doubt that such systems exist, the question is *how* to define them. This he does by referring to the group of people labelled to as 'traditional' and suggests three ways in which these have been defined: i) Folk Groups: indigenous, marginal urban or generally speaking that do not share the scientific world view, ii) groups that are different, opposite or simply antagonistic to the dominant

(scientific) and iii) groups that are not modifiable or incompatible with dominant processes (Menéndez, 1994). In essence, Menéndez describes as 'traditional' the medical system of any group that is not biomedical. As I will describe in the following chapter, the Huichol and their medical system fits neatly into this definition.

### *Explanatory models*

One of the underlying claims of the interpretative tradition in Medical anthropology is that disease is not an entity, but an explanatory model. While some may debate whether indigenous groups such as the Huichol can lay claim to a 'Traditional Medical System' of their own, they certainly have a specific Explanatory Model (EM) that is intertwined with spirituality, culture and traditions, one that I describe in detail in the following two chapters. The EM approach to understanding medical cultures was initially developed as a clinical application of an anthropological concept. These models are effectively a set of beliefs and understandings that specify how an illness episode is caused, its mode of onset and symptoms, pathophysiology and its treatment and they have often been used to teach clinicians the 'native point of view' (Dein, 2007). Very often it is through the EM that medical anthropologists are able to understand the *meanings* behind sickness since these may overlap with their social, spiritual and environmental aspects.

According to Kleinman (Kleinman, 1978a) EMs contain explanations of any or all of five issues: etiology, onset of symptoms, pathophysiology, course of sickness and treatment. These can be elicited from practitioners, patients and family members for particular sickness episodes and, within traditional cultures, are historical and socio-political products as opposed to clinical. Herein lie the fundamental differences between biomedicine and traditional medicine. A biomedical EM may structure a view of clinical reality in which the sickness is located within the body of the person and care is viewed as treatment of the diseased organ while those of popular culture may locate the

problem in the family and label the entire family as sick. Science, as opposed to the social, cultural, political and historical, is the basis of explanatory models for biomedicine. In contrast, indigenous EMs are holistic, seeing causality as a wider social and cultural phenomena, as Durie suggests in his description of the indigenous concept of health (Durie, 2004). In the following chapter I describe the Huichol EM in more detail as a model that is primarily determined by religious and cultural elements but as a dynamic model it has also been affected by the biomedical model, incorporating elements of this on its own terms into the traditional model.

### *A holistic approach*

The Huichol explanatory model, as is the case for many traditional models ranging from that of Evan's Prichard's Azande to Alfredo Lopez Austin's Mesoamerican model locates the cause and cure for disease in magical-religious realms. But to fully understand these models, we must relate cultural, socio-political and biological determinants to biological and cognitive processes through the medium of *cultural systems of meaning*. Thus these models need to consider health and sickness as multi-factor interactions on biological, psychological and social levels, not the result of single determinants operating on only one level of analysis (Kleinman, 1978a). Essentially, understanding the meaning of ethnomedicine needs a holistic approach, one that attempts to describe 'patterns of relations between illness-related beliefs, behavioural norms, roles and transactions that show how they integrate into and from local cultural systems', or as Dein explains it, 'a social institution cannot be understood in isolation from other social institutions' and we cannot understand the health system of a particular culture in isolation from their economy, social relationships, religion and political systems (Dein, 2007). Emphasising their holistic nature, both Menéndez and Kleinman refer to medical systems as 'cultural systems'(Menéndez, 1994, Kleinman, 1978a). More than simply systems of meaning and behaviour, they revolve around social and cultural relationships and institutions. Menéndez in fact describes the role of a

healer and medical system as one of ‘cultural integrator’, a role that is clearly assumed by the Mara’akame in Huichol communities.

#### **4.3.2 The meaning centred/interpretative approach**

##### *Cognitive categories*

‘Over and over again I have been struck by the enormous power of the idea, within medicine, that disease is fundamentally, even exclusively, biological’ (Good 1994, p70).

Discussions around illness representations and meanings also need to confront the broader, epistemological question of whether the nosological categories that are used to describe disease, the body and other related concepts have the same meanings everywhere and to everyone. In what Lock and Scheper Hughes describe as a ‘critical interpretative approach’ medical anthropology becomes more than ‘simply the study of medical systems and practices’ (as described above), but ‘the way in which all knowledge relating to the body, health and illness is culturally constructed, negotiated and re-negotiated in a dynamic process through time and space’ (Lock, 1996, p49). This process is situated within a geopolitical context and, for the Huichol, their location in the sierra, and their relationships with deities have been crucial to this construction.

A wide and varied range of experiences and behaviours have become grouped under one category, or as Good states, ‘complex human phenomena are framed as ‘disease’ and by this means become the objects of human practices’(Good, 1994a, p53). This argument revolves around the ‘mistaken belief that our categories belong to nature, that disease as we know it is natural and therefore above or beyond culture’. This mistaken belief is what Kleinman terms a ‘category fallacy’ (Kleinman, 1977, p4).

The principal criticism of the biomedical concept of disease from medical anthropology is that this definition is assumed to be universal when in fact it constitutes a particular culturally specific perspective about what disease is.

Western medicine defines and describes illness and disease from a uniquely biological perspective that ‘makes sense’ in light of cultural traditions and assumptions about reality, in this case the scientific world view around which western societies are organised (Mies and Shiva, 1993). This ‘category fallacy’, is described by Kleinman as ‘perhaps one of the most basic and certainly most crucial errors one can make in cross cultural research’ rejects indigenous and non-western categories on the basis that they are ‘culture specific’ while considering itself ‘culture free’ (Kleinman, 1977, p4). As I illustrate in the following chapters, Huichol illnesses are mostly supernatural but their categories are dynamic. As a rule there is no categorical differentiation between illnesses on the basis of their biomedical form but on the basis of their cause. The logic of western medicine simply does not apply.

By categorically stripping illness and disease down to ‘deviant behaviour’, Kleinman proposes that we must compare explanations (of behaviour) as opposed to entities (diseases), for each culture explains and interprets this deviance differently. Biomedicine does this on an individual basis through biology and science while other cultures look to society, religion, spirituality and other sources for their explanations. Kleinman, along with Scheper-Hughes and Lock and Csordas approach the study of deviant behaviour phenomenologically (Kleinman, 1977, Scheper-Hughes and Lock, 1987, Csordas, 1988). Referring to psychiatric disorders Kleinman proposes that we begin with ‘phenomenological descriptions which would enable us to compare indigenous and psychiatric explanations of the disorders with the behaviours they interpret (...). These accounts could be used to analyse the influence of culture on these disorders in each cultural site. Rather than looking for universal explanations, this perspective proposes the dismantling of categories in order to understand how illness is conceived from a broader starting point. This would conceive of disease as malfunctioning or maladaptation of biological or psychological processes, the physiological ‘deviance’ and illness as the personal, interpersonal and cultural representation of disease. While social and cultural factors may not

influence the nature and course of disease, they will *always* influence illness, as this is per-se socially and culturally constructed. Furthermore, the manner in which illness is conceived will influence treatment, care and behaviour associated with prevention. Healing is to illness what cure is to disease, the social/emotional/spiritual aspect of treatment and the physiological aspect of healing. Biomedicine tends to focus on the cure of diseases independent of social behaviour (Fabrega, 1975) while non-biomedical systems are more inclined to address the healing side of treatment (Kleinman, 1977). There is little in the healing rituals of mara'akate that could be considered to treat the 'disease', their procedures focus almost entirely on the social and spiritual aspects of illness. This is discussed in more depth in chapters 5 and 6, but essentially healing involves correcting transgressions, as opposed to treating a disease. In fact while mara'akate recognise the role of medical doctors in the treatment of certain diseases they continue to perform their healing rituals since only these are capable of healing the social and spiritual cause of illness. Differentiating between these categories is crucial, as is the understanding that they sit, at times comfortably, side by side. They are different and complementary and in terms of therapy they are both curative and symbolic.

### *The body*

In parallel to the concepts of disease and illness, many medical anthropologists question the meaning of the concept of body itself (Csordas, 1990, Scheper-Hughes and Lock, 1987, Lock, 1993, Turner, 2006). A starting point for this position is what Csordas refers to as the 'collapsing of dualities' though the concept of embodiment. The body has been described variously as a 'repository of values' a 'setting in relation to the world', a 'concept for understanding cultures and society' and a 'natural symbol, supplying one of our richest source of metaphors' (Douglas, 1973, p65, Bourdieu, 1977 p68, Scheper-Hughes and Lock, 1987 p8). Each of these alludes to the notion of an embodied entity. The individual/ society and nature/culture boundaries are key to embodiment which Csordas (1990, p7) describes as the 'methodological principle' involved

in the ‘collapse of dualities between mind and body, subject and object’. The fleshy or visible body being the physical medium for experience, memory, illness, thought, relationships and other ‘embodied’ experiences. Through the collapse of dualities, the conceptual lines that separate our body within itself and from external events are erased; these events are embodied to form a whole, the body-self identity-social process.

Scheper Hughes and Lock, and Csordas are concerned with *epistemological* issues relating to the body, proposing that in order to understand the human body, we must re-think certain analytical categories that pre-determine how we conceive of this entity. Scheper Hughes and Lock base this position on the fact that non-western civilizations have developed alternative epistemologies that tend to conceive of relations among similar entities (such as the body) in monistic as opposed to dualistic terms. The authors of ‘The Mindful Body: a prolegomenon to future work in medical anthropology’ suggest that since this epistemological tradition of generating multiple categories is a ‘cultural and historical construction and not one that is universally shared’, it is essential that we begin our project in Medical Anthropology ‘with a suspension of our usual belief and cultural commitment to the mind/body, seen/unseen, natural/supernatural, magical/rational, and real/unreal’ dichotomies, particularly relevant to the study of a society, as I have described in Chapter 3, for the Huichol there is no division between natural and supernatural or a dichotomising of magical and rational. In terms of illness explanatory models, for the Wixárika the magical is rational and the supernatural is also natural for humans can enter the supernatural realm and spirits inhabit homes. In perceiving the body in relation to society, or ‘as a setting in relation to the world’ Scheper-Hughes and Lock also suggest suspending the individual/society division, wherein humans are single and separate entities and the culture/nature and natural/supernatural<sup>21</sup> dichotomies which suppose that

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<sup>21</sup> As I explain in chapter 3, the Huichol do not differentiate between natural and supernatural, this is a division that does not exist since their world is their cosmos. For clarity I will retain their use in this thesis.

humans live separately from their environment and divinities, assumptions that do not hold in many indigenous communities. This gives us an entity in which mind and physical body are one, society and the environment flow freely in and out, creating and recreating, and this earthling is also a member of the supernatural cosmos, freely liaising with divinities and moving within their social world. Each of these bodily components: society, the environment and cosmos are vital aspects of its wellbeing. For the Huichol the 'healthy society healthy body' metaphor comes into its own at the moment of the fiesta. This is the moment at which people commune with deities and through sacrifice and ritual they ensure both bodily and social wellbeing. These relationships are illustrated in Chapters 5 and 6.

Much as a corporal extension to the concept of 'habitus', Bourdieu talks of 'body hexus', a concept that Throop and Murphy describe as a 'practical methodology which embodies, turned into a permanent disposition, a durable way of standing, speaking, walking, feeling and thinking' (Throop, 2002). Thus, the body *hexus* is the performance aspect of habitus, the socially inculcated ways the individual moves, carries and positions his or her body in the lived world. Key to Bourdieu's concept is memory and the body as a 'living memory pad' for childhood, beliefs, and 'instituted dogmas'. As a structuralist, he sees the body as a construction of the society we live in and in particularly the institutions. Institutions, symbolic power, and 'habitus', the whole social order impose themselves in the deepest sense on Bourdieu's concept of the body. In essence, the body embodies society in a holistic sense in which 'everything from the cosmos down to the individual organs of the human body are understood as one single unit' (Scheper-Hughes and Lock, 1987, p12). To bring this discussion back to illness, it should not be surprising then that sickness is often explained or attributed to malevolent social relations such as witchcraft, to the breaking of social and moral codes, to disharmony within the family or the village community or seen as a form of communication between, for example, nature, society and culture nor that therapeutic rituals become group or community

processes. The role of witchcraft is recurrently mentioned by my Huichol informants and clearly plays a central role in their beliefs about illness causality.

#### **4.3.3 Critical medical anthropology**

The ‘critical’ position in medical anthropology builds into the interpretative approach described above; focussing on the social and political nature of health and illness, with the additional theoretical level that it posits these aspects as *causal* as opposed to simply interpretative. The critical perspective in fact suggests that biomedical and symbolic explanatory models of disease can obscure the social causality of illness. This position argues that international public health has purposefully avoided the politicization of health and illness, by what Farmer refers to as the ‘erosion of social awareness’ (Farmer, 2004), while clinically applied medical anthropology ‘produces little or no challenge to the perverse economic power relationships that inform and distort every medical encounter’(Scheper-Hughes, 1992, p191).

While the interpretative approach emphasizes the need to situate disease and illness historically and socio-politically in order to understand *why they are constructed in a certain manner*, and illness representations concentrate on symbolic and ritual elements as if these were ‘independent of political economic context’ (Singer et al., 1990), Critical Medical Anthropology (CMA) looks particularly at history and politics for the causes of disease and illness, or as Farmer defines it, ‘the large scale social and economic structures in which affliction is embedded’(Farmer, 2004).

Scheper Hughes (1992, p189)describes CMA as the ‘application of Marxist political economy to the social relations of sickness and health care delivery’ beginning with the recognition that ‘many illnesses that enter the clinic represent tragic experiences of the world’, referring to situations of extreme poverty, exploitation and discrimination that *undermine agency* in people’s access to healthy living conditions and health provision. These elements are

what Farmer describes as 'ethnographically invisible' (Farmer, 2004, p305) but they become embodied as individual experiences, just as cultural and religious aspects are also embodied through the habitus, making people particularly vulnerable to certain risks. In this case, the risk of harm from pesticides.

As with all variations of Critical Theory, CMA looks for invisible and hidden truths beneath the surface, beginning with a direct attack on the medical industry as a branch of the capitalist mode of production and the recognition that illness, disease and treatment occur within this context. In its critique of how the system exercises ideology and power over individuals and submerged social groups and shapes social processes, CMA suggest that it is contradictions within the capitalist mode of production that are responsible for differing patterns of health, health care and health related behaviour as well as illnesses and ultimately also preventable deaths (Scheper-Hughes, 1992, Singer, 1990, Baer et al., 1986).

Baer et al suggest a critical definition of health as 'access to and control over the basic material and non-material resources that maintain and promote life at a high level of satisfaction'(Baer et al., 1986, p95). These authors refer to a number of actors within the health sector, including 'international health agencies, foundations, national-bilateral aid programmes, all multinationals'. They make specific mention of 'purveyors of chemical fertilisers and pesticides and sellers of population control devices', implicating these organisations in the health of individual people and groups of people.

The critical approach to medical anthropology proposes a broader understanding of the causes of disease and illness and one which comprehends factors that clinical and interpretative medical anthropology and medicine themselves do not look to. Inherent in this discussion is a criticism of positivist approaches to social sciences and medicine which, as I discussed above, tend to break down issues into parts and study each of these separately, rather than looking at the wider picture, not least the anthropological tradition of localised

studies of cultural groups. In this sense Singer posits this theoretical approach as a bridge between political science and anthropology, describing its role as one of 'synthesising the macro-level understanding of political economy with the micro-level sensitivity and awareness of conventional anthropology' (Singer, 1990). Essentially, applied to this context CMA links the individual experiences of Huichol tobacco workers to national and international level political and economic power relationships, historical injustices and several layers of social discrimination.

Within the critique of the capitalist world system Farmer, Last and Menéndez turn to the role of colonialism as a key determinant of the health of the poor (Farmer, 2005, Last, 1981, Menéndez, 2002). These authors, in particular Farmer, discuss how colonialism laid the foundations for contemporary health structures and relationships, defining access, social relationships and economic inequalities that ultimately determine the ill health of the poor. Farmer and Menéndez are emphatic that one cannot avoid the role of colonialism in shaping people's access to and *agency* in health. Farmer described the mechanisms through which the structures imposed by French colonialism in Haiti created racial and economic structures characterised by 'too much and too little' that continue to have 'grave material consequences for Haitians today' in terms of 'Management of time, affection, food, scarcity, water and family crises (including illness)'. The author refers to neoliberalism as the ideology 'promoted by the victors of colonial struggles, an ideology grounded in the inequalities and exploitation that continue to be embodied by Haitians today' and to 'play itself out in the daily lives and deaths of the part of the population living in poverty...' (Farmer, 2004, p313). For Huichol women these historical relationships are evident in their decisions regarding up take of health care and they have played an important role in defining Huichol birthing practices for a lack of agency and feelings of inferiority have generated a culture of shame, a condition that Bourdieu refers to as a manifestation of 'symbolic violence' (Bourdieu, 2004) as I illustrate in chapter 6.

### *Structural violence*

One of the central concepts within CMA is structural violence (SV), described as ‘the social arrangements that put individuals and populations in harm’s way’ (Farmer et al., 2006, p2). This concept proposes that violence is embedded in the economic, political, legal, religious and cultural structures, stopping individuals, groups and societies from reaching their full potential through structural constraint of their agency. The term violence is employed in a broad sense that goes far beyond the physical to refer to, ‘the avoidable impairment of fundamental human needs...or the impairment of human life, which lowers the actual degree to which someone is able to meet their needs’ (Galtung, 1969, p167). In this sense the concept SV refers to *causal* as opposed to *explanatory* factors in premature death and disability.

A lack of social and economic rights is central to the idea of structural violence in the manner in which it curtails access to the basic human needs that we require for good health. Scheper Hughes illustrates how this operates in Brazilian Shanty towns, explaining how hunger and poverty curtail women’s ability to mother and care for their children describing how ‘the mothers you are talking about rarely pay attention. This class of woman is too poor to take care of themselves, let alone a damaged child’ (Scheper-Hughes, 1992, p372). In ‘Death without weeping’ the author refers to the ‘unmet and basic human needs’ that exclude them and ‘redefine them as something other than what they are’, by which she refers to the manner in which poor parents are classified as bad parents, neglectful or uncaring because they fail to ensure the wellbeing of their children, as if the ability to cope with poverty were somehow independent of the structural factors that define their lives (Penn, 2002). Penn uses the concept of structural violence to critique the manner in which development programmes that focus on empowering poor women to improve their lives, or participatory programmes that aim to improve ‘inappropriate child feeding practices’ neglect to address or even question the underlying causal and structural factors: hunger, exploitation and poverty. Like Scheper Hughes, the

author points to the effect that these political and economic structures have on agency.

As I explain in Chapters 3 and 7, many of the employers who I interviewed in as part of this research process spend half of their year in Virginia, USA, where they themselves work as migrant labourers on tobacco plantations and earn far more than they are able to pay their Huichol workers. It should come as no surprise that the conditions under which they work in the USA are, relatively speaking, little different to the context I have describe in this thesis and in his ethnography of tobacco labour camps in North Carolina, Benson also recurs to the concept of structural violence to explain how these workers are particularly in harm's way (Benson, 2008). As I do in the following chapters, Benson describes not only the structural but also the everyday and symbolic forms of violence that are played out on farm labour camps. Ironically, Benson's study only came to my attention once I had completed my analysis of the manner in which structural violence is played out among Huichol migrants but as if to reinforce the rhetoric, the author identified an almost identical set of social and historical conditions and relationships between southern white farmer and Mexican migrant workers as I do between the Huichol and their mestizo employers. A similar analysis has been conducted by Quesada et al with reference to Latino migrant labourers. These authors develop the concept of structural vulnerability, suggesting that latino migrant labourers are a population especially vulnerable to structural violence because their economic location on the lowest rungs of the US labour market is 'conjoined with overt xenophobia, ethnic discrimination and scapegoating' (Quesada, 2011).

Structural violence, using Bourdieu's concept of habitus is 'structured and structuring', constricting the agency through social inequalities as these are quite literally embodied as illness, hunger and premature death. Because it is *structural*, SV constrains *agency* –the capacity of individuals to act independently and make their own free choices. Empowerment, in contrast, is a process that enables individuals to access power, without challenging the very

structures that constrict their capabilities and their power. It is from this position that Schepper-Hughes, Farmer and Penn, among others, criticize the industries of multilateral aid and international public health that serve the capitalist system by producing sticking plaster solutions –such as empowerment and participation– to structural problems and in doing so facilitate their perpetuation, as Farmer describes, ‘International organisations are not on our side. They’re there to help the thieves rob and devour...international health stays on the side-lines of the struggle’ (Farmer, 2005, p225).

Another of the mechanisms through which international public health and the medical profession in general operate to perpetuate unjust social and economic structures is through what Schepper-Hughes refers to as the medicalization of poverty, the manner in which the social and economic needs of a population are medicalised and given an illness label, as opposed to politicised and attributed to injustice (Schepper-Hughes, 1992, p169). Using as an example the Brazilian folk illness *nervos* (*nervios* in latin American Spanish) which she defines as a ‘rich folk conceptual scheme for describing relations among mind, body and social body’, the author describes how the illness becomes de-socialised, concealing the ‘social relations of sickness’ where an ‘individualised discourse on sickness comes to replace a more radical and socialised discourse on hunger’. Again the concept of embodiment serves us here in terms of the way in which people come to inhabit their own bodies. To better illustrate the issue the author asks ‘how have these people come to see themselves primarily as nervous and only secondarily as hungry, how have mortally tired cane cutters and washerwomen come to define themselves as weak rather than exploited?’. So why are these chronic embodiments of social injustices thought to be curable with medicine? Nervos is social illness for which the medical establishment and folk medicine itself prescribes a series of pills and other ingestible remedies, but not a cure for poverty.

Structural violence is embodied as illness and compounded by what Farmer refers to as a series of 'axes of oppression', referring in particular to race and gender, making women and particular racial groups more likely to suffer ill health as a consequence of social inequalities in what Farmer refers to as the 'conflation of structural violence and cultural difference' (Farmer, 2005). With reference to racial and cultural differences the axes of race works in two ways, firstly as a grounds for discrimination and the denial of rights and secondly, from the relativist perspective as cultural difference. While in recent decades racial discrimination has reduced substantially, rather like the permanence of colonial history, racial difference continues to structure people's access to services, constrict agency and on a practical level, create barriers such as language, morals and customs. Today race is also a proxy for class and in both the UK and the USA racial differentiations in health exist even once socio-economic and educational factors have been accounted for (Platt, 2002). In relation to the Mexican tobacco workers in the USA Benson in fact takes this position a step further, suggesting that class and economic depravity are used to reinforce discourse about race, suggesting that the idea of white supremacy is made possible by the economic subjugation of Latino workers, a situation similarly obvious between the Huichol worker and their mestizo employer (Benson, 2008).

Race is also used to condone inequity on the basis of *cultural* beliefs. This axis is more problematic and one that is buttressed by anthropology itself where poverty and inequality are overlooked or justified as some form of 'otherness' (Farmer et al., 2006). Essentially this issue embodies what CMA proposes, the critique that certain branches of anthropology, by focussing excessively on the cultural and symbolic and the importance of self-determination and tradition, overlook and ignore structures of inequality and injustice, a criticism that is highly relevant to the study of Huichol people. Cultural difference is used to explain away suffering as if there were a free choice in the matter. As Farmer points out 'culture does not 'explain' suffering, it may at worst, furnish an alibi'

(Farmer, 2005, p48-9). Scheper Hughes equates this racial aspect of structural violence to stigma, which, as a discourse ‘consigns the victims to a living death on the margins of interaction’ (Scheper-Hughes, 1992, p197).

Gender works much in the same way, as an axis of structural violence wherein women are ideologically situated as inferior to men. On this basis their rights are violated and so it is poor women who more likely to be victims of this structural inequality, as I make clear in chapter 6 in relation to women’s choices regarding health care. Less access to education because they are required to help with care of younger siblings or domestic tasks, mothers being the last mouth to be fed at the table, difficulties in accessing health care, for example this access being dependent on approval by a male figure, are all typical in the lives of poor women and can constrain their agency in access to health. In most settings, gender alone does not define risk for such assaults on dignity, but where this coincides with extreme poverty, it is likely to further generate disadvantage and constrain agency.

#### **4.4 Conclusion**

The essential argument of critical medical anthropology is the recognition of social and economic injustice as a causal factor in health and disease, where there is one standard for the wealthy and wealthy nations and another for the poor. Menéndez describes this as the conditions of hegemony/subalternity that oblige marginalised groups to develop a variety of health related strategies, aspects of their curative processes and their definitions of disease and illness, (Menéndez, 2002) of which *nervos* is a clear example, since these enable their survival. The crucial point here is that when we study explanatory models of illness and disease we must recognise their role as survival strategies within situations of injustice and inequality, not simply as folk treatments or cultural curiosities. Every discussion related to popular knowledge about health and illnesses must also refer to the context within which these develop. Here Menéndez makes reference to Latin America where

'most indigenous people suffer from the pathology of poverty: a high incidence of infectious and contagious illnesses, many of which can be explained through cultural syndromes such as *empacho*, *mal de ojo* and other traditional illnesses' (Menéndez, 2002, p231). Like Farmer, Menéndez brings the concept of structural violence full circle, illustrating its importance in the construction of the illness metaphor and representations themselves, linking together the three elements of medical anthropology that I have discussed.

It could be argued that CMA is in direct contraction to the Health Beliefs Model which works on the basic premise that knowledge leads to action and that it is the individual who must change. Structural violence is a critical and essentially Marxist approach suggesting the need for large scale social change that is complicated for an applied approach. It explains what is happening but struggles to propose real and short or even medium term solutions to these deep rooted social injustices that are the causal factors of ill health. Thus the theoretical proposal of this thesis is multi-layered. Between these two extremes the positions of meaning centred and interpretative medical anthropology will help fill gaps in our understanding and give pointers that may be of use in an applied sense, shading in some of the space between the indigenous and the scientific world views of how pesticides affect health.

## **Chapter 5 '*Nobody has anything in Taimarita'***

### **Tuapuritari ethnomedicine and medical syncretism.**

#### **5.1 Introduction**

In this chapter I will present and discuss data on the practices, beliefs and attitudes of my Huichol interviewees regarding health and healthcare based on data collected on tobacco plantations and in the Sierra. Interviews were initially informed by a freelist exercise where migrants were asked about the most common maternal, child and reproductive health illnesses and problems faced by their community and what they thought the causes of these illnesses might be, in an attempt to fill what Pelto and Pelto refer to as the 'communication gap' in the interpretation of cultural health systems (Pelto and Pelto, 1997). The exercise generated Huichol and Spanish terms for illnesses and provided initial insights into how informants view causality. Using this data in depth interviews were complemented by key informant interviews with medical doctors and field diary notes.

The chapter is divided into three parts, the first describing attitudes, practices and knowledge/beliefs regarding the provision of modern healthcare. In the second part I describe, through informants' experiences, their particular (traditional) medical explanatory model, summarising their relationships with the traditional medical system and their practices, knowledge and beliefs regarding Wixárika medicine. I conclude with a discussion of how these two systems merge and overlap into a syncretic form that is dependent on both sets of practices and beliefs/knowledge for its survival.

## **5.2 Experiences and attitudes, knowledge and beliefs, practices and norms regarding modern health care and provision in the Sierra and on the coast**

### *Contextual preamble*

As I explain in Chapters 2 and 3, the migrant workers who participated in this study are not a representative or typical sample of Huichol families or the Wixárika ethnic group as a whole. Most of my informants live in rancherias inaccessible by vehicle, are from some of the poorest and most marginalised extended families in the Sierra and the couples and individuals whom I interviewed have no financial option other than to migrate for work. This is sometimes because the husband of the family has a *cargo*, as was the case of Maximo whom when I met him had recently finished three consecutive five year periods as jicarero. Maximo and his wife Lucía live in *El Roble*, their extended family ranch in the agency of Taimarita, several hours hike from the nearest health clinic or vehicle accessible road. They have had eight children, including the baby that was born between the 2010 and 2011 picking seasons and a child that died in infancy, shortly after they returned from the 2002 tobacco pick. Maximo was working on the coast to begin paying off the twenty thousand peso debt that he had accumulated over the past fifteen years in his role as jicarero.

The fact that several of my informants were jicareros or had recently completed a five or ten year cargo suggests that this selection of families is probably closer to the Wixárika culture and traditions than the typical Huichol family. Like a mara'akame, a jicarero or peyotero must become immersed in his cultural responsibilities in a manner that the lay or *uninitiated* Huichol does not (Neurath and Bahr, 2005). As I explain in Chapter 3, these religious roles are extremely time consuming and resource intensive. They jicareros must attend every fiesta that takes place in their tukipa throughout the year as well as accompany the deer hunters and the peyote gatherers. Tobacco harvesting is one of the few forms of employment that will fit around these demands. These migrant families are also the least educated, school attendance is far lower in

the rancherias than in the Sierra towns of Pueblo Nuevo and Nueva Colonia. In fact, simply living in the rancherias is highly indicative of their socio-economic status since, with the exception of one two poorly paid primary school teachers and health promoters, there are no paid jobs in these valley communities.

These are also the families with least geocultural access to health care since they live in relative isolation within the sierra, speak less Spanish and are relatively unaccustomed to dealing with mestizo society and regulations. For these reasons they also continue to rely heavily on traditional health provision. So although many young women and men from the highland towns study in the foothills town of Huejuquilla and Mezquitic and give birth in mestizo hospitals or sierra clinics, none of the participants in this study had completed primary school and very few had given birth in a health centre or hospital. As Liffman describes in his ethnography of Huichol territory, while modernisation is occurring in Huichol territory, this is largely limited to the vehicle accessible Sierra towns (Liffman, 2011).

Indigenous Mexicans throughout the republic are entitled to free healthcare in any of the Ministry of Health clinics and hospitals by registering with the *Seguro Popular* scheme, or through the Oportunidades welfare programme to which many are signed up, but health provision in the Sierra is basic. There are two health centres in Santa Catarina which, in theory, should be staffed by a fully trained medical doctor, a nurse and a *médico de modulo*, a travelling doctor who visits the rancherias on foot once each month. In reality, service provision is extremely varied. The clinic in Nueva Colonia that serves the rancherias of Taimarita and Las Latas (among others) has been run by the same female doctor for the past fifteen years. She knows the community well and has built up considerable trust among the population that she attends. Doctora Carmen, as she is known in the Sierra, is supported by the only Huichol medical doctor (also female) working in the Sierra as her *médico de modulo*. In contrast, the clinic in Pueblo Nuevo which also serves Pochotitia and some ranchos of Taimarita has been fraught with problems. Few qualified doctors have stayed long and there

have been on-going conflicts, with the clinics effectively living up to their reputation as government outposts. A recent incident at the clinic resulted in the police being called from Huejuquilla and the trainee doctor being arrested and removed from his position. The two qualified doctors at each clinic work twenty consecutive days in the month followed by ten consecutive days off, but these 20 days are frequently reduced to fifteen or fewer if the doctors attend a course or a meeting, or if they take leave. In their absence the clinics are run by a *pasante* a medical student in training. '*Ya vez como es!*' (you see how it is!), Don Toño tells me, '*there is never anyone there...that's why we never use the clinic*'.

Doctora Carmen talked of the many problems she had faced over the years with medical students, most of whom found the Sierra an impossible and incomprehensible place. She recounted anecdotes of the student who refused to open the clinic gate to anyone when he was alone, the young man who was so hated by the community that he was beaten up and chased from the town, the student who never recovered after a baby died during a delivery he attended and numerous cases of students who simply behaved extremely 'inappropriately' and felt the Huichol were dirty, ignorant people who were 'reluctant' to receive medical care and advice. On the whole my informants knew which days Doctora Carmen would be at the clinic and would go only on those days. Carmen described how she would always return to queues of patients who had put off coming in her absence. There is also a casa de salud in each rancheria, served by a community selected and minimally trained health promoter. In the case of Taimarita this is an 18 year old lad, chosen because he had completed secondary school while the promoter in Pochotita is a woman in her fifties who has benefited from many years of training and experience. These health promoters attend monthly training in Colotlán, from where the Sanitary Jurisdiction is coordinated and where they learn basic first aid and other skills. Some of these casas de salud had basic antibiotics when I visited but they are

mostly limited to analgesics, oral rehydration, anti-inflammatories and a maximum of two scorpion antidotes.

## 5.3 Knowledge and practices of migrant workers

### 5.3.1 In the sierra

Generally the migrant workers I interviewed used the local clinics and casas de salud infrequently and had a poor impression of service provision. The entire municipality of Mezquitic is classified as 'highly marginalised' and as such all families are eligible for the Oportunidades welfare payments but many migrant families are not enrolled in this programme. Several informants complained this was because the conditions attached to these hand-outs required them to make regular monthly clinic visits, a six hour trek up the mountain with small children in tow or while pregnant to listen to a health talk that they did not understand and to be told-off for poor attendance, as Felipa (F56, Taimarita) explained, '*Maybe the wife of Maurillio...no, no, they haven't been getting it for the past year. Nobody here has Oportunidades. They have to go to talks in Pueblo or Colonia and nobody wants to go that far*'. Attendance records at Oportunidades talks are kept by the doctor in charge and missing talks or appointments will result in families having their payments withdrawn. Carmen had no qualms about *dando de baja* (un-inscribing) families who do not attend the regular meetings and appointments. It is particularly difficult for migrant labourers to maintain their inscription to Oportunidades .

The attitudes, 'motivational results of people's knowledge and beliefs' (Pelto and Pelto, 1997), of these migrant workers are highly influenced by their ongoing relationships with the healthcare system and workers, one that is also marked by a structural injustices. The combination of poor Spanish and low levels of education made many of the women I interviewed feel ashamed, and *pena* (shame) was one of the principal reasons given for not seeing a doctor. Pena permeated discussion of using local health facilities and appeared to

underlie people's reasoning for not going to the clinic, as is illustrated by the following conversation with Cecilia (F 26, Taimarita):

*J: Were you ever seen at either of the clinics, while you were pregnant?*

*C: Me? No....*

*J: Are you in the Oportunidades programme?*

*C: No. I only go to the clinic to take my boy, so they can check him.*

*J: Only your son? Have you ever been for yourself?*

*C: No. Only when they come here with the vaccinations.*

*J: So you don't go to appointments at all?*

*C: Well...who knows, lots of people don't go because they are ashamed.*

*J: Do you know anyone who does go to the clinic?*

*C: Yes, some go. Some even give birth in the clinics. But those of us who are really ashamed, when are we going to go? And well, sometimes something bad happens to you because you don't go to the clinic.*

That the Huichol are *penosos* (ashamed), was a recurrent theme and there was considerable recognition and agreement that '*this is what we, the Wixárika, are like*', as Elvia (F39, Pochotita) explained:

*'Well, yes they tell us that [we should go to for antenatal appointments], but you know what the Wixárika are like, we are ashamed, well I am really ashamed and I don't go, even if they tell us to go....'*

When I enquired *why* there were ashamed this was mostly attributed to feelings of inadequacy, poor Spanish and lack of education or understanding, although one informant suggested that women were embarrassed to be seen by male doctors. Another informant related the question of shame to a more generalised shyness, not wanting to talk about themselves to a stranger, as Inés (F47, Cajones) explained '*you know what we, the Wixaritari, are like, we don't want to talk*'.

Pena came up again and again, as much in relation to women and reproductive health as to questions on their knowledge about pesticides. While there was a

strong element of gender related pena, essentially the pena with which women related to health professionals was determined by a self valuation of inferiority and worthlessness, an inferiority compounded and characterised by their experiences of racism, linguistic and economic inadequacy. *Pena*, this cultural knowledge and norm, is also characteristic in a much wider sense of the Wixárika relationship with the Mexican state. It is a response to their position within a social and cultural hierarchy that has economically and socially punished them for their ethnic identity. In the context of the Brazilian Favela Scheper Hughes describes shame as an expression of everyday violence (Scheper-Hughes, 1992, Scheper Hughes, 1996), itself a symptom of wider forms of structural violence. For the Huichol *structural* violence is played out through the delivery of health care and conditional welfare payments: the obligation to attend appointments and talks in order to receive the paltry hand-outs that enable them to continue surviving in extreme poverty. *Everyday* violence exists in the power relations and social inequalities that are present in their daily lives: their relationship with healthcare providers is one of extreme inequality. Not only do doctors reprimand them for their 'unhealthy' cultural and social practices (not eating three times a day, not washing their children, not contracepting or taking measures to prevent STIs, allowing animals to enter their homes, relying on the mara'akame for ante-natal care, refusing nutritional supplements during pregnancy etc) they also have the power to deny them their Oportunidades if they do not comply with the rules. As Bourgois explains 'these different expressions of everyday violence then reverberate into the symbolic violence of self-blame and shame' (Bourgois, 2002, p223). Pena is *symbolic* in that it is violence inflicted with the complicity of the agent, as Bourdieu describes,

'The practical acts of knowledge and recognition of the magical frontier between the dominant and the dominated that are triggered by the magic of symbolic power and through which the dominated often unwittingly, sometimes unwillingly contribute to their own domination by tacitly accepting the limits imposed, often take the

form of bodily emotions, shame, humiliation, timidity, anxiety...' (Bourdieu, 2004, p341).

Essentially, shame is the symbolic demonstration of how structural factors undermine agency.

When framed within the positions of structural, everyday and symbolic violence, it is unsurprising that many women, like Felipa, chose not to use the clinic or to receive their Oportunidades. Not to do so liberated them from the reminders of their position of social, racial and economic inferiority. Being seen on their own territory (their home or community health centre) rather than in the government outposts that are the health clinics seemed to be more acceptable. On these occasions it was the doctor and not the patient who was on unfamiliar ground. Felipa (F56, Taimarita) exclaimed, '*when someone comes who can explain well and will attend us well, then maybe, maybe we will go to the clinic*'.

### **5.3.2 Medicine distrust and envy**

The one reason many informants gave for going to the health house or clinic was to be given medicine: medicine for pain, medicine for old age or simply medicine. As Ines suggests '*it's good to go to the health centre to get medicine*' or Cirilo (M60, Pochotita) who tells me that he goes '*when I have pain, to get medicine*'. However many seemed to feel that if they were not given medicine they had not been properly attended and there were several complaints that the health centres, in particular, simply did not have medicines when they were needed. There is a generalised resentment at having to pay for *anything* in the Sierra so when the clinics refused to give out medicine or did not have any this was also a cause of complaint. Jorge (M27, Taimarita) described in detail how he had to sell a rifle and other items to pay for a private doctor, injections and medicine because the Sierra doctor did not give him anything.

*Jorge: There's none of that stuff [in Taimarita]... and when my boy had a cough and cold there was nothing, so I had to go to Colonia, they told*

*us the doctor there had something...and this time this is what happened to me [the doctor in Nueva Colonia didn't give him anything]. It lasted until the illness had gone, the whole family, fever, pain in the bones, and nobody could sleep, so I went to Huejuquilla, I had to sell things of value to buy medicine, I spent nearly 3,000 pesos.*

*J: What did you sell?*

*Jorge: A rifle, I didn't know what to do.*

*J: And in the clinic did they tell you what to buy?*

*Jorge: They didn't have anything, so I went to see a private doctor and he told me 'buy an injection but it will cost you this much'. So much pain I was bleeding from inside. The injection cost me 480 pesos and then the appointment 500 and it was still a long time before I got well. I took my kids powder and Olivia a pill, he told me to give the kids the powder in water, in total I spent 3,200 pesos. And the pills didn't do anything, we were still coughing and coughing.*

Jorge's account is interesting in that he appeared to distrust the doctor in Nueva Colonia, believing that the clinic *wouldn't give him any medicines* rather than the possibility that *there are no curative medicines* for a cough and cold. In the end he visited a private doctor and was prescribed expensive medicines that had little effect.

Jorge's extended family particularly felt that not only was the health provision of poor quality and lacking resources, but also that health care providers were selective about who they treated. Jorge explained:

*'They [the médico de modulo] only come to the clinic in Taimarita, they don't come to our homes, that's where they attend people. The people that live there are bad, the people in charge only help the people they know and if they don't like you they won't help you and they tell you 'there is no time for you'. And that's what has happened to our family, well people don't like my family, I don't know why, they just tell you there is no time for you'.*

A similar attitude was expressed by Jorge's brother Julio: (M 37, Taimarita)

*'...well sometimes there is medicine but they don't want to give it to you. The people there, with us they are hard work. For example, like me, I don't go back to the pueblo and I don't go to meetings or do community work, well people there don't like me and if you have family they won't give it to your family either and this medicine isn't theirs either'.*

The family of Jorge, Felipa and Julio is by all accounts socially marginalised within the rancheria of Taimarita. In his narration of the 1998 murder of US journalist Philip True<sup>22</sup>, Liffman (Liffman, 2011) points to the role of incest as a contributing factor in the social exclusion that leaves some extended families on the margins of regional society<sup>23</sup>. Referring to the family group of the brothers-in-law accused of the journalist's murder, Liffman describes how 'Quasi-incestuous relationships in their rancheria implied a collapse of social categories which could have facilitated homicide'. Liffman's description of the San Miguel rancheria that was home to the accused men, could easily be mistaken for a kiekari within the agency of Taimarita, similarly characterised by 'infernal heat', proximity to scared sites and location in the depths of a barranca many hours walk from a road or telephone. The family of Jorge and Julio appears to have been tainted in a similar way, beginning with the murder of their mar'a'akame father by his own cousin in a drunken brawl after a fiesta. On their father's death their mother briefly married Rosendo, the father of her only daughter Esperanza, only to leave him shortly afterwards for his (Rosendo's) step-father, Gonzalo, to whom she has been married ever since and with whom she has three sons. The complicated web of intermarriage does not end there as her eldest son, Tunuri, who works in the unscrupulous but lucrative job of people smuggler (*pollero*) on the US-Mexican border, married his half-sister Esperanza, leaving Olivia, his previous wife, whom his younger brother Jorge

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<sup>22</sup> US Journalist Philip True was found murdered in the governorship of San Miguel in 1998. He had one trekking alone and may have visited sacred sites that are out of bounds for Teiwari. Numerous controversies remain around the circumstances and reasons for his death and the culprits named in Liffman's book remain free.

<sup>23</sup> Mata Torres (1982) and Pacheco de Ladrón (2002) discuss the existence of incest or intermarriage between members of the same family presenting this as an accepted form of association. Mata Torres describes embarrassment about the issue but neither author characterise incest as a social taboo.

went on to marry. As my assistant and translator Totupica explained, '*this family are not well liked in Taimarita and like them [referring to the incest] there is another down the hill, and another other there and another in that direction*'. In short, all three informants within this family made reference to the fact that they are out of favour with their community and believed that for this reason, they were denied health care in some form or other.

Many informants expressed a feeling of entitlement to medicine, probably an extension of the widespread attitude generated by the particularly harmful strain of welfareism to which indigenous Mexico has been subjected since the 1980s, one which ensures a corresponding lack of social and economic development (Fernández Ham, 2003). In theory, indigenous Mexicans are entitled to free health care and medicine under the Seguro Popular scheme or through the Oportunidades programme. However what comes through in their statements is an attitude which suggests they feel that this right is at times withheld from them unjustly, with suggestions such as '*they won't even give me medicine*'. The expressed need and desire for medicine came up in almost every conversation and in fact the multiplicity of contexts within which it was brought up suggested that medicines are seen as some form of *teiwari* magic cure, accompanied by an apparent belief that pills, powder, creams or liquid medicines are the answer to every illness or health problem. The potentially magical nature of medicine is curiously replicated by Otilia (F35, Las Latas) in the inverse sense as she describes how '*my sister says that I am going to kill myself if I take mestizo medicine, that's what she says*'. Although Otilia herself admits to using medicines for a headache problem, the comment is perhaps a reflection of a more generalised distrust in the *teiwari* and aspects of mestizo culture, particularly those that are not well understood. This is an attitude of distrust that Liffman also evidences in his discussion of issues regarding land tenure and indigenous justice. The authors in fact describes the distrust of outsiders as 'a widespread and profound incitement of envidia (envy/jealousy)', another central concept in the beliefs and attitudes to health care among the

Huichol. Otilia recalled a positive experience with a travelling doctor but then became cynical, making reference to the theme of envy.

*O: ...then a nice man called Roberto started coming and he gave me a pass [for the hospital]...well this person would come to Las Latas to see me, sometimes he gave me an appointment.*

*J: Do you know who he was? Was he from a special programme?*

*O: I think he was a doctor. Sometimes he just came. But I think his colleagues reported him and they sent him to prison. I never saw him again. You know what things are like [here]. Always when someone does something well there is envy, that's what happens here with the Wixaritari and that's what I think happened to him.... He was the one who told me my baby was transverse and, and he said he wanted to turn it, but it couldn't be done, and you know what the Wixaritari are like, I never went to be attended...*

Jorge, Felipa and Julio's assertions that they were not given medicine or were poorly treated at the clinic because '*people don't like us*' resonates with many other comments about the interpersonal relationships, grudges and antagonisms regularly summarised with the term '*envy*', and frequently used to explain causality in illness and health problems associated with witchcraft. I will discuss this concept in more detail in the second section of this chapter but of interest at this point is the attitude, that personal grievances in some way affect the quality of attention given, whether a health provider is willing to provide medicines and that they feel they are entitled to. Envy as a determinant of health provision, along with the apparent belief that medicine is some form of teiwari magic, suggests that mestizo or modern medicine is seen through the lens of the Huichol ethnomedical explanatory model wherein the supernatural (magic) and witchcraft (with origin in interpersonal grievances) mediate illness and its cures and envy mediates relationships. I will return to this issue later in this chapter.

### 5.3.3 On the coast

These attitudes to modern health provision are by no means confined to the Sierra, as Angélica (F26, Santiago/Pochotita) narrated, '*... they don't attend you well, that's what they are like the doctors in Nayarit*'. Angélica and her family live in Santiago. Her husband Fausto is a full time agricultural labourer travelling between crops throughout the year while Angélica has a small *chaquira* (bead jewellery and handicrafts) stall in the Plaza of Santiago, but both also work on the tobacco harvest. Four of their five children were born in Nayarit but Angélica refused antenatal care, and two of her four children were born in the open air of tobacco plantations. When I asked her why she told me;

*'I mean, if you go to the health centre they tell you "we only attend people who are from this region". What are they called? People from here, they don't attend Huicholes...although sometimes they do attend us properly...when they want to'.*

Poss refers to the Health Belief Model as an 'expectancy model', one that proposes that 'behaviour depends upon how much an individual values a particular goal' (Poss, 2001). This would suggest that if the health issue was really important or threatening a person would seek care, placing emphasis on the value of health (perceived *vulnerability* to and *severity* of disease coupled with perceived *benefit* of care) as the principal motivation for seeking care. Consideration of *barriers* to care also form part of the model but vulnerability stands alone as a determinant of motivation. The model was born in the context of the US Public Health service where Rosenstock, one of its principal authors, was employed at the time. It was not designed for situations where access -a category in which I would include geographical, cultural, social, political and economic barriers- plays such a major role in decision making that it could be considered the primary determinant of care seeking behaviour.

During my two year period of data collection I accompanied three informants to local hospitals, on each occasion spending a large part of the day waiting in queues and dealing with frontline staff who were generally unhelpful and

disrespectful. Bureaucrats who, in the words of the tobacco farmer leader who accompanied me on these visits are '*not paid enough to smile let alone speak to you politely*'. Workers who are on the bottom rungs of their employment hierarchy and sought to recover some dignity by exercising the little power they had to its full potential, against those whom they considered to be socially inferior to them. To be able to use their entitlement to free healthcare within the ministry of health hospitals anywhere in the republic, patients must first register with the 'Seguro Popular', a *tramite* (bureaucratic procedure) that is in itself complicated for an illiterate monolingual Huichol. Once the paperwork is complete they must queue again to request a first appointment with a general practitioner and from there await another appointment to see whichever specialist they require. This process is likely to take many months. Complicated forms, multiple photocopies of birth certificates, proof of address or certificate of school attendance coupled with intransigent bureaucrats are the norm in Mexican governmental institutions for any *tramite*. These days most Huichol have a birth certificate, although often with a fabricated date of birth, since this document is required for every conceivable *tramite*. Very few have a proof of address. Felipa gave her place of residence as 'known place within one kilometre of the school in Taimarita'. The Huichol find it shameful to describe the conditions in which they live. They are ashamed to admit that they have no address or that they don't know their date of birth. Contact of this nature with mestizo bureaucrats is always intimidating and exposure to humiliation is another form of everyday violence and a very real barrier to seeking care. For antenatal care this is coupled with the humiliation of needing to bare parts of their bodies to healthcare workers and confess to unhealthy cultural norms and practices.

On several visits I was fortunate to be accompanied by someone who was very well connected in the hospitals and on each occasion he managed to negotiate an extra-official appointment. I meticulously documented each hospital visit noting down the occasions on which the monolingual migrant workers I was

accompanying would have given-up seeking care. These were i) when they were asked to first visit another heath centre at a different location then come back with a referral letter, ii) when the birth certificate was requested or they were told to register with the Seguro Popular, iii) when we were told that the first available appointment was not for another four months or at a time when they would no longer be in Santiago, iv) when, after an entire day waiting to see a specialist we were told we had been sent to the wrong hospital and must return to the main hospital to ask for another appointment v) when it was clear that neither health professional nor patient could understand the other and vi) when the ophthalmologist asked his illiterate patient to read from a list of letters (Field Diary). Even with a translator and the advantage of having contacts within the hospital we still waited for several hours on several occasions and the attitude to Huichol workers was one of pity and intimidation. Accessing appointments and treatment is complicated and frustrating for a mestizo who lives in Santiago, virtually impossible for a Huichol migrant labourer.

Barriers to access are more obvious in the sierra where *measureable* factors such as geography and quality of services play central roles (Morales Rodríguez, 2004), but less so in the towns of Santiago and Tepic where the more subtle effects of racism, intimidation, incomprehension and fear of bureaucracy are the hurdles that cannot be avoided. How does one weigh up the impact of humiliation as a determinant of seeking care? Does belief in one's position of inferiority have a place in the Health Beliefs Model?

Bourdieu explains how 'symbolic violence accomplishes itself though an act of cognition and misrecognition that lies beyond or beneath the controls of consciousness and will, in the obscurities of the schemata of habitus (...)’(Bourdieu, 2004, p273). Shame and humiliation, symbolic manifestations of everyday violence that are the human and lived experience of powerless people within a health, social and political system characterised by structural violence. I will return to this discussion in Chapters 6, 7 and 8. For the remainder of this chapter I will focus on the specific form of ethnomedicine that is practiced in the

Sierra Huichol and how this exists alongside modern health provision, forming a dynamic and syncretic medical system.

## 5.4 Ethnomedicine and medical syncretism

### 5.4.1 Mara'akame: healer, witch, shaman and singer

Numerous ethnographies have shown that the mara'akame or shaman is central to any understanding of Huichol health and illness, essentially functioning as a mediator between the profane and the supernatural, people and gods, nature and deities (Fajardo Santana, 2007, Casillas Romo, 2000, González Sobrino, 2008). Mara'kate are also much respected and feared members of the community, respected for their wisdom and position and feared for their magical powers, as Fajardo comments 'one must never cross the path of a mara'akame if you can avoid doing so'(Fajardo Santana, 2007, p79). The Huichol shaman is also implicit in witchcraft: witches and mara'akate are one and the same, although by the nature of their magic mara'akate cure while witches curse, in practice, a mara'akame can be both a witch and a witch-doctor. I discussed the role of the mara'akame in health and illness with my informants, focussing in particular on his importance in curative processes through an exploration of practices, experience and knowledge/belief. It was also my intention to speak to a mara'akame and with the central question of pesticides and reproductive health in mind I met Tutupica, a well respected mara'akame from Pochotita, whom I was introduced to by my research assistants. Juan and Rosa considered him a close and trusted friend and trust is a very key concept for mara'akate. We explained to Tutupica that we had come because I was researching issues concerning women's health and that I was particularly interested in understanding what people think causes problems with reproductive health. Juan had insisted to me that this mara'akame was a specialist in maternal health, he 'puts' babies in women's stomachs. My assistant explained that Tutupica was in fact infertile, describing how he had magically 'made' his three children with each of his three wives and that this was his

speciality. We spoke around a fire, well into the night. Tutupica wanted to know what this information was for and particularly how we were going to use it. We explained the project in more detail but Tutupica doubted the relevance of his knowledge to this, saying that I would get the answers I needed from the people. His son Ricardo who spoke Spanish more confidently also contributed to the discussion. Ricardo, whose young wife had recently given birth to their first baby at the age of 17, recalled how they would have liked to have seen the baby on a screen. '*This is what we want in the Sierra*' he exclaimed, '*a hospital with machines that can show babies before they are born*'. His father, the mara'akame who magically 'put' babies into wombs, agreed. Tutupica said he would sleep on it and we could talk more the following day. We slept on the patio outside his kitchen to the sound of coyotes howling. Tutupica was up before dawn and came straight over to where we were sleeping, excitedly. He had had a dream and now he knew what he had to do. The mara'akame then proceeded to tell us, in a very long and extended conversation that lasted until almost midday, that he could not talk to me because, essentially, he did not know me well enough and needed to visit my home first of all. In the process of his meandering explanation, intercalated with questions and comments from Juan, Rosa, Ricardo and myself, he described how he had taken many years to become a mara'akame and that the knowledge that he gained through dreams was of great value. Tutupica described how the knowledge of one mara'akame is unique and can never be mixed with the knowledge of another. The knowledge that he had gained over many years, with much sacrifice, was uniquely his and if he did concede to speak to me one day, I must solemnly promise never to ask another mara'akame. It took me considerable time to fully understand the reasoning behind this last point, upon which he insisted vehemently. A mara'akame acquires his skills through dreams that come to him over his five year period of training and throughout their life, directly from *kakau'yarixi*. This knowledge and these songs become his curative tools and methods and they are unique to him. No two mara'akate have the same dreams or the same

knowledge, each cures illness in a different way. There is no one single form of Huichol medical knowledge as is there is in biomedicine.

The protected nature of the knowledge of traditional healers is described as a characteristic of the ‘extreme institutionalised secrecy surrounding medical matters’, where ‘practitioners are not expected to describe their methods. They are trade secrets’ (Last, 1981, p9). Two decades ago when the Wixaritari still mostly lived in their extended family ranches, each had their own ‘family’ mara’akame whose wisdom was passed down through the family. These days there are fewer and fewer mara’akate.

The dual role of healer and witch that is played out by mara’akate is curiously evident in the variety of translations given to the word when used in Spanish. My bilingual Huichol informants and translators would variously talk of curanderos (healers), chamanes (shaman), cantadores (singers) and brujos (witches) to refer to them in different roles, yet the Wixárika only have one word: mara’akame(*te* if plural). Singer is used to refer to their role as the shaman who presides at a fiesta, singing continually in a low chant to evoke the attention of and communication with deities. The healer/witch duality is entwined in the Huichol illness explanatory model that I describe in Chapter 3, sees the witch accused of causing illness, infertility and death while the healer is called upon to cure these same illnesses and problems. I will return to this dichotomy shortly. The mara’akate’s ability to do magic that is enshrined in their role as witch is also evident in all areas of Huichol community life and witches are thought to be responsible for many bad events. One such tale recalls the wild wolf-like behaviour of a large number of children in the primary school hostels of Cajones, Nueva Colonia and Pueblo Nuevo around the years 2005-6. The three versions of the story that I was recounted coincide in describing how a number of children in each hostel began behaving like wolves at night, crawling on all fours and howling, apparently in a trance or a similarly distant state and that this lasted for several months. Don Antonios (Key Informant, M46 Pueblo Nuevo) explanation of these events is magical:

*'When the albergue (boarding school) in Pueblo Nuevo was built it was constructed over the pathway of the wolves. The mara'akate didn't notice at the time and so didn't do the correct ceremonies that they should have done, asking for thanks and permission. Sometime later the mara'akate became angry with the school teachers, they drank a lot in the evenings and could be seen drinking in the schools, so three mara'akate joined forces to put a spell on the albergue...'.*

The rational explanation provided by a mestizo doctor who was working in Pueblo Nuevo at the time is that the mara'akate used the powerful kieri plant to intoxicate children each night, probably by entering the albergue and putting some of the plant on their bedding. But the belief that this was some form of witchcraft is widespread among my informants for whom magic is a commonplace and acceptable explanation for events. Mara'akate in their role as witches are held responsible for much evil and illness in what is a complex circular relationship that must be understood as part of the Huichol explanatory model for illness. Only the mara'akate can know how to cure Huichol illnesses because only they are able to communicate with deities who are the real healers of illness. This is the origin of the fear and power that mara'akate exercise over people. The more skilled mara'akate are considered to be, the more they are feared and admired but also the more they are envied. Envy between mara'akate is commonly thought of as a reason for witchcraft. Several informants discussed rivalry between mara'akate and specifically how this often seemed to lead to the death or one or more of them. Don Antonio described in detail how his mara'akame father was killed by witchcraft:

*'...he didn't sleep for ten days. At first we thought he would come through it but he didn't, he spoke to people in the night, I never saw anyone but he spoke to people and would be up all night, sometimes telling people to leave him alone, but there was never anyone there. After about five days my sisters tried to make him drink but he couldn't. He didn't eat or drink for ten days. I wasn't there when he died...sometime in the evening he asked to be brought near to the fire. They carried him here, and here next to the fire he died. He just wanted to die next to the fire'.*

The father of Jorge and Julio who was also a mara'akame, was killed in a fight after a fiesta and Ha+tsima is convinced that her ninety year old grandfather was killed because he was a mara'akame. Generally my informants confirmed what many Huichol ethnographies tell us: that envy between mara'akate regularly leads to violence and is frequently the cause of death and illness (Fajardo Santana, 2007, Furst, 2007).

A fully trained mara'akame in his role as the intermediary between deities and humans is a powerful religious leader. His power, articulated around the threat of illness and misfortune, is inevitably applied to subjects and groups. It is the 'knowledge of the group that articulates the representations and practices received from medical knowledge through the representations and practices that the group utilise'(Menéndez, 1994, p172). Menéndez, like Last and Dein, makes reference here to the role of a healer in enforcing a moral and social code and pattern of behaviour, the point at which his role as a religious and social leader comes into play (Dein, 2007, Last, 1981). The moral/religious elements inherent in shamanic healing along with the social role that this fulfils form an essential aspect of medical explanatory models, with the 'key effect of religious healing' being to 'alter the meaning of an illness for the sufferer'(Csordas, 1988, p122). Kleinman and others from the field of interpretative medical anthropology would argue that the social control exercised by healers is by no means confined to shamanic (religious) healing. He maintains that it contributes to the social meanings of illness in a global sense where sickness becomes a metaphor for societal or individual transgressions of one form or other, directing social practices and forms of organisation (Kleinman, 1981, Young, 1976, Fabrega, 1975), a position that is also upheld by Kaufert and O Neil in their discussions of decisions about risk (Kaufert and O'Neil, 1993), when they suggest that 'risk' is essentially a moral choice. In the Wixárika world it is the mara'akame who determines what this particular moral transgression was and who was responsible, effectively making him judge and jury. That mara'akate usually know their patients well facilitates this role as they are able to identify

past events and link these to present cases of illness. In this religious role a mara'akame also presides over ceremonies and fiestas, he is called upon at the beginning of life to bless new born babies and ensure their safe entrance into the world and he talks to the newly deceased as they begin their passage to the afterlife, five days after death. This final role is indicative of the degree to which a mara'akame holds the social and moral balance of power because five days after the death he is given a final opportunity to communicate with the deceased. At this moment he is able to enquire about the cause of death, or more specifically ask 'who was responsible for your death'. In essence, the illness explanatory model of this group cannot be understood without first situating the mara'akame in this social, religious and moral role.

#### 5.4.2 Explanatory model

When I began asking about causality in relation to illnesses, obstetric or fertility problems more often than not I was told '*I don't know, you'll have to ask the mara'akame*' or '*only the mara'akame knows that*'. These responses were given very matter of factly, the more assertive respondents even adding to this with comments such as '*todos te van a decir lo mismo...*' (everyone is going to tell you the same thing). I understood this as one would understand a response such as 'I don't know, you'll have to ask a doctor' and simply assumed that people had very little knowledge about what caused illnesses, just as many in the west are still ignorant as to the habits and practices that cause heart disease and diabetes. Unsatisfied with these responses I would sometimes probe further by asking what had caused the illnesses that their children had suffered from, only to be retorted with a '*sabe*'<sup>24</sup>. In fact I felt a certain emotion for the possibility that people simply did not seem to retain information about causality since, I

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<sup>24</sup> The word 'sabe' comes from the verb saber (to know) but in this context is slang for 'I don't know', (rather like dunno). Sabe is used very frequently by the Wixárika and has been adopted to Huichol- it is used within usual Huichol speech. More than a simple 'dunno', sabe often has the additional connotation of 'I don't want to tell you', and in this sense is a real conversation stopper. On many occasions I asked simple and un-invasive questions such as 'what is your name', 'what is your daughter's name', 'when did you arrive', or 'where are you working' only to be answered with a sabe. I would try to follow this up by joking about the fact that they did not know their own name, if only to indicate that I understood that they simply did not wish to tell me.

reasoned, almost everyone had seen a mara'akame at some point, often for the same common illnesses. It was not until much later it dawned on me that in effect, only a mara'akame *can* know what causes illnesses in individuals for only he has access to this knowledge. In fact, not even the mara'akame really knows, for he is only communicating information from the gods.

As Dein suggests, 'when people say a god or witch caused a specific illness they represent not the precise powers of these supernatural agents but the reasons for acting as they do in moral terms, the *why* rather than the *how*' (Dein, 2007). Thus, in a medical sense there is no clear logic to the relationship between illness and its cause –such as the relationship between infection and disease or exposure to toxic substances and subsequent sickness - since any particular illness may have any number of different causes and cures. The logic lies not in any association between causality and illness, but in a sacred relationship between the cause and the cure with the illness to some extent a random by-product of this sacred partnership.

As I describe in Chapter 3, there are essentially three explanations for illness causality in the Huichol costumbre, all of which reside within the supernatural realm. These are i) non fulfilment of the costumbre, 2) transgressions or falling out of favour with specific gods and 3) witchcraft.

Non-fulfilment refers principally to the ceremonial and spiritual obligations that the Huichol must fulfil in their lifetime to lead a healthy life and in a sense this first causal element of the explanatory model is a *preventive*. Fulfilment is a process that begins before birth and many informants talk of the importance of seeing a mara'akame for blessing before a baby is born and during or shortly after a baby's birth. Obaldo (M73, Taimarita) describes how, when his wife was pregnant he would see the mara'akame '*so that he [the mara'akame] could check the baby was ok*'. He would also '*make a sacred arrow and have this blessed, so that when the baby was born it is blessed at its (Huichol) baptism and the arrows are taken to the nearest sacred place*'.

The medical doctors I interviewed confirmed that most women whom they saw during pregnancy and birth also saw a mara'akame and that it was fairly common for both the doctor and a mara'akame to attend a birth: while the doctor delivered the baby, the mara'akame fulfilled a spiritual role.

Every year for the first five years of a Huichol child's life he or she must attend the fiesta del tambor. This ceremony, which forms part of the Wixárika mitote fiestas is held each year at every ceremonial centre and individual family xixiki. Attending this fiesta is essential for good health and fortune. Uama (M39) told me that '*many years ago there was an epidemic*', and that is why it was decided that they would hold this fiesta every year, to protect the health of Huichol children. The ceremony itself is a spiritual and imaginary journey to Wixikuta, with stops on the way at every sacred site that the pilgrimage passes through. Beginning in their community, the group of children travel through the air –as if they were birds- stopping to meet the deities who live in each sacred place. Children on their fifth and final journey, have come with their *kutsuri* (traditional woven bag) filled with food and offerings packed for their onward journey into life and they bid farewell to the gods when they reach Wixikuta. None of the Huichol I interviewed admitted that their children had missed any of the five year journeys. In fact Don Antonio explained how '*...my children have not been ill because I have fulfilled and I know what we have to do. We have been to all the sacred sites and we leave offerings and here we do all the ceremonies*'.

Visiting the sacred sites periodically throughout their life and attending the annual cycle of agricultural/religious fiestas continues to play a key role in illness prevention and fulfilment as does the important task of growing each of the five sacred varieties of maize. The second causal element in the Huichol explanatory model refers to religious transgressions or offences, failures that must be repaid with sacrifice, often by subsequent generations. Also referred to as '*deberes*' or debts with the gods, transgressions can be of an intergenerational nature. Maximo (M39, Taimarita) describes how '*teiwarixi [solidified souls of gods] live in each rancho...sometimes, these gods don't allow a baby to be born*

*and this is why women sometimes struggle, for their debt with sacred places or gods...the Wixaritari know why this happens'. Teiwarixi are the souls of ancestors as these pass onto the supernatural realm in death –solidified in crystal form– and Felipa describes how 'we must know how to keep them happy, if they are unhappy we have to do a fiesta for them'.*

Organising family or xixiki level fiestas is the key element of this second aspect of the explanatory model. The fiesta organised by Maximo, Felipa and their families in Taimarita was to serve this purpose. In fact the fiesta, at which seven cows were sacrificed, was held to bring good health to several members of the two extended families. These family or individual fiestas strictly serve the purpose of fulfilling ancestral failings, repaying transgressions and appeasing angry deities. Unlike the very structured mitote rituals, the fiesta organised by two of my informants was adapted to the sacred request of its organisers. In spite of this less formal structure, every detail down to the intricate patterns and colours of decorations was planned as part of a package of gifts for the gods. Everything had to be carried out in accordance with the requirements of teiwarixi and kakau'yarixi. It was explained to me that you cannot re-hang a ceremonial tostada that has fallen because '*the gods wouldn't like it after it's been on the floor*' and that the kakau'yarixi '*like the more natural colours, they like everything more natural*'. There was painstaking attention to detail in the positioning of candles and for every aspect of the offerings while the deer head that was carried from one side of the ceremony to another, day after day, always needed to be placed in a particular position in relation to the xixiki and the spread of offerings. Intense discussion was held between the mara'akame and fiesta organisers about the order of events, who would take each bunch of candles to which sacred site after the event and whether or not there could be a pause in the ceremony to prepare the meat after sacrifice. Everything was done for the gods and a very deep sense of belief in this hung thickly in the air for the duration of the fiesta, so much so that the transit of the souls of seven cows from

Taimarita to the cosmos was almost visible. Something very deeply human and sacred was happening and the teiwarixi were quite clearly everywhere.

Preparing and paying for these fiestas is an extremely costly, an expense which must be shouldered at an individual family level. Felipa totted up the cost of organising the previous fiesta;

*'3,000 for the cow, 1,000 for the beers to share with my helpers, another 1,000 for the tamales and other food I need to provide then there are the supplies for the deer hunters, the gifts for the musicians and the mara'akame, we had to pay someone to bring the food and beers on a mule, the transport to Huejuquilla.... all in all it comes to about 7,000.. (approximately £350)...we never have money because it is all spent on fiestas'.*

Felipa's son Julio explained how '*if you want to fulfil you must work hard to save four or six thousand pesos and to buy what you will need for the mandas (gifts/offerings)...that's what the people do there to be free of this...*'. He went on to explain that this was how, to some extent, he compensated for his long periods of absence from the Sierra, for not growing his milpa or attending mitote ceremonies;

*'We are carrying the costumbre, the tradition from up there in Taimarita, it's that they were asking me to organise a fiesta, an obligation that we have in the sierra...last time I went on the deer hunt too, then I came down to work nearby then it was the fiesta and I went back and what came next was that I had to come here to leave the offerings at the sea'.*

Correcting ancestral faltas or asking for peace with the gods can also be achieved by lesser mandas such as making and taking an offering to a particular sacred place, or, as Cirilo explained, by a long and often very drawn out series of sacrifices and gifts. As I will discuss in the following chapter Cirilo lost eight children, mostly in early infancy. He and his wife have spent the remainder of their lives 'paying' though mandas for the 'cure' to this spate of infant deaths. He explained:

*'Well, here things are like this. Apparently if you ask for health...you have to make a gourd bowl which your wife sticks (wax) animals onto and puts money inside. And the man needs to make arrows for the virgin, for Jesus Christ, for San Jose etc. For each [child] I needed to make the arrows and the gourd bowls. This is what we did and we were going every Easter week [to take the offerings] and we went three times to Hara'mara. But, it seems the gods were paying much attention to this manda and now they want a fiesta and I need to kill five animals. I still have one to pay...except that now I don't have money to pay for the cow and buy the candles, to pay the mara'akame, buy the refresco....'.*

The cure or manda will vary between mara'akate and for each illness or problem there will be a number of different mandas. There is little logic from a scientific or biomedical perspective to these relationships. The mara'akame will use his individual knowledge and communication with the gods to prescribe.

#### **5.4.3 Witchcraft**

While there is some overlap between the first and second causal factors of the Huichol explanatory model, the third element, witchcraft, described by Otilia as '*a bad thing that they do to you*' stands apart. Although occasionally witchcraft is benign or good, as are the cases of Tutupica who can magically put a baby into you or the plan to spiritually tie Ha+tsima's brother and wife together (as a couple), mostly Huichol witchcraft is thought of as bad or evil. As with the first two causal elements, witchcraft can only be identified by a mara'akame, a fact that introduces considerable suspicion and is often the reason for rivalry, hatred and acts of witchcraft between mara'akate. Inés in fact described this as the illness itself:

*J: What was the illness (that the child had)?  
I: They did mention it but I don't remember*

*J: Does it have a name in wixárika?*

*I: Well, the name in wixárika, they said it was witchcraft, but they both [mara'akame and medical doctor] cured me.*

Much reference is made to witchcraft as a causal factor in relation to birth and pregnancy problems –a discussion I will return to in more detail in Chapter 7. Fertility appears to be a frequent victim of witchcraft, often associated with envy from somewhere or other. Witchcraft was clearly an accepted cause of illness among my informants and none expressed doubt or disbelief in its ability to cause harm or even death although, like all powers held by the mara'akame it was feared and not well understood. In a discussion about sterility Enrique (M35, Pueblo Nuevo) expressed a particularly angry attitude towards a mara'akame who conducted witchcraft:

*J: And do you know how to cure it (sterility)?*

*E: Them, the mara'akate, they can cure it. But it's very expensive. It's cheaper to kill them, but you have to know which one it was. Only the person who did it can cure you. Only him. It's better for me to kill him, it's cheaper....they are very bad the mara'akate. That's why. A doctor can't do anything against the illnesses the mara'akate create. The government should help us so that they don't do us so much harm, the mara'akate, they make the illnesses. Only they can cure them...and then they charge a lot of money.*

Not everyone felt angry, most people expressed an acceptance that this was something that just happened. There also appears to be an element of blaming witchcraft for unexplainable events or illnesses, irrespective of whether or not a mara'akame has actually 'diagnosed' this as a cause. Otilia was sure that 'envy' had been the cause of her headaches and birth problems, although she had not explicitly been told that this was the case:

*J: ...and why did you suffer?*

*O: Because of what they did to me with this child [while pregnant].*

*J: But what was it, what was the suffering?*

*O: Well it took a whole day, he wasn't born until the following day.*

*J:... do you know what happened? What is behind this problem or what was the cause of this problem that you had then?*

*O: They forbid me from having any more children, because of envy, that's why this happens...We do think about solving this problem but it's not little that they ask of us, they tell us we have to do a fiesta to save the lives of our children, all the way at wixikuta, with our brother peyote.*

In terms of difficult births Cecilia also spoke with acceptance about the role of witchcraft, suggesting that '*I think that it's the mara'akate who do this, and that's why they have them (babies) with a lot of sacrifice*'. Mara'akate are skilled herbalists and many know how to use a series of plants that are native to the Sierra for magical purposes. Several informants mentioned the existence of a root that was used to prevent pregnancy (although none knew its name or where it could be found) and many more mentioned the use of kieri, the sacred deity-plant that plays a central role in witchcraft. Kieri is frequently implicated in problems related to pregnancy and birth, and it is thought to play a role in infant death, infertility and miscarriage (issues that I will explore in more depth in Chapter 7) as well as more general health problems such as Otilia's headaches, '*it's because of the plant kieri, it won't leave me in peace...when it reaches me I am left with an awful headache*'. Here Otilia appeared to suggest that Kieri acts alone. Similar conceptions were expressed by others with kieri taking on a subjectivity of its own as a singular evil force, at once plant, god, person and witch.

Evans Prichard's classical text describes the use of witchcraft to explain 'unfortunate events', and just as my informants expressed a normality about witchcraft, Evans Pritchard describes how 'Witchcraft is no less anticipated than adultery. It is so intertwined with everyday happenings that is it part of a Zande's ordinary world' (Evans-Pritchard). It is Evans Prichard's words that are reiterated by Dein, when he describes how witchcraft explains *why* events are harmful to man and not *how* they happen (Dein, 2007) (My emphasis). Mara'akate, like the Zande witch doctors also extract items through rubbing and sucking as part of their curative process. For the Huichol extracting a grain of maize may indicate *Ik+xiya*, the usually fatal 'illness of maize', or it may be an

extracted thorn to which the mara'akame assigns an evil origin. In 'Medicine and Magic' Gonzalo Aguirre Beltrán, the father of Mexican medical anthropology, describes the three main elements of indigenous medicine as their knowledge of herbal remedies, the 'aetiology of sin' deserving of 'punishment from the gods' and the 'aetiology of witchcraft' explained as the 'roots of illnesses in the hostile desires of others' (Aguirre Beltrán, 1994a, p228). The permanence of belief in the supernatural origins of illness among Mexican indigenous groups has been well documented (Campos, 1992, Menéndez, 1994, Zolla, 1988). Looking deeper into the relationship between ancient Mexicans and the supernatural realm Lopez Austin describes in much detail the idea of reciprocity between people and gods to which sacrifices and ceremonies are a necessary element. In this sense illness is a result of an imbalance between the two parts, a perspective that is discussed in depth by Neurath in relation to present day Huichol communities (Neurath, 2002, López Austin, 1980).

The three supernatural causal elements that I have described as forming the Huichol explanatory model of illness are common to indigenous or 'magical supernatural' explanatory models in Mexico and the world. In their classical text on medical anthropology Foster and Anderson conclude that there are only two important non-western medical systems, the personalistic and the naturalistic (Foster and Anderson, 1978). According to Ortiz de Montellano, Mesoamerican medicine falls into the former of these categories (Ortiz de Montellano, 2005). The personalistic system sees illnesses as being caused intentionally by an agent that could be supernatural, a non-human element such as an evil spirit or ancestor or by a witch. The Huichol may represent one of if not the most 'traditional' indigenous group in Mexico and Mesoamerica, retaining their practices in large part because of geographical isolation, nevertheless Dein's criticism that 'anthropological experience suggests that people who attribute magical or supernatural causes to misfortune are generally aware of the immediate mechanical or biological causes of these elements as well...' also

rings true with Wixárika. Like other non-western explanatory models the Huichol continues to develop alongside a western model in conditions that Zolla and Menéndez describe as disadvantageous (Zolla, 2005, Menéndez, 1994). That is to say, they have become subordinated to the western medical system, a point to which I will now turn.

### 5.5 Conclusions: a specific form of medical syncretism

When I asked mara'akame Tutupica what the Sierra needed in terms of health care he agreed with his son that some machine to see inside women's wombs would be useful, as would a paved road to Pochotita. For my informants the supernatural and magical origins of illness are very real explanations of causality and the magical nature of causality, prevention and cure remain central to their practices and systems of beliefs. Fused with the supernatural elements of their explanatory model is a hesitant belief in the powers of western medical care, for the informants of this study did not appear to trust allopathic medicine or health providers although they know that this has an important role in illness prevention and cure. Their belief in the supernatural does not imply a disbelief in the scientific basis of illness, although I argue that this is no better understood than are the workings of magic. The mara'akate who hold the key to this magic may know its workings but this knowledge is not shared with lay Huichol who do not have access to this information. As Evan's Prichard comments (in Dein 2007, p42) 'Zande belief in witchcraft in no way contradicts empirical knowledge of cause and effect'. While this statement is equally true of the Huichol brand of medical syncretism in addition I propose that what is also happening here is the application of magical *reasoning* to their *understanding* of western, empirical, medicine.

Here we have a syncretic medical system where the Huichol migrants who participated in this study rely on both magical/supernatural medicine and allopathic/western medicine. All of my informants spoke of using the two systems and often for the same illness event. A birth, miscarriage, infertility,

scorpion sting, headache, cataract, broken arm, cough or cold were treated simultaneously by a mara'akame and an allopathic health provider. This coincides with the assertions I make in Chapter 3 regarding the origins of illness and cure, where modern health care is known to be curative and, for example, is vital in cases such as a scorpion sting, but since the *real* cause is supernatural a mara'akame must also be sought to prevent another misfortune. This suggests to me that the two systems are not only compatible but potentially *interdependent* within the syncretic model, each one enabling and strengthening continued belief in the other as they work together, separately but simultaneously, on one illness event. The mara'akame has not been made obsolete by modern health provision: on the contrary, the added benefits of modern health provision distract from the known fact that mara'akate cannot cure all ills. The traditional model has given a very clear role to modern health care within its own system and mara'akate encourage the use of modern health care while it does not impose on Huichol costumbre or contradict their system of beliefs. The theoretical point that I am making here is that the Wixárika form of medical syncretism is not a simple layering of one upon the other or a happy marriage of two medical systems. It is the insertion of western medical care into the traditional Huichol model without diminishing the power of the latter and in a manner that serves its cultural purposes. There are three key elements to this idea. Firstly, allopathic medicine appears to be understood through the lens of the traditional model. As I explain earlier in this chapter, there appears to be an expectation that western medicine can cure all ills and a belief that pills or medicine are the western or mestizo version of wixárika magic: something incomprehensible, a magical power wielded by health providers, access to or denial of which could be a question of personal grievances and envy. Mostly there is little attempt to penetrate the logic of western medicine in terms of understanding how these curative forms might work, just as there is a generalised acceptance that one cannot ever understand *how* a mara'akame cures his patients, beyond the knowledge that he uses magic.

Secondly, there is a sense of distrust in western health providers. Just as there is a sense of distrust in mara'akate, in the knowledge that they can cause harm as well as good, there appears to be distrust in medical doctors. Such distrust probably also reflects an inability to understand each other linguistically and a deep seated distrust of any mestizo, particularly when he or she is in a position of power. This is heightened by the underlying connotations of racism that are expressed by so many health providers and, as I have discussed in this chapter, is another manifestation of the everyday forms of violence that characterise the attention that Huichol regularly receive from western health providers.

Third and finally, within this syncretic model, allopathic medicine cannot work without the support of the traditional system. While a mara'akame can work alone and potentially cure without the help of western medicine, a doctor cannot cure, he or she can only temporarily allay a sickness, for the true cause of the illness is always supernatural and without a supernatural cure, illness or misfortune will strike again.

Menéndez suggests that one of the principal characteristics of a 'traditional medical system' is that this is always subordinated to the dominant, western model. Last on the other hand, argues that in fact contact with western medicine has so eroded traditional systems that these can no longer be classified as such, but rather they only exist as a 'putative' form (Menéndez, 1994, Last, 1981). Last describes this erosion of traditional systems as the origin of 'not knowing' about illness and illness causality as he suggests that 'not knowing' actually conceals a lack of knowledge and a lack of certainty. As I describe in chapter 4, Last defines a medical system as one where i) there exists a group of practitioners all of whom adhere to a common, consistent body of theory, ii) patients recognise the existence of such a group of practitioners and iii) the theory is held to treat and explain most illnesses that people experience. Notwithstanding the fact that the informants of this study were largely from barranca communities, many were monolingual and none had finished primary school education (implying a corresponding exclusion of the more educated and

acultured Huichol who form an important proportion of their ethnic group) I argue that a Wixárika traditional medical system continues to exist and that this has incorporated into its own explanatory model the use of western medicine. Clearly, as Menéndez and Zolla remark, on a political and economic level western medicine is the dominant of the two but among these migrant families western medicine is a far less important influence in their lives than magic. Huichol ethnomedicine does continue to develop in what Zolla describes as conditions of extreme disadvantage. There is no government support for mara'akate nor financial provision for the infrastructure of Huichol medicine and there is no effort on the part of mestizo institutions to ensure the continued existence of mara'akate. In spite of this, the empirical model of illness causality does not predominate among this group of migrant labourers. It is an accepted form of treatment but it is distrusted both as an institution and as a curative form.

Felipa whom I accompanied to clinics and hospitals so that she could receive treatment for growths of her eyes that were causing blindness believed that these may have been caused by years of exposure to pesticides while working on the tobacco. The operation which returned her sight to one eye was followed by a curative fiesta through which she restored her relationship with the teiwarixi who share her kie and her community. At least among this population the social and moral role of illness continues to reinforce adherence to the *wixárika yeyiya*, the Huichol way of life or *costumbre*.

## **Chapter 6 '*Don't let the children wander at fiestas*'**

### **Reproductive and maternal child health: knowledge/beliefs, practices and problems.**

Asking Huichol migrant workers about maternal and reproductive health was always difficult. From a practical point of view asking was complicated by the problem of manoeuvring between Spanish and Huichol. An on-going limitation of my fieldwork, the problem of translation was most acute when it came to discussing reproductive health issues. I spent considerable time discussing the concepts that would need to be translated into Huichol with my assistants before the interviews. Even so, Juan and Rosa were never entirely comfortable about asking these questions, possibly because they themselves were still getting used to talking openly about such issues. Eventually we settled on an interview dynamic in which I would initially pose the question in Spanish and they would then translate it into Huichol. This suggested to me that they were more comfortable when it appeared that the question was coming from me as opposed to them. Sex, sexuality and reproduction are not taboo issues as such for the Wixárika. In fact, as Neurath (Neurath, 2003a) and Pacheco de Ladrón (Pacheco de Ladrón, 2002) discuss, these issues are key to the Huichol world view and central elements in their cosmogony. Sexual acts are played out in mitote fiestas and described in detail in mythology such as the 'myth of the toothed vagina' (Baez Jorge, 1996), a legend that is shared with other Mesoamerican indigenous groups. In common with Mexican mestizo culture, sex and sexuality are regularly joked about and the Mexican '*albur*', a play on words which gives a double meaning of a sexual nature to exchanges, is also used in Wixárika. The social and cultural acceptability of polygamy and extra marital relationships, infidelities that are frequently dealt with on a communal level, along with the public confession of sexual acts during the pilgrimage to Wixikuta maintain the centrality of sexuality in everyday life. The regularity of sexual jesting contrasts starkly with the acute lack of knowledge about sex and reproduction. As I discuss in Chapter 2, the Huichol of Tuapuire lacks a plain set

of anatomical concepts that refer directly to the male and female sexual organs. What exist are single word terms which are considered vulgar and phrases or terms that refer to parts of the anatomy by describing their *purpose*. For example '*xieyame*' literally means the 'place urine comes out of' and '*niweyame*' the 'place the baby is born from', where *xie* translates as urine and *niwe* as baby or child.

In this chapter I will discuss interview and field diary data relating to and illustrating the understandings, practices and problems of Tuapuritari migrant workers regarding reproductive and maternal child health (hereafter r/mch). As I explain in Chapter 4, my position on the concepts of belief/knowledge is that these are not contrasting terms nor are they hierarchically juxtaposed, but equivalent concepts. The idea that one form of knowledge is more true because it was formed using the scientific methods of inquiry is irrelevant to the Huichol whose system of beliefs centres on the supernatural. As it becomes apparent in this chapter, Huichol women have built up a system of beliefs and practices that are based on empirical and lived experience. Although this often flies in the face of medical advice, these experiences constitute what they *know*, about their reproductive health, this is their *authoritative knowledge*, to use the term first developed by Jordan (Jordan, 1983).

Most of the data presented was given in response to questions regarding maternal and reproductive health which formed part of semi-structured interviews. Some respondents replied directly to questions such as 'how do you care for yourself during pregnancy?' and 'what are the main reproductive and maternal child health problems among women and men in your community?' (see annex for interview guide). Others narrated their reproductive histories and while doing so described the r/mch problems that they or their family had experienced and how they had dealt with them. Migrants' comments are supported and contrasted with data from key informant interviews with medical doctors and employers from Nayarit and complemented with observations and extracts from field diaries. The chapter is divided into three

sections, the first reporting on knowledge and beliefs regarding r/mch, the second on practices and behaviour and the third discusses problems relating to r/mch.

### **6.1 Understandings: knowledge/beliefs about maternal and reproductive health**

It is not at all unusual for Huichol women to become pregnant and give birth without knowing anything about the process of reproduction, for this is a topic that is rarely discussed at home between mother and daughter. Several women refer to their first pregnancy as the point at which they learn about reproduction and childbirth, as +tuama (F37, Pueblo Nuevo ) tells me:

*'My Mum never talked to me (...). When my periods started my Mum told me I had to 'behave', I was no longer a girl, and I was scared because I didn't know [anything] (...). Later they said they wanted to get me together with a man...(...). They told me off and she hit me and my Dad also, he told me off and I wondered why. The Wixárika, they never talk , they don't talk to their children, it just happens. Later they made me get married, when I was 16, well then my mother said to me 'what are you going to do now, because you are pregnant', and well, I didn't know that I was pregnant. The first time I had twins, on my own, I gave birth at home, [at] about seven months and there they died, but I didn't know that I was pregnant because my Mum never told me properly (...). Sometimes my Mum asked me but I couldn't say anything, she asked me if my period had come and I said it hadn't and I think that's how my Mum knew that I was pregnant, she said to me 'you are pregnant, that's why it doesn't come' and I got scared because I didn't know...'.*

Sisters K+paima (F37, Nueva Colonia) and Estela (F35, Nueva Colonia) who live in Nueva Colonia told me that these days girls learned about reproduction at secondary school. Estela told me '*today they learn everything at school, but as we didn't study we didn't know from the beginning and now in school they tell them everything, but even so they get pregnant [young]*'. K+paima and Estela said they learned bits and pieces through 'a woman' from the Oportunidades programme. There they learned everything about contraception and K+paima tells me '*when*

*there was the Oportunidades programme for women we learned about everything that the doctors in the clinic can give you, pills, devices, but I didn't use anything...’.*

The majority of my informants live in valley communities and do not receive Oportunidades or attend these talks. K+paima and Estela live in the Sierra town of Nueva Colonia where Estela works in the women's cooperative shop. K+paima's husband Federico spends much of the year working legally in the USA where he has earned enough to build the family a four roomed home. Both husbands (brothers) own pickup trucks and travel about the country working on agricultural plantations much of the year. These families were the wealthiest of my informants, hardworking and respected in the community. They attend the Oportunidades talks and support their children through school.

One of the key questions I wanted to explore was whether these migrant workers would know enough about the biological process of human reproduction to be able to understand how agrochemicals interfere with embryo and foetal development, particularly during the very early months and including pre-pregnancy exposure. These are the periods when embryogenesis and foetal development are considered most at risk (see Chapter 1). From a public health perspective, some understanding of how agrochemicals interfere with reproduction would be useful for both men and women, so that they could employ some form of additional caution during the most high risk moments of pregnancy and when attempting to conceive, with the caveat that such precautions might be of little use to a population who do not plan their pregnancies. It was soon clear that I would only be able to explore this issue in a very broad sense. Generally speaking, the women and men I spoke to had little knowledge about r/mch processes and what they knew they had acquired largely through their own reproductive experiences. Most women could tell me that they had known they were pregnant because their period did not come but they could not tell me which days of the cycle they were most likely to become pregnant. Marisela (Key Informant, F27, San Miguel), the Nueva Colonia health

promoter who has completed secondary school and the government's health promoter training, said that she did not know which days of the menstrual cycle she could become pregnant and admitted she thought that '*with just the tip or even with your pants on you could get pregnant*', suggesting a lack of clarity about the process of conception itself. The methods of contraception that my informants mentioned they had used were injections, the IUD, and sterilisation, none of which requires a clear understanding of the process of conception. Both informants who said they had been sterilized *had* known at the time that they would not be able to have more children after the operation. This was an important point considering the many cases of forced sterilisations that have been practiced in indigenous communities over the past decades, where health workers have been implicated in the abuse of this lack of knowledge to force through population and contraceptive targets (Smith-Oka, 2009, Menéndez, 2009).

Maximo (M37 Taimarita) who has seven children told me '*this is something only women know*'. Actually, many men I spoke to, particularly those with many children, had helped their wives give birth on several occasions and could talk confidently about this. When I asked Otilia what she knew about the reproductive cycle she at first responded with a '*hauki*' (don't know) and on prompting with questions about the menstrual cycle she went on to add '*I don't know, only that if I have intercourse well, I will get pregnant and for nine months I am not going to have a period*'.

Given this generally low level of knowledge about the process of conception and reproduction in general, the conceptual difficulties and generally delicate nature of this issue it did not seem correct or appropriate to explore the issue of their understanding of biological reproduction any further. Instead I focussed on what my informants did know and did wish to talk about.

## 6.2 Practices in pregnancy and birth

### 6.2.1 What to do and not to do for a healthy pregnancy and baby

As an attempt to elicit women's knowledge about pregnancy and reproduction, I asked people what they thought they needed to do to have a good pregnancy and healthy baby and whether there was anything they thought they should avoid doing while pregnant. The responses they gave to these questions reflected their syncretic approach to medicine and health care in general. Not all of the women I interviewed had been working on the tobacco during the period of this research: several were wives of men I had encountered on the coast and whom I met for the first time at their homes in the Sierra. Some of the women I interviewed migrated almost every year with their husbands while some rarely worked on the plantations but all were also subsistence farmers because all Huichol who live in the Sierra cultivate a plot of land and grow their own maize.

#### *Pregnancy and physical work*

Sierra life could be considered harsh in comparison to modern living, particularly the lives of barranca families. No-one has running water or drainage in their home, most cook using wood that is gathered by hand, clothes must be hand washed and all food is prepared from the most basic whole ingredients, most of which are grown on individual family plots. The remainder must be bought and carried long distances and is used sparingly. In short, regular daily tasks are time consuming and physically demanding and most women I interviewed simply said that when they were pregnant they carried on as normal, as Elvia told me, '*well I work normally, I go to the water, up to the water hole and do all the house work, I sow maize and I weed the milpa*'. Otilia spoke for Huichol women as a whole when she told me '*well a Wixárika woman doesn't look after herself, I do the same as ever, when I am pregnant I go far for water, I never sit down or lie down, I didn't do that. I always sowed like Wixárika costumbre and I weed. Everything is the same*'.

Some talked about working less while in their final months of pregnancy and others mentioned not carrying anything heavy. In particular men mentioned that their wives should carry less although no mention was made of helping them with strenuous domestic chores. Enrique mentioned that '*the only problem is when a woman lifts heavy things*', likes '*stones or working with tools*', although he seemed to think it would be ok for her to scrub clothes for hours. Others made mention of not walking too much up and down the hillsides but again these are relatively unavoidable tasks for someone who lives in the barranca and these comments seemed to reflect advice that they had been given as opposed to practices that they necessarily adhered to. That women were used to and perhaps even benefitted from this taxing physical routine was alluded to by Felipa who suggested that women these days suffered more during pregnancy precisely because they did not work hard enough, '*these days women are delicate*'.

### **6.2.2 Nutrition during pregnancy**

Several women mentioned that they needed to take care not to eat too much while pregnant so as not to grow too big and so to facilitate childbirth. Morales Rodriguez and Fajardo also report the tendency of Huichol women to limit their food intake and in particular consumption of bread, manteca (lard) or too many tortillas to avoid problems at the time of birth (Morales Rodríguez, 2004, Fajardo Santana, 2007). Jorge suggested that women should '*not eat too much, not eat pig fat or seeds which can be harmful to babies, only things like bean soup without too much lard*' and Leonardo (M40, Pochotita) told us '*I think if they eat too much the baby gets stuck inside and struggles to get out. They mustn't have vitamins [either] so that it doesn't grow too much and can't get out*'. These comments actually contradict the only study of nutrition in pregnancy. Crocker et al found no mention of the need to eat less during pregnancy so as not to put on too much weight, findings perhaps biased by the fact that theirs was a study nested within a larger nutritional education programme (Crocker Sagastume et al., 2004).

The issue of pregnancy and nutrition is one of the principal concerns of each of the medical doctors I spoke to in Tuapurie. According to Dr. Carmen, babies born in the Nueva Colonia clinic tended to average 2-2.5 KGs at birth. This unsubstantiated fact, despite its apparent contradiction with medical science, at very least reflects the impression of most women I spoke to that Wixárika babies are born small. Both Carmen and Michaela, the travelling doctor, associated this low birth weight with generalised under nutrition among pregnant women which the doctor related to the fact that the Wixárika only eat twice a day. She felt that only eating twice a day was not because women do not have access to more food but rather it was a result of social and historical factors, a habit, or as her patients told her, it was their costumbre. Either way, she considered that this small food intake was an unnecessary remnant of the times before vehicle access and Oportunidades when food really was scarce in the Sierra, and felt that on the whole Sierra families did have sufficient resources to be able to eat a more substantial diet. In contrast, Michaela felt that social changes such as increasing rates of labour migration meant that these days families *produce* less food. She commented on how the increasing absence of men from communities had led to a neglect of family subsistence agriculture and young families in particular must resort to buying maize part way through the year when their own supply runs out. She told me:

*'Some eat three times and some only twice. These days they grow less, the men leave to work more and few send money or they only send very little. They leave their women without money. Now, at least there is Oportunidades, but they spend it all on alcohol. Here, that is why, because they drink a lot and that is why we have a serious problem with the men'.*

In her ethnography of Huichol health and nutrition Fajardo describes how the Huichol diet has always been ‘scarce in calories’, an eating culture that ensured high levels of infant and child mortality (Fajardo Santana, 2007). That malnutrition has always been common is also illustrated by its multiple representations in Huichol nosology: illness of the deer, illness of maize, illness of the lizard, each represent a different stage and severity of malnutrition.

Despite the commonality of under-nutrition and malnutrition, eating less continues to be practised during pregnancy, it forms part of Huichol authoritative knowledge about childbirth. Jordan explains in her ethnography of 'Birth in four cultures':

'In order to deal with this danger [maternal and infant death] and the existential uncertainty associated with birth, people tend to develop a set of internally consistent and mutually beneficial practices and beliefs that are designed to manage the physiologically and socially problematic aspects of parturition in a way that makes sense in that particular cultural context' (Jordan and Davis-Floyd, 1993, p4).

Jordan's theory of authoritative knowledge has predominantly been used to explain how different groups have developed what are effectively survival focussed strategies for coping with birth. Of particular relevance to the Huichol context is the work of Daviss and Kaplan, and O'Neil with the Inuit, a group who, like the Huichol, do not have the figure of a traditional birth attendant (Kaufert and O'Neil, 1993, Daviss, 1997); and that of Bieselete who describes Ju/'hoansi women's tradition of lone birthing (Bieselete, 1997). These are practices relating to pregnancy and childbirth that are determined by the environmental, historical and cultural characteristic of each group, a point to which I will return later in this chapter.

### 6.3 The mara'akame in maternal health

In spite of her concern that women did not eat enough during pregnancy, Doctora Carmen was cautious not to criticise traditional practices, particularly if these came in the form of advice from a mara'akame. She tells me:

*'The mara'akame checks the position of the baby, that it is growing well, they almost always touch it with feathers and muvieri and tell women not to eat too much so the stomach doesn't grow too much, [sometimes he advises them to] tie a ribbon around the stomach and he tells them "things work out well because you have been good". Treatment by the mara'akame is magical'.*

In addition to the practices and attitudes regarding self-care during pregnancy, most of my informants also described their costumbre, the practices that are part of their Wixárika tradition. Otilia told me how you must '*see the mara'akame so that he can check [you], make a sacred arrow, keep it safe and have it blessed, then when the baby is born, have it blessed and baptised and take the arrows to the closest sacred place*'. Michaela confirmed that 'almost everyone' saw the mara'akame and although some also went to the clinic, those who lived in the barrancas only saw the mara'akame. Cecilia lives in Taimarita and like the other informants from her community she only saw the mara'akame during her pregnancy and did not make visits to either of the Sierra clinics. There was an element of resignation about her attitude towards pregnancy when she told me, '*mmm, well you know the Wixárika don't have good pregnancies. The truth is my first pregnancy gave me many problems, this baby didn't even live, despite the way it punished me [during pregnancy]... and we were seeing mara'akate in Pochotita but they didn't say anything*'.

The doctors I interviewed described the role of the mara'akame during pregnancy as spiritual. There were conflicting accounts about how much they touched the stomach and whether they were able to check that the baby was in the correct position or physically help with delivery. My informants mainly described the mara'akame as 'blessing' the pregnancy and ensuring the parents fulfilled their obligations and offerings before its birth. Clearly mara'akate are experienced in this antenatal role and there is some indication that they sometimes feel the abdomen to make sure the baby is in a good position. There are mara'akate, of whom Tutupica from Pochotita is one, who specialise in providing magical cures related to reproduction and fertility as I will discuss later on in this chapter, but whether these shamans also fulfil a role similar to that of a midwife is unclear. The people I spoke to suggested that this was not the case.

As I discuss in Chapter 3, most other factors that contribute to high risk pregnancies and low birthweight also exist in the Sierra: women begin their

reproductive life very young, birth intervals are small and they are generally less healthy, regularly suffering from gastrointestinal problems (Fajardo Santana, 2007, Morales Rodríguez, 2004). There is little in the way of reliable epidemiological or surveillance data on this population that could form a basis on which to explore this issue further, but my interviews did suggest that a lack of specific attention to themselves during pregnancy could be resulting in high proportions of babies being born with a considerably lower than average birthweight and, as I will discuss in the following section, many women work as migrant labourers throughout their pregnancies.

#### **6.4 Pregnancy and migrant labouring**

Three of my informants, Leocadia (F31, Santiago/Pochotita), Ester (F19, Cajones) and Lola (F36, Pochotita), were pregnant when I met them on the tobacco plantations in Nayarit. Leocadia is a permanent resident in Santiago, she and her sister Angélica and their husbands left their homes in Pochotita four years ago. Leocadia's life is that of a swallow migrant, moving continuously between crops in different parts of the country, leaving her two eldest who attend local schools in the care of her sister, Angélica. She was accustomed to working while pregnant and thought nothing of it, although she did notice the effect on her baby. She tells me '*a while ago I felt ill so I went to the clinic.... they gave me a drip, medicine, these chemicals they cause you harm, you get a headache... when you are working you can pass it to your baby, it can get ill, it's born traumatised, half asleep*'. Leocadia's baby was born healthy, in their one roomed home, a few months later.

Ester was in her first few weeks of pregnancy in February of 2010 and reluctant to talk to me at all. It was her mother Inés who told me, while she was describing the problems that her other daughter had experienced, that Ester was two months pregnant. Like her husband Julio, Ester was exceptionally shy and spoke almost no Spanish at all. They were accompanied by the couple's first child Claudia (3) and her cousin Saul (7) who helped them thread tobacco.

When I met them the following year in Huejuquilla, Inés told me that after leaving Nayarit they had returned for a short while to the Sierra. Their *rancheria* is in the Agency of Cajones but several kilometres from the community itself and about half an hour's walk from the road. In October, accompanied by Juan and Rosa I tried to visit Inés at their Sierra home but found the place empty and was told by neighbours that they had left some months ago. They had grown little maize that year and by July were forced to move off again, this time to Fresnillo to work on the tomatoes and there, on the plantation, baby Yeni was born. Picking tomatoes is heavy compared to tobacco threading and Inés, still suffering pains in one arm, took over the childcare while Ester worked. Leaving the Sierra during this period meant missing some important fiestas and more importantly, neglecting their cornfield but with no maize and no money they had no choice. By chance I found them in Huejuquilla in January 2011. At that point they were renting one squalid room on the back of Julio's salary as a day labourer cutting corn stalks for fodder.

Lola, was six months pregnant when I met her in Nayarit in March 2010. She had been working with her father, younger brother and sister as her husband Leonardo held a cargo at the time. She returned to the Sierra in May of 2010 and her baby was born at home in Pochotita. Lola and Leonardo have several children and told me that one of them travelled to the pick every year. Usually Lola stays at home as someone must remain in the Sierra to be with their school aged children, the eldest of whom is severely epileptic, but this year, despite being pregnant, she went to work in place of her husband.

Many interviewees attended the pick with small children. Cecilia who had a three month old baby with her when we met in Nayarit explains '*Well the Wixárika are always working, whatever is happening, I went to work on the tomatoes pregnant...I worked for all of my pregnancies, I always worked...(...)...there are some men who are really critical, if I don't work they get angry*'. Marta tells me that her pregnancies were always intercalated with working and tobacco migration, '*I tell the women here "how can you not go to*

*work if I worked". I didn't have problems with any of my children, they were all born here, I went to work when I was pregnant and when I came back to my rancho they were born'.*

Others were more ambivalent: sometimes they worked, sometimes they didn't. Anita said she had never worked while pregnant but that her father's wife had done and her children had been fine. Otilia told me she hated working on the tobacco and although she had been to the pick the previous year, when we met, she would never go again. She had never worked while pregnant. While Angel (M42 Cajones) explained that his wife had come to work while pregnant but only to prepare their food and look after the children.

#### **6.4.1 Seeking ante natal care in Nayarit**

With the exception of Angélica and Leocadia who live in Nayarit all year round, none of my informants talked of seeking antenatal care while working on the coast. All of the women I spoke to saw a mara'akame while they were pregnant but only a few visited the clinic. These were the women who lived in close vicinity in the Sierra towns and received Oportunidades. Most of these migrant working women rely exclusively on the mara'akame for their antenatal care, a practice that is upheld while working in Nayarit, despite the fact that at least in theory, they have access to free healthcare while working on the coast.

When I met Lola she was working for Chaparro who told me how he explained to her that she would not have to pay anything if she went to a clinic, '*any of these workers is seen for free*' he explained. When I asked him what he did for pregnant women who came to work for him he responded '*well whenever they need something I take it to them, I help them in whatever way I can but they are very different (...) they are very dependent on their people, the ones that cure them, well once I took them to a mara'akame, one of those healers, I took them because he [the husband] asked for a bicycle and I said, no, I will take you'*'. Patrónes Ramon and Ignacio spoke of how they had not always noticed that the

women who came to work for them were pregnant since they wore loose clothing. Several farmers also commented that it seemed to be the husband who made decisions regarding his pregnant wife, whether she saw a doctor or went to a clinic. Efrian explained '*there are even husbands who don't let their wives be seen by a doctor and, well, the women they put up with it*'.

The overall impression I gained was that working while pregnant was normal and necessary. Maybe it could be risky, but this attitude did not predominate and most workers and employers focussed on the practicalities. The employers I spoke to also talked about the normality of seeing pregnant women at the tobacco harvest. They all had stories to tell. The majority of tobacco farmers in this region have been cultivating the crop for many years. It is a crop in decline and now largely sustained by farmers in their late 40s, 50s and 60s, when they benefit from a retirement pension. Mostly they know their workers well and they all demonstrated some understanding and sensitivity to their indigenous lives. Efrian tells me:

*'I am aware that there is risk for them [pregnant women] when they come and work on the tobacco, not only for them, but also their husbands. But in the sierra they have no work and that's why they come. And so there is risk for both of them but what can we do? We give them water and sometimes tortillas but our economic situation doesn't allow for more. And well, we would like to have them [living] like ourselves, they are human beings, one would like to give them a house so that they are comfortable but our economy doesn't allow it'.*

## 6.5 Births

The majority of women I spoke to gave birth at home, sometimes accompanied their mother, mother in law or husband and sometimes with the presence of a mara'akame. Some women had given birth in the clinics of Pueblo Nuevo and Nueva Colonia and some had been in Huejuquilla or Santiago when they went into labour and chose to give birth in hospitals but these were a minority, as K+paima told me '*We are penosos, we don't like anyone to see us*'. 'Pena' or shame is a big part of a woman's decision about where to give birth.

When I asked Otilia where she gave birth she told me, '*Me? Alone. I didn't need anyone, only my old man was with me to pick up the baby*'. I asked her what position she gave birth in and she continued '*Just crouching, it's just that I didn't want anyone to see me...when my first baby was born I didn't even tell my husband until the baby was born... I never said anything to my old man, who knows what he thought....'*

That Huichol women have always given birth alone is evidenced by their knowledge of birthing positions, and they are all the more knowledgeable because these are women who have given birth to many children. All of Martha's ten babies were born at home in Taimarita. She tells me how there were several ways to give birth alone, so that the baby falls softly and the mother has something to hold onto, she told me;:

*'Well, some women have help when they can't give birth, sometimes they hold them round their middle tightly, so the women has something to hold onto and can push harder and the baby is born. Another way is holding onto a pole [a log or stick lodged diagonally across the room], but I had mine by grabbing hold of a rope [tied to a roof beam]. When the pains are close together I grabbed the rope and when the baby is coming out I pushed hard, that way the birth is not difficult'.*

When women do choose to use the local clinic they very often bring their mara'akame along. Each of the Sierra doctors I interviewed described the side-by-side use of doctor and mara'akame. Carmen told me how when the mara'akame comes along to the clinic she quietly leaves him to get on with it. She recounted how a woman with a transverse baby was successfully attended:

*'A woman came to me when she was six months pregnant. The baby was transverse and I told her that she would have to go to Huejuquilla if it didn't turn. I saw her again when she was eight months and the baby was still transverse, I told her that the baby wasn't going to come out and she would have to go to Huejuquilla. But I kept seeing her around, she would walk past the clinic and of course the day of the birth came and she arrived at the clinic, she was 4cms dilated and the baby was still transverse. Now, I said to her, you will have to go to*

*Huejuquilla and I am going to find a camionetta for you. But she didn't want to go and she called the mara'akame Felipe. When he came I left the room and let them get on with it. A little later he left. I don't know what he did but the baby's head was crowning, you could see the head and then it came out, healthy'.*

I asked her what the mara'akame had done and she continued:

*'Really, I don't know. It's always with the muvieri, he moves it above her like this [demonstrates with] and sort of whispering. I never really see them touch the body, it's all with the muvieri, sometimes they put a hand on the stomach but it doesn't go beyond that'.*

### 6.5.1 Plantation births

Angélica has five daughters, the eldest of whom is now eight was born in the Sierra, with the help of her mother, she explained '*this one was difficult but they didn't take me to the clinic because they couldn't*'. The four youngest were born in *tewarit+a*, while she was working as a migrant labourer, she described these to me:

*A: The next one was born there in Zacatecas, the one that is Fausto's, but I also didn't go to the hospital or anything, just on my own with my husband.*

*J: Alone in your home?*

*A: No, there where we were working in the fields.*

*J: But where were you when your baby was born?*

*A: In the fields, in one of these, what are the called? Tents, it wasn't a camping tent, just a cloth tent.*

*J: But on your own?*

*A: Alone with my husband, nobody helped us because I was far away and the patrón only came on weekends sometimes. That day he did come to see but he didn't take us to hospital or anything.*

*J: Was that Estrella?*

*A: Elena. Estrella was born here in the field, also no clinic or anything, they didn't take me to hospital.*

*J: In a ramada [palm canopy]?*

*A: Yes, Estrella.*

*J: She was born when you were in Amapa? And who was there?*

*A: Just my husband and me. Then after her comes the next girl, she was born in a hospital, the patrón took us to hospital but he didn't say anything, he didn't even say 'help these people', he just left us outside the hospital. (...)*

*JG: The hospital in Santiago?*

*A: Yes, here in Sanitago. My husband went in and said to a man 'could you help us' and they received us and that was it.*

*J: But she was born well?*

*A: She was born well and the nurse told me she didn't have anything, she was fine.*

*J: And the last one?*

*A: She was also born there. This time the patrón did help us and said to the person in charge, what's he called? The people that receive you?*

*J: Nurses? Doctors?*

*A: I dunno, the director or whatever he's called.*

*J: The director of the hospital?*

*A: Yes, and he asked if he could help us because we were indigenous and working in the tobacco with him.*

*J: So the four youngest were born during harvest when you were working in the fields.?*

*A: Yes.*

Each of the patrónes I interviewed also spoke of the women who had delivered while working for them. Efrian described his experience:

*'There in the field, two women, and sometimes I didn't believe it until I saw it, on both occasions I turned up in the afternoon and the women were picking tobacco. When I came back in the morning the baby was there crying and I said 'caray [blimey!], what happened'? One admires*

*them caray! I did take them to the clinic, the health centre, so they could be checked but all was ok (...). The husband cuts the umbilical cord, he helps her. No, no! You admire them! (...) I think their blood is strong, it means it doesn't affect them, well imagine, with any old knife!*

Ramon who had worked as a tobacco farmer for over fifty years told me of a young 14 year old girl who was working for him when her first child was born:

*'She was almost ready to give birth when she arrived and we helped her get her Seguro Popular...I don't know how many years ago it was when that family came and it was their daughter, I took her to the Seguro (hospital) and when we came back I said, look, she must come home with us, my wife will look after her. "No, she's coming with me" my worker said, "because she's just given birth,...bring her back (to me)" he said, "she's going to work with me" ...and the next day she was working. They are very strong and resistant, I have seen many like that and have many stories like that'.*

Ramon also described how another heavily pregnant woman turned up looking for work, and 'quick as a flash' her baby was born, there on the plantation, '*they are brutal!*' he said, '*(afterwards) she went straight back to work*'.

Patrónes coincided in describing how the women who had given birth with them were strong or resilient, that they mostly chose to give birth alone and get straight back to work the next day. Although these employers spoke of offering the women some form of post natal care, in particular a space to stay in their family homes, they also suggested that this was neither wanted nor accepted.

## 6.6 Health beliefs or structural violence?

To some extent the Health Beliefs Model can help explain why these women chose not to seek hospital care before or after giving birth, or why they worked at all when they were pregnant. In terms of health beliefs regarding pregnancy and childbirth my data suggests that this is considered a very normal condition, that women continue as normal as opposed to adopting particular health promoting strategies. The main concern seems to be not eating too much

so as not to grow too big, otherwise my informants describe going on as normal. This is not perceived as a time of particular vulnerability or a time when medical attention is required. In terms of perceived *severity*, there is also little indication that working and birthing alone are seen as threats to their or their child's health. Although some informants mentioned the insalubrious living conditions that they endure while on the coast others see a positive side, as Anita remarked '*they live well and eat well while on the coast*'. In the following chapter I will discuss the issue of pesticides and how this is perceived but in general there is little indication that this is considered a *serious* risk to their own or their child's health. There is also little indication that these migrant workers think they would *benefit* from seeking care. They do not seem aware of what the benefits of ante natal care might be, perhaps a case of not knowing what they have not experienced. Having to deal with a complex bureaucracy, communicate in a language they are unfamiliar with, lack of privacy and shame are all barriers to care seeking. In addition there is a *perceived cost*, for while they are on the coast, although their employers emphasize that they will not have to pay for care, it is not clear whether they actually *believe* this to be the case. Furthermore when they attend appointments there is a real cost in terms of lost earnings which could amount to half a day or one day's wages as well as the cost of transportation. Ultimately this is a population who use modern health services sparingly and maternal health is not one of the situations for which they tend to seek medical care. They do not see themselves as vulnerable or 'at risk' (*perceived vulnerability*) and almost certainly do not see any risk as severe (*perceived severity*), they do not know what the benefits of care seeking are (*perceived benefits*) and they are familiar with the barriers to seeing care, that are real and have been experienced (*perceived barriers*). Probably these workers do not consider pregnancy and childbirth to be a time when they need to take particular precautions or seek care, at least not medical care, they do not believe that they need to seek care while pregnant. In contrast, they do feel vulnerable to supernatural forces, to mara'akate and witchcraft and know that the risks of not seeing a mara'akame can be severe and they believe there are

real benefits to having the pregnancy and child blessed by the mara'akame and the kakayauxixi.

Although the HBM based explanation for behaviour suggests that beliefs are an important determinant of behaviour, in this case it does not tell us more about these beliefs and is probably inadequate for explaining medical systems that are altogether different and where causality and prevention operate from a different logic. Seen from the logic of supernatural explanations of causality, although 'exposures' may be a trigger for illness, this illness will be unavoidable irrespective of the exposure. If ultimately the determining factor is spiritual, anything else is relegated to a secondary or subsequent position in terms of risk/benefit. Mostly my informants seemed to consider the mara'akame to be the most important element of antenatal care and preventing r/mch problems. Seeing a mara'akame and fulfilling the mandas was considered the principal means of ensuring a healthy pregnancy and birth and possibly this influences their perception of the benefits of western healthcare. Such a conclusion would suggest that the mara'akame needs to be central to any strategy aimed at improving r/mch and increasing knowledge about wellbeing.

There are also broader barriers to seeking care that are better explained from the perspective of structural violence than reduced to a question of beliefs. It does not do justice to the injustice of gender inequality to categorise this as a 'perceived barrier'. Women are clearly subordinated to their husbands in terms of decision making, particularly when it comes to reproductive decisions. Fajardo identified the importance of considering male opinions and involving men in a cervical cancer prevention programme since husbands operated as gatekeepers to their wives (Fajardo, 2006). While women freely admit to being ashamed about anyone else seeing them, men are equally zealous about allowing anyone else to see their wives and a woman cannot be seen without the consent of her husband. When I asked about women's health problems, Estela from Nueva Colonia referred to the fact that '*men do not let their wives make [reproductive] decisions, they just get them pregnant then leave*'. She and

K+paima discussed this at some length, telling me, '*something needs to be done about this*'. The Huichol have one of the highest fertility rates in Mexico and among the multiple reasons for this is the centrality of a woman's reproductive role to her status and kinship relationships. A woman who cannot and does not produce children is of no use to her husband and he will either leave her or take another woman (Fajardo, 2006). She cannot use contraceptives without her husband's consent and her movements in general are limited by what her husband will allow her to do. Gender equality among the Wixárika is a subject that few have researched, it is an issue that is delicate to approach with men or women. Pacheco de Ladrón and Schaefer (Pacheco de Ladrón, 2002, Pacheco de Ladrón, 1999, Schaefer, 2001), who have written the only ethnographies about Huichol women both did so without discussing in any depth the question of gender equality. In her short text entitled 'Sexuality and maternity among Wixárika women of Nayarit' (p37) Pacheco de Ladrón describes how;

'The *Wixárika* costumbre does not assign (them) rights as individuals (...) within the indigenous costumbre women take their rights from their role as biological reproducers from where they participate in public and community spheres in their role as daughter, sister, wife and mother [of a man]'.

The Huichol are also one of the few ethnic groups in Mexico where polygamy is endorsed and accepted, even respected, on a community level. Although it is more common these days for men to simply abandon their first wife, the tradition of taking and keeping a second or subsequent wife has by no means been abandoned. Wife suicide, that Lira (pers com 2010) refers to as the 'ultimate revenge', is a growing phenomena in the Sierra and more worrying for its frequency among young women. The younger sister of my research assistant, desperate that her husband had taken a second woman, hung herself in November 2010, leaving an 18 month old child and Lira recounted to me numerous similar cases that occurred during her five years of field work.

Gender inequality referred to by Farmer as an ‘axis’ of structural violence is embodied and expressed as symbolic violence. Bourdieu talks of the ‘dominated habitus’ which he describes as a ‘somatised social relationship, a social law convened into an embodied law and not the kind [of law] that can be suspended with an effort of will, founded on a liberatory awakening of consciousness’. Gender violence forms part of Bourdieu’s habitus and ‘The effect and dispositions of its efficacy are durably and deeply embedded in the body in the form of dispositions. This is seen , in particular, in the case of relations of kinship and all relations built on that model’ (Bourdieu, 2004, p341). The idea that expressions of a ‘dominated habitus’ are transmitted through kinship relationships is also suggested by Goffman in relation to the linked concept of stigma. In his essay on stigma, that he refers to as ‘undesired differentness’ Goffman describes the ‘tribal stigma of race, nation and religion, these being stigma that can be transmitted through lineages and equally contaminate all members of a family’(Goffman, 1968, p4 ).

As I discussed in the previous chapter, symbolic violence is exercised only through an act of knowledge and practical recognition that takes place below the level of consciousness and will. Essentially this gender inequality which forms part of the Huichol costumbre is embodied, and no-where is this embodiment more evident than in the bodily functions that relate to reproduction. For, as Pacheco suggests, women belong to men and their reason for existence is biological reproduction. From a young age Huichol women know that this is their reason for existence and they embody the social role to which it is attached.

## **6.7 When things go wrong: infant death, miscarriage and congenital malformations**

In his study of reproductive health in the Sierra Morales Rodriguez found that 73% of women gave birth at home or in the home of a family member and only 18% of births were attended by a health professional while Pacheco de

Ladrón reports that 35% of women she interviewed gave birth alone, 34% with a family member, 21% with a mara'akame and only 10% with a health professional (Morales Rodríguez, 2004, Pacheco de Ladrón, 2002). Although younger women from the sierra towns increasingly choose to give birth in the Hospitals of Huejuquilla and Fresnillo, the nearest city, there seems to be little 'need'. Morales Rodrigues estimated that only 1.4% of births were by caesarean section while Carmen told me that they were 'extremely rare'. In ten years she had only sent two women to Huejuquilla for a c-section, a rate of less than 1%. Like the anecdotal evidence on birth weight and the description of mara'akame Felipe delivering a transverse baby this data on caesarean sections appears to fly in the face of medical evidence which has established population means and survival rates for such events. Medically speaking it would be impossible for a woman to deliver a transverse baby vaginally unless the baby was physically turned. The WHO has recommended that 'Both very low and very high rates of caesarean section can be dangerous' and they suggest that 'a lower limit of 5% is reasonable for caesareans performed for both maternal and foetal reasons' (World Health Organization, 2009, Leigh et al., 2008). It has been estimated that around 14% of newborns are of low birth weight, below 2,500g at birth (Blanc, 2005), at odds with Carmen's suggestion that this was an 'average' figure for birth weight in the Sierra.

Although these descriptions of Huichol pregnancy and birthing practices appear to contradict established medical evidence and recommendations they are reflected in high rates of infant and maternal mortality and frequent miscarriages. Accurate data on these events is equally difficult to obtain but, as I mention in Chapter 3, infant mortality in the Sierra Madre is among the highest in Mexico. It is probably also an underestimation of the local IMR since many babies are born and die in the barrancas without appearing in vital registration of any kind. The situation is repeated for maternal mortality.

Almost all of the women I interviewed had lost at least one child in infancy and many had lost several. Cirilo and his wife Esperanza lost eight children between

them, including the baby that was born to Esperanza's sister, who was also Cirilo's first wife. They described to me how these children 'left them':

*E: Only one died at the beginning*

*C: Well, I don't remember well but with the first woman [Esperanza's sister] we buried one up there. Before there were no grave yards so we buried them anywhere and this one we buried it where the house now stands, didn't we?*

*E: Don't you remember [to Cirilio] that you told me we buried it up there, when you were invited to play at the burial of K+wima's son?*

*C: No, no, that wasn't the one we buried up there...*

*J: And that baby, how did he die?*

*C: Well, he just got an illness.*

*J: How old was he?*

*C: About one. I don't know what type of illness it was, well he just got ill and died...he just lost all his strength and died, but I don't know what the illness was. And now, with her [Esperanza] how were the deaths...*

*E: Well some very small and some like the baby he [referring to their son Benjamin who sits in a ki opposite] was carrying a while ago and some about six or seven days old, really small...*

*J: And why do you think this happened?*

*E: Well, who knows why it happened to me. And also, they didn't get me medicine to treat me, well in those days there wasn't any and this man also didn't take me to Huejuquilla.*

*Who knows why this happened but after that my mother spoke to the mara'akame. That was when we started to be treated by the mara'akame and who knows what he did but thanks to the words of my mother the mara'akame treated us and no more children died.*

*J: So, all the first children died, and then [after you had seen the mara'akame] they lived?*

*C: Well, she had the babies then a month later they died.*

*J: But they were all born ok?*

*C: They were born ok.*

*C. And who knows what happened... but afterwards my mother-in law said that she [his wife] had to make a xukuri and I had to make some arrows...we took the offerings [to San Blas] three times in Easter week. And that is why today they are alive. After we had done that I saw another mara'akame and he told me I owed the virgin, so I had to do four fiestas, I am still missing one to be at peace. It's not easy to ask for life, somehow you have to pay for it, and that's what happened to me, the gods made me pay and today I still owe a fiesta for the family that I have. But thanks to that, the death of my children was ended, because before that they were all dying. But who knows, the children that are here, Benjamin's children ...*

*E: One died, the one that was born after Domingo, then no more died. And none have died with his other wife either...that one when she is pregnant she lies down on the bed and gets ill, that's what happens to his second wife.*

Cirilo and Esperanza now have more than fifty grandchildren. They talked of their children dying more than twenty years ago, when there was no clinic in nearby Pueblo Nuevo. Curiously, Esperanza saw the babies' deaths as an illness that had befallen her, '*they didn't get me medicines to treat me*' she told us. Such a logic coincides with the idea proposed in chapter 5, that this particular form of medical syncretism sees the application of the traditional explanatory model to western medicine: within Wixárika ethnomedicine the cause of infant death will always lie in some transgression of a parent or ancestor and not in a failure of the infant itself. More than two decades later they still owed the gods for having given them 'life' in the form of their children, a debt that will be passed onto their children or grandchildren if they fail to fulfil it before they die.

Also in Pochotita, Lola who has very recently given birth and her husband Leonardo, talked of the three children who left them. Lola is now 32, She has had eight children and five survive, all were born in their rancho in Pochotita:

*Ll: I have had eight children but one couldn't be born and it took about five days.*

*Le: Day and night [the labour lasted]. With the pains she lasted all night then in the morning it was born then it died two or three hours later. It was born with marks from mistreatment, with wounds; I think*

*because of the time that it spent inside. They [the mara'akate] did position the baby so that it would come out well but it couldn't, until afterwards, after five days. It was the first one to be born and the next one was born without problems, the rest were born alright, only three died from illness, two were born then died from illness.*

*J: And how did they die?*

*Le: The oldest one was nearly two, he could almost speak and the third one was small, about three months old and no more have died up to now.*

*J: And was this a long time ago?*

*Le: This was about ten years ago. The first one died in 1996 when Lola was 16, now she is 32.*

*J: Do you know why they died?*

*LL: I don't know, suddenly they died, like with a heart attack, they got fever, vomited and diarrhoea, that's how they died.*

*J: And did you take them to be treated with anyone?*

*Ll: We took them to see the mara'akame, the two year old, but he couldn't be saved.*

*Le: The mara'akame said it was because of the plant, Kieri, and that illness is very characteristic because the skin goes white and well no one knows about this illness. That's what they say. And they both died the same way.*

*Le: They said it was because of a debt with the gods and also the illness is very strong, the mara'akame couldn't [fight it]. But we didn't go to the clinic.*

*J: What did the mara'akame tell you?*

*Ll: That it was because of the plant, Kieri and because we have not fulfilled, and we haven't done a fiesta, we just said we were going to do the fiesta, you know what the costumbre Huichol is like...if you owe to the gods anyone can get ill but if you continue to fulfil then nothing will happen.*

Several informants described their children dying from Huichol illnesses, many of which were probably some form of malnutrition possibly exacerbated by infection. As I have already explained the Huichol have many names for

nutrition related illnesses and these, along with scorpion stings, have been the main causes of child death in the Sierra for many decades. In his detailed analysis of Huichol illnesses Casillas Romo describes fourteen 'illnesses of the digestive tract' and eight 'nutritional disorders' (Casillas Romo, 2000), among these are *teparixiya* which Inés' second child died of. According to the author *teparixiya* is when a small hard ball forms in the stomach, leading to diarrhoea, fever and vomiting. *Ik+xiya*, *maxaxiya* and *atacuaxiya* are all categorised as nutritional illnesses and probably all refer to some stage of malnutrition. These are the illness that my informants mentioned most, Maximo explains:

*'The illness of maize is very characteristic, the mara'akame told me that he [Maximo's son] had an illness, his body became swollen then went down and he got a rash. He had this illness for three months then he died. I took him to the clinic [where] they gave him medicine and also to the mara'akame, finally no... the illness won. It didn't work. Later I found it had been Ik+xiya'.*

While most of my informants made a clear association between incumplimiento or costumbre and their child's death, Enrique from Pueblo Nuevo, one of only three informants who had not lost a child, said that when a child is ill you 'must go to the clinic', in his broken Spanish he explained that his two children were born in the clinic:

*E: Anyway they [other people] say to you "how are you going to do it if you have the baby in the clinic?", They say to us "how are you going to do it so the baby does well?" and so you do the, the introduction [by a doctor] that they give you, if you do it the baby will be safe, only there are people who don't do it and there are moments that the baby disappears, totally, it dies.*

*J: And, how do you understand this?*

*E: Well, it's not your fault if you can't care for the baby well, because this is why the doctor gives you [medicines], they ask you, what are you going to do if the baby is not well when it comes? And, some don't believe them, right? Or if you don't have any money then you can't care for the baby well.*

Some women gave medical explanations for their children's deaths. All of Estela's children were born at home in their family rancho near Las Latas or their ki near Nueva Colonia and she explains '*I thought it was hard work to have a baby in the clinic, that's why I didn't have any there, me and my husband we helped each other so that the baby could be born*'.

When Estela's second baby became ill she took him first to the clinic, then to Huejuquilla and finally to the hospital in Fresnillo where '*they said he had pneumonia, (...) there they gave him medicine but he didn't survive*'. With her fifth child *she* became ill, '*a piece of placenta got left inside. The first day I was fine but on the second day I think it became infected and they had to take me to Huejuquilla and there they removed the placenta. They gave me medicines and I took them, to clean the womb*'. Estela had to be carried on a stretcher from her rancho to Nueva Colonia then endure the bumpy three hour drive to Huejuquilla in severe pain, but she was fortunate.

Enrique lives in Pueblo Nuevo and is with Oportunidades . He told me that his wife has always been to her appointments and receives good attention at the clinics. When they are pregnant , he said '*they pull them [pregnant women] in close*'. Earlier in the conversation Enrique had expressed anger at paying 200 pesos for a mara'akame to see his pregnant wife only to be told nothing could be done. Here he referred both to the distrust that other people had in the advice given at the clinic and their concern that if you gave birth at the clinic your child would not do well, perhaps because it had not been blessed by the mara'akame. But his opinion was rare: few of my informants expressed such confidence in the local clinics and he was alone in his cynicism of mara'akate. Enrique was very much of the opinion that the mara'akate did more harm than good, explaining that they were the ones who caused the problems which they then charged large sums of money to cure. He even suggested it would be easier to 'kill them'. Probably his cynicism lay not in disbelief in their powers to communicate with the gods and conduct magic, but in a distrust of their motives, seeing these as both economic and evil.

Olivia's baby died about eight years ago. She felt pains when she was heavily pregnant and was worried, so she went to see the mara'akame Marcelino, accompanied by her husband Jorge and his mother. Marcelino was not at home, but his wife was. Olivia explains that the baby died because the umbilical cord was cut too short. They tied the cord and cut it too close to the knot. It came undone, they tried to tie it up again and again but couldn't knot it. There was too much blood and it kept slipping undone, until eventually the baby bled to death. Olivia's mother in law, Felipa blamed inexperience, '*the women these days are not prepared*' she tells us. This is the only description of an infant death in which the costumbre was not implicated in any way, at least not in my presence.

None of my informants made any mention of a possible association between infant death and exposure to pesticides. There was a sense that infant death is part of their lives and in some way linked to faltas al costumbre for which they or their ancestors were responsible. There was also a sense that they as parents were not in the position to save their children, as Maximo said 'the illness won' and Lola explained that 'he could not be saved'. Such comments sit comfortably within the Huichol explanatory model of illness which places causality within the supernatural realm. Lola and Leonardo said that Kieri was responsible for the death of their child, suggesting the use of witchcraft, while Esperanza and Cirilo made more general references to costumbre as a processes of exchanges where you needed to 'ask for life' and 'pay for life'. Another element that emerged from these narratives was the undertone of normality and acceptance, expressions of a culture which has always experienced extremely high rates of infant mortality. Scheper Hughes argues that 'A high expectancy of infant death is a powerful shaper of maternal thinking...(...)'(Scheper-Hughes, 1992, p340). In her discussion of infant death in Brazilian Favelas, the author discusses how the normality of child death contributes to a maternal detachment from children, based on the idea that one must not become too emotionally involved in a child that is likely to die. Huichol women see their role in life as that of mother and I did not witness a similar detachment. Neither did I witness the

death of a Huichol child. The element of normality and acceptance seems to be better explained by a combination of the *frequency* of these events and their belief that beyond fulfilling their religious and cultural responsibilities, there was little that they as parents could do to avoid or prevent the death of their children.

Existing literature suggests that most of these deaths were from nutritional related disorders and an assumption that the majority were preventable would be acceptable from a public health perspective (Crocker Sagastume et al., 2004, Fajardo Santana, 2007). Such a hypothesis is buttressed by references to illnesses such as ikuxiya and maxaxiya, the most severe forms of malnutrition. Most parents talk of taking their sick children to the mara'akame and local clinic, the latter often as a last resort when the illness is well advanced. However, there remains a sense of resignation about these efforts, as if the death had already been decided and that this was a fate that they could not avoid. Scheper Hughes also discusses this fatalistic attitude to death, citing a young woman who told her '...[it] doesn't matter what you do to prevent it, they will die anyway...' (Scheper-Hughes, 1992, p369).

A Health Beliefs analysis of this attitude might well conclude that these Huichol parents do not believe in the efficacy of their actions. While this may be the case, such an explanation would clearly be missing the point: for these families the life and death of their children is really an issue of supernatural proportions. Yet, to describe attitudes to death as largely culturally determined also minimises the impact of social context, for the *frequency* of death is not cultural but social and structural, as Farmer explains 'culture does not explain suffering, it may at worst furnish an alibi' (Farmer, 2005, p49).

Some explained how their children became ill while they worked in Nayarit and later died, but again, no suggestion was made that this was linked to any harmful exposure. As I describe in Chapter 1, there are numerous ways in which exposure before, during and after pregnancy can affect an infant or young child,

leading to low birthweight , poor reflexes, underdeveloped organs and a range of congenital malformations all of which could impact on their growth and development (Dunn et al., 2003, Reigart, 1995, Garry et al., 2002, Garry, 2004). A study of tobacco working families in Nayarit found indigenous children to be more affected than adults, with a higher level of cholinesterase depression than their parents and a greater rate of depression than the adult workers who also applied the pesticides (Díaz Romo, 2002). A secondary analysis of this same data found rates of cholinesterase depression of up to 190% among indigenous child workers (Gamlin et al., 2007). Children are more vulnerable to pesticides than their parents because of their smaller body mass and physical proximity to the ground and because their bodies are still in the early stages of growth and development (Quang and Woolf, 2000, Woolf, 2002). The children in this study work and play in contaminated soil and the living conditions are such that they are continually in contact with contaminated ground and air. The secondary analysis of data from tobacco children also found very high rates of anaemia (93%) among children and there was discussion of the possibility that indigenous children are more affected by pesticides because they are also frequently malnourished (Gamlin et al., 2007), a reason that was also given for the high mortality rate during the measles epidemics (Santos et al., 2004, Fajardo Santana, 2007). Although some of my informants described deaths that occurred at the beginning of their reproductive lives, in some cases more than twenty years ago, there were also many who had experienced the death of a child within the last five to ten years. As I explain in chapter 2, census data continues to rank Mezquitic among the municipalities with the very highest rates of infant mortality but epidemiological data about the maternal and child health of this population is severely lacking and from a policy perspective, this would also be necessary to define any intervention. Knowing how these migrant workers understand the deaths of their children is clearly important to any strategy, but this needs to be accompanied by data that tells us the main causes of death and what can be done to prevent them.

### **6.7.1 Infertility, miscarriage and congenital malformations.**

*'In our costumbre the mara'akate tells us that we suffer with our pregnancies and birth because of something we have not done for the gods. Or for example, there are people who are good at killing deer (...). They told us how many deer they had killed but they never thanked the gods and that's why today, we are paying [the gods] the consequences, I mean, the deer put their horns in our stomachs so the babies are in a bad position and so that the mother suffers. Or for example, the tsik+ri (eye of god) lodges itself in the door of the vagina so that the baby can't be born. That's what the mara'akate tell us'. (Felipa).*

My informants hold the opinions of mara'akate in high respect and invest considerable trust in their knowledge and wisdom regarding maternal and reproductive health. In his role as intermediary with the gods a mara'akame can cure infertility and 'make babies', but he is also responsible for causing fertility problems. Inés described how she had had difficulty becoming pregnant so went to see a mara'akame who gave her a treatment so that she could become pregnant. Then she remarked '*and now I ask myself, well why did I want to bother, I don't know why I wanted more children. Or maybe that's why it became complicated*', suggesting that the mara'akame may have helped her become pregnant and at the same time given her a complicated birth.

This ability to give and to take away was suggested by many as they described how mara'akate were responsible for both cure and the cause. In the previous chapter I explained how Tutupica was known to be skilled at 'making babies'. In fact he offered to 'put' me a girl child if I stayed in the Sierra long enough. Felipa told us how she had seen this happen 'by magic' but she warned, if anything went wrong '*she must go back to the same mara'akame, only he can cure her*'. Similarly Enrique talked of how it is mara'akate who made people sterile and only mara'akate who can cure infertility:

*E: You are born sterile. Men, women. And it can't be cured. Some are born like that and sometimes the mara'akate do something to your womb, they twist it and they tighten it, that's why lots of women are like that.*

*J: And do you know how to cure it?*

*E: Them, the mara'akate, they can cure it. But it's very expensive. It's cheaper to kill them, but you have to know which one it was. Only the person who did it to you can cure you, only him.*

There is a strong belief that mara'akate are in some way involved in making women infertile. Like their ability to cure illness, these are skills they possess only in their capacity as agent of the gods for it is the kakayuaxixi who bother the baby and '*there are some men who care for their wives, for whatever pain they take them to the mara'akame, even for fever. They take them to the mara'akame so that he can move the kakayuaxixi to one side*' (Felipa).

Like infertility, miscarriage is generally thought of as 'a bad thing that they do to you'. There is no mention of any other possible cause for sterility or infertility; it is a problem that is very clearly blamed on witchcraft of some sort. Infertility is a problem that has been linked to pesticide exposure through damage to the spermatozoa, ovum and embryo, but there was little evidence that it was affecting the fertility of my informants. Few had experienced anything more than temporary infertility and there seemed little reason for asking a woman or man who already had several or many children whether they had problems conceiving. In contrast, most of the women I interviewed had suffered one or more miscarriage, another r/mch problem that is linked to pesticides through either maternal or paternal exposure (de Cock et al., 1994, Nurminen, 1995, Curtis et al., 1999, Wigle et al., 2008). Miscarriage has been associated with pre-conception exposure to pesticides and exposure during the first few weeks of pregnancy and through the same mechanisms, pesticides have also been linked to congenital malformations (see discussion of these effects in chapter 1). It was not the purpose of this thesis to ascertain whether or not these migrant workers had suffered r/mch problems because of exposure to pesticides but to explore whether workers were aware of this risk and what they did know about the risks of pesticides and health, thus I asked them what problems they had experienced and what they knew about the causes of these. On the whole there was no spontaneous mention among my informants of a possible link between pesticides and r/mch problems. After prompting some did query this,

for example Elvia suggested '*maybe this is why he (her son) died*'. Rosa, like her cousin Felipa was working in Nayarit when she miscarried and she explained '*when they do bad things to you, you can never have children*'. After some discussion about her experience of miscarriage Rosa referred to the fact that while she was working on the tobacco she knew her baby was suffering because she could '*feel him move about when the smell was strong*'. Although her comment was sincere, it came at the end of my fieldwork by which time Rosa and most of the inhabitants of Taimarita knew that I was researching pesticides. By this time they had begun to talk about the idea that there was an association between pesticides and reproductive health. Essentially if her 'work' was somehow implicated in her miscarriage, the cause was another. Like infertility, miscarriage is largely linked to supernatural causes.

Angelina (F31, Taimarita) had a total of seven miscarriages, many well in to pregnancy. In fact although she described these as miscarriages several were actually neonatal deaths. She and her husband Rogaciano (M43, Taimarita) described their reproductive problems in some detail.

*A: Yes, I had two abortions, the first children were the ones I aborted at 7-8 months, only they died, the others were born well.*

*R: After that they were born well because I took her to see a mara'akame who cured her, they told me she had been bewitched, that's why she was aborting.*

*J: And do you know what was causing the abortions?*

*R: Well, they had used witchcraft against her, that's why this problem was happening.*

*J: Was that the end of your problems?*

*A: After that the rest were born well, then after three children I had another abortion, and after that another, there were five in total, when I was 2-3 months pregnant. A lot of pure blood come out.*

*J: And where were you when this happened?*

*A: Here, (...) they were all born here.*

*J: So two died, then three were born alive...*

*R: And after that there were five abortions.*

*A: So I went back to the mara'akame so that he could cure me again.*

*JG: So in total seven have left you?*

*A: Yes*

*JG: And were they born alive?*

*A: I was in pain, for about two days, as if I was in labour, then I aborted, I felt weak and was left without strength(...).*

*J: When you felt bad did you see anyone about it, to make you feel better?*

*A: I didn't see anyone, I didn't go to the clinic but I did see the mara'akame.*

*J: And what did he say to you?*

*A: Well, that I was bad in the head, dizzy.*

*R: She felt bad when she got her period.*

*A: Once I went to the clinic and they didn't give me anything...(...). I had understood that they did blood transfusions but that wasn't the case...(...)...they only checked me out, that was all, nothing else. They didn't give me medicine or a drip or anything...(...). They just said I should drink lots of water and that's why I haven't been since.*

*J: Did you feel better afterwards?*

*R: She felt better [when she became pregnant], but when the time came again the same thing happened. Also the illness of Kieri came back again.*

*A: When this illness visits a pregnant woman it's always the same, it takes the baby and the mother, but I put up with this illness and thank god I am well today.*

*R: But I think it is our destiny.*

None of my informants' children were born with a visible congenital malformations or an internal malformation that was picked up later on, Enrique told me that '*we don't know of these things here*'. On one of the hospital visits I

made with Inés she told me that her other daughter, who had not accompanied her to the coast, had lost two babies. Both had been born with cleft lip and palate and a third child had been born with a respiratory problem, only able to breathe through one nostril. She asked me why it might have happened. The babies were born in Cajones about five years ago, without any antenatal or post-partum care. They were not taken to the clinic. Like babies who were born and died in Taimarita during early infancy these children never existed officially: they were born at home and they died at home. The first one was born with only a cleft palate, '*they gave him little to eat*', and he lived about two weeks. The second was born with a cleft lip and he lived about a month. When I asked Inés why she thought they died, she simply said that she didn't know. She went on to talk about a second daughter who had lost two babies to illness and a third who had problems becoming pregnant, '*my [ex] husband drank a lot*' she told me, '*maybe it was the alcohol*'. Not once did Inés make reference to supernatural causes, neither did she mention pesticides, she simply did not know why this was happening to her family.

Luciano and Galindo discussed with me what they thought the causes of congenital malformations were, although neither had experienced this in their families. Luciano (M34, Santaigo/Pochotita) joked with me that children could be born with no feet or a malformed vagina and he suggested that this could be caused by an eclipse. This popular folk explanation, shared by other Mexican indigenous and mestizo groups, tells that an eclipse 'produces illnesses that particularly affect pregnant women and their children in gestation' (Pinzón and Zolla, 1994). Galindo (M56, Santa Catarina) also mentioned the idea that malformations could be caused by a lunar eclipse and shared a number of Huichol explanations for problems relating to reproductive and maternal health. He described the importance of getting things right at the fiestas. Firstly the wood that is laid out on the central fire must be placed in a particular way. If the sticks are crossed in a bad direction they can block the entrance to the vagina when a baby is being born, or if the fiestas tamales, (small steamed maize

bundles) are tied too tightly they can have the same effect. Most importantly though he told me, '*don't let children wander at fiestas...parents should keep their children close by them*'. The last of these ideas refers to the fear that since during fiestas the mara'akate, kakau'yarixi and teiwarixi are all around, children should never be allowed to wander because you never know what harm could come to them.

## 6.8 Conclusions: gender, shame and costumbre

In practical terms, it is virtually impossible to live any better in barranca communities like Taimarita and Pochitita. Here there will probably never be better or easier access to health care and the only means of earning a living is migrating for work, which usually means leaving wife and family behind. Over the past decades these communities have been gradually emptied, fewer and fewer young people remain or return once they have left. So to some extent Michaela's prophecy that the only solution for women's health is to '*get them out of there*' is a reality. Young couples from Taimarita and Pochotita are asking for land to build homes uphill in the Agencies of Nueva Colonia and Pueblo Nuevo, leaving the communities of Taimarita and Pochotita largely inhabited. Those who stay behind have the highest birth rates and mortality risk. They begin their reproductive lives extremely young as these are the girls who do not go to secondary school, do not learn about reproductive health and who get married to their young husbands soon after menarche.

When I asked the women and men in communities what they needed in terms of health care for r/mch their responses were mostly quite different to Michaela's. Some, like Rogaciano and Obaldo simply said they needed medicine, which, as I discussed in the previous chapter is described as a magical solution to all of their health problems. Others did not separate women's issues from general health needs. When I asked Cecilia what women needed for r/mch she said that they needed more scorpion antidote, suggesting that perhaps reproductive

health is not seen as a health problem as such and that other problems continue to dominate wellbeing, particularly in the barranca communities.

Julio from Taimarita and Elvia and Tutupica in Pochotita all mentioned the need for a road. This, they said, is what would most help the women in their communities. Pochotita had asked for a road to cut through to them several times and the request had been approved or 'promised' but never fulfilled. Six years ago the community of Santa Catarina, seat of the traditional government, was connected by road to Pueblo Nuevo and what was a two hour walk is now a half hour drive. With the road came a secondary school but there is no transport service and only a health centre with no qualified doctor. Maybe one day Pochotita will get its road, but this is virtually inconceivable for Taimarita which lies at the bottom of a very deep valley. Several informants mentioned the need for some form of income generating help. Maybe cows or goats suggested Jorge, or some way of making income Leonardo suggested and knowing that I had been discussing the idea of forming a group of female health promoters some mentioned that that this was what they needed, '*some people who are especially trained in women's health*' suggested Estela. Some of these needs correspond to perceived barriers to health care, such as cost and access that I discuss above, but on the whole what my informants felt they needed did not relate directly to better health care provision or improved ante natal care as could be expected for a group of people with such poor r/mch outcomes. Although there was much discussion of miscarriage and infertility there was no mention of services to address these needs. The issue of nutrition was not a concern that was raised by my informants although it was mentioned by all of the medical doctors I spoke to and singled out as one of the principal determinants of wellbeing among pregnant women and children. In fact, as I have discussed above, women and their husbands were concerned with overeating as opposed to not eating enough. Malnutrition was not seen as a perceived risk to their health, and although there was some mention of needing to take it a bit easy during pregnancy, agricultural work was not specifically identified as a risk factor. On

the whole these Huichol migrants hold different ideas about perceived vulnerabilities, perceived severity and perceived benefit and their beliefs and practices do not correspond to a western model of prevention and care for r/mch.

The second theoretical perspective that provides explanation for wixárika r/mch beliefs and practices draws on the interpretative tradition in Medical anthropology. As I describe in chapters 3 and 4 the Wixárika of the barranca communities are deeply immersed in a complex cultural world through which they give meaning to and live their lives. Their r/mch are seen through this spiritual and cultural lens and the same syncretic explanatory model applies. Attitudes to reproduction and pregnancy slot neatly into the wixárika explanatory model of health and wellbeing where a healthy pregnancy is the result of fulfilling costumbre and paying off debts to the gods, this together with their own experiences of childbirth, forms part of their authoritative knowledge about r/mch. Problems such as miscarriage and infant death are caused by debts of one sort or another and witchcraft is frequently used against women. As Kleinman (Kleinman, 1978b), Menéndez (Menéndez, 1994) and others describe, more than systems of meaning, medical explanatory models revolve around social and cultural relationships and institutions. In his role as cultural integrator the mara'akame commands adherence to a set of beliefs and practices that ensure the continuation of a social and cultural system, giving explanation and meaning to health and wellbeing. Unlike the medical explanations of reproduction the Huichol understanding of r/mch is seated within a specific cultural gender identity, the role that women occupy as providers of life and the social and cultural reasons for childbirth. While Huichol women undoubtedly know the 'facts of life', they ultimately believe that it is the kakau' yarixi who are responsible for their reproductive wellbeing.

Finally, structural violence also helps explain and understand Huichol beliefs and practices regarding r/mch. Pacheco de Ladrón(Pacheco de Ladrón, 2002) tells us that for Huichol women, reproduction is their purpose in life, they were

put in the world to reproduce. Carmen also said that she felt somehow even young girls were prepared for childbirth and giving birth alone because this is the moment they have been waiting for all their life. Both primary and secondary education in the Sierra are substandard; as I describe in chapter 3 , Sierra children are taught by secondary school graduates who are not required to obtain the national teacher training qualifications expected in urban state primary schools. Secondary education is television based. Neither school gives young Huichol women, or men, the formation they need to improve their lives and health *in* the sierra. The benefits of Oportunidades do not reach the barranca communities and the families that live there are by all objective measures surviving in extreme economic poverty. Like good education, social support is only available to the extent that they are prepared to abandon their traditional lifestyle and language. The standards of healthcare and services that are available to them are not the same standards that are available to a mestizo population. Carmen described to me how, since electricity arrived in Nueva Colonia, (in 2010, part way through my fieldwork) she was having to ask for a 'contribution' of \$10 pesos from each woman so that she could pay the electricity bill '*Otherwise how will I pay the bill?*' she asked, while Don Toño explains that when piped water was brought to Pueblo each community member was asked to dig ten metres of piping since there were no government funds allocated for this task. Felipa told me how the only time a helicopter landed in Taimarita was to collect a political candidate with diarrhoea. These are situations that would be inconceivable in a mestizo community. In short, Huichol lives, infants and lifestyle are of little value to the Mexican state. Government neglect and discrimination underlie the substandard services and inappropriate policies, driven by an ideology of capitalism that places an economic value on everything. To this we must add the layer of everyday forms of violence that women experience, which generate in them feelings of shame and humiliation, reasons why they choose to give birth on a plantation rather than in a hospital or clinic.



## **Chapter 7 ‘What can you do? We have to work!’**

### **Tobacco production, pesticides and experience.**

Angélica is feeding Itza, her six month old baby daughter. Itza is chubby, covered in insect bites, mucus and dirt. Her sister Leocadia, in comparison is skinny and pregnant, with a bump that is small for her six months of pregnancy. *‘Where do you sleep?’* I ask them.

*‘Here’s the hotel’* jokes Angélica, in reference to the tarpaulin that hangs above the mountain of tobacco leaves beside them. *‘Here nobody is comfortable, the kids get up and wander about, they pick things up and eat them’* comments Leocadia’s husband, Lucíano. *‘They pick up a stone and suck it, they have chemicals in them, dirty stuff they use here, gives you diarrhoea, your mouth feels dry, I want to drink water but I don’t as I worry it might cause me more harm, my head aches’. ‘All the soil is poisoned here’* adds his wife:

*‘Last year a smell reached me in the afternoons when I went out to pick, I felt dizzy, I vomited blood. A while ago I felt bad so I went to the clinic... they gave me a drip, they gave me medicine, these chemicals do us harm, give you a headache...you are out working and can give it to your baby, even make your baby ill. That’s why it’s born poorly, sleepy..., sometimes the kids get headaches when they are picking and carrying tobacco’.*

Baby Itza, now sat on the ground, continues to eat handfuls of dirt, the same soil Lucíano has been telling us is been contaminated. I ask if they know of children who have been born with malformations and whether they know what the cause of this might be. Leocadia responds, *‘a baby [can be] ... born without feet or legs, with these it can only walk a little...’*. Lucíano joins in, and the two laugh as he says *‘yes, some are born without a vagina...it’s because of the eclipse’*.

Lucíano finishes the conversation comparing life here and in the Sierra,

*'Here we are at risk... there in the Sierra everything is good, you pick up this and that and the only thing you get is cold. Here you have to buy water and this and that and you have to rent the land. There everything is nice and the land is good, but I can't go, the kids are studying and I still can't go.'*

I say goodbye telling Leocadia to take care of herself and she replies '*What can you do? We have to work!*'.

The discussion with Leocadia and Luciano neatly summarizes the main findings of this research in terms of the attitudes and understanding, knowledge and beliefs, practices and behaviour of Huichol migrants regarding the effects of pesticides on their reproductive systems and general health. This family is aware of the existence of pesticides in their working and living environment, they know that they and their children can be affected by them and on occasions they experience sickness as a result of exposure. They have some notion that these pesticides could also affect an unborn baby although they are not clear how this could happen. However this has no real impact on their behaviour. Since they suspect that I am researching the issue of pesticides from a health perspective they are keen to demonstrate knowledge and awareness of the problems that these agrochemicals can cause, yet their understanding of health and wellbeing is mediated through their costumbre, and their practices are dictated by their basic needs of food and shelter.

This principal focus of this chapter is to discuss my findings on the understandings, knowledge and beliefs, practices and behaviour of Huichol migrants regarding pesticides and their health. In the first section (7.1), I will summarise what workers and employers told me about tobacco production, contractual relationships between the tobacco companies, patrónes and workers and the living situation of tobacco pickers. In section (7.2), I will describe the use of pesticides, how they are applied and what employers know about their risks and in the third section (7.3) I will describe the knowledge and beliefs of Huichol workers about pesticides.

## 7.1 Tobacco production in *Tet+ata*

Don Maximiliano explained to me how good tobacco is produced; soil preparation, sowing, the different applications of fertilisers and then pesticides that need to be applied. '*A good leaf should be soft with these small these small brown spots on*' and he explains how these are threaded and hung up to dry, making sure the air can circulate between the leaves. A good patrón who ensures that the tobacco is planted on time, harvested on time and uses the right fertilisers can make as much as 30,000 pesos (£1,500) per hectare.

'*We hardly use agrochemicals*' he tells me. There are a number of natural alternatives. Some use bees to chase off the white fly, plant maize around the *tabacal* (tobacco field) to attract the insects (maize is favoured over tobacco) and by taking care to ensure the plant does not get too wet they can avoid the fatal blue mould. '*Of course though, if a plague comes in we have to use pesticides*', he adds:

Maximiliano talked at length about how poorly paid tobacco is and the ex-union leader, Federico Langarica, who facilitated many of my contacts with farmers jokes '*My cousin asked me the other day what I thought he should plant. I told him if you want something that you have to work really hard on and which pays very badly, grow tobacco.*'

So why do people still grow tobacco? They explained to me that because the tobacco companies pay money up front it is often the only crop a poor farmer can afford to produce. The company supplies the seeds and gives the farmer a production regime, including instructions for use of fertilisers and pesticides and they set a price per sarta to pay the workers. These expenses usually leave the farmer out of pocket. He must also cover any extra costs such as paying the worker over or above the sarta price offered by the tobacco company. In 2010 the set price per sarta was 9 pesos but farmers paid their workers 10 or 11, pesos as well as the additional costs of pesticides used to deal with unexpected

plagues. Federico explained how the companies use coercive strategies to ensure farmers continue to produce tobacco at such a low profit margin. These include favouring certain farmers with special benefits and additional financial support, then publicly awarding them prizes for their hard work, in an attempt to demonstrate that it really is possible to make good money from tobacco. In reality he explained, these farmers barely break even from their crop. In addition to the financial advance, farmers in Nayarit continue to produce tobacco because the companies pay social security contributions for their employees, the farmers, so that when they retire they will receive a small pension. For this reason alone, many older farmers like Maximiliano continue to grow tobacco, although they could make considerably more profit from beans or vegetables.

Fifteen years ago pickers were also insured for the period they worked, giving them the right to use Social Security clinics and hospitals, but this all came to an end in 2004 when the PAN government introduced Seguro Popular. In theory this scheme provides the same service as the IMSS (Mexican Institute of Social Security). In practice it offers exactly the same sub-standard health provision that was always available through ministry of health hospitals.

Like many Nayarit tobacco farmers Maximiliano travels to Virginia on a working visa when he has harvested and sold his crop. There the sarta is paid at about 2.5 dollars and the tonne is bought at 2, 3 or 4 times what they are willing to pay Mexican workers. Like other farmers and locals his migrant income is his lifeline and for six months of the year the ejidos around Santiago are emptied. In his ethnography of tobacco labour in North Carolina, Benson describes a situation not dissimilar to that lived in Santiago, fingers caked in ‘gooey bits of tobacco’, a diet of ‘beans, eggs, tortillas and pickled chili peppers’ but most strikingly, ‘interlocking forms of subordination and marginalisation’. Their meagre paycheck becomes ‘a synecdoche, an illuminative fragment of the mean face of depravity and structural violence’ (Benson, 2008).

Producing tobacco in Nayarit is only possible because indigenous people are willing to work for so little and in such poor conditions, explains Federico. A skilled worker can thread up to 40 sartas in a day and when the whole family works they manage far more. As I explained in chapter 3, these migrant workers live virtually cost-free but in precarious conditions. Sugar cane cutters and tomato pickers based in other parts of the state, largely indigenous migrants from the southern states of Oaxaca and Guerrero, live in hostel type accommodation for which they pay a minimal rent. Although these concrete rooms are generally poorly lit and insalubrious, at very least they offer shelter and workers have access to a kitchen or canteen, running water and washrooms. In contrast, tobacco migrants sleep in the open air of tobacco plantations with no cooking or washing facilities, which is the reason that they are particularly vulnerable to the chemicals that are used on these fields. These are the conditions that put tobacco workers particularly in harms' way.

### **7.1.1 Pesticide use in tobacco production**

I asked several farmers what instructions they were given by tobacco companies regarding the use of agrochemicals and how these are applied. Victor Chaparro has been planting tobacco for more than twenty years in Botadero and he explains;

*'Yes, they tell us everything, like when the tobacco is so tall and the plant starts to go yellow then they give us a liquid called Atara, we have to apply this one plant by plant or inject it into the soil, they tell us all this...(...). They give us overalls, although this company PTN Pacificio doesn't give them any more. But when it was British American they gave us the overall, but here we don't have to use it, with the heat we can't bear it, that's why we don't use them. I've got one at home. They also gave us one for our workers and I gave it to them but they don't like them...they are embarrassed, that's why they don't use them and they say to me 'why would we want them'?*

There are small differences in the practices of each company. Efrian who has several fields near the canal in La Presa is contracted to Phillip Morris-British American Tobacco and he explains;

*'Well, they specify that when you apply them, because they are strong products they give you special equipment, suits, goggles and when you are applying them [they specify that you] have as little contact with the product as possible, not drink water or anything. Because we know it is toxic and they give us talks about this, how to apply it and all that. ...Every year they give us the same chemicals.'*

Ignacio Arrangue lives and farms in the ejido of Amapa where the majority of my informants were working. He mentioned a series of natural insecticides he had been using, including fermented garlic and a leaf he referred to as Nim. Ignacio spent considerable time explaining to me how for some time he had been using alternatives because they were more economical and equally effective. Like the other farmers, he admitted that once or twice a year there was no option but to use one of the heavy organophosphate (OP) pesticides. Ignacio specifically mentioned *Acrobat*, a fungicide. There was also some mention of stronger pesticides such as *Lannate LV*, a 'highly toxic' OP pesticide that is used to attack seasonal plagues , rather than as standard and the 'moderately toxic' *Orthene* and *Vydate*, also both OPs and cholinesterase inhibitors. Both Efrian and Chaparro explained that nowadays the chemicals they use are less toxic than they were some years ago and they both described cases of themselves or their family experiencing intoxication. It seems that protective clothing is not used by anyone even if it is given out for free.

The local airstrip is owned by Polo, who is now *Presidente Municipal* of Santiago Ixcuintla. *Fumigaciones Polo* is the only provider of aerial spraying throughout the region and his political campaign used a small plane as its logo. This was distributed as a car sticker and could be seen all over Santiago during the 2011 picking season. The day we visited the airstrip and 'port' a producer arrived with a truck full of fungicide which he began to mix. None of the mixers wore any protective clothing and a very strong smell of pesticides hung in the air.

Most agrochemicals are used in the early stages of growing, so on the whole the patrónes themselves, sometimes, with the help of one or two full time workers, apply them. Julio from Taimarita commented that he was employed for some

time at a daily rate by a man in Botadero. During this time, in December, he applied pesticides using a *mochila* (backpack) pump spray and described to me how his hand would go numb from the chemicals as they leaked around the spraying nozzle. Although most spraying is done before picking season sprayers such as Julio, using plastic backpack tanks can be seen throughout the harvest season. Although most tobacco is planted in November or December some farmers stagger production planting as late as February for a May harvest, so there is always a field somewhere with tobacco in its early stages of growth. Furthermore, tobacco only makes up a proportion of crops in Santiago. Polo was always busy spraying a field and the drift from aerial spraying reached tobacco pickers. Rogelio (M33, Taimarita) explained how he had managed to photograph the plane with his disposable camera: '*the plane did circles overhead really low and it even dropped some liquid on me*'. Enrique also managed to photograph a pesticide plane overhead. The employers I spoke to explained how they always told their workers when they were going to spray to give them time to move their belongings. Aerial spraying is an everyday occurrence in Santiago and the surrounding ejidos and while farmers would advise their *own* workers when they were about to fumigate, workers in neighbouring fields would often not know it was going to happen.

I asked Angélica how she knew that pesticides had been used on nearby fields. She replied:

*'Well because we see them! Sometimes we see it when they are planting, first they use fertiliser for plants, apparently, and then after that pure liquids they use, when the farmers begin to plant and that's it, we see them. Sometimes when they get us to pick tobacco that is when we see them using the liquid. Straight away you start to smell it and then you get a headache and nausea, all that'.*

Lucía (F39, Taimarita) had a similar story, suggesting that despite what the patrónes told me, little attention was given to informing workers when pesticides will be used:

*'The farmers don't tell us anything, they don't even tell us to take care. What's more, sometimes when we are working the planes fly overhead to spray the medicine (pesticides). Sometimes they tell us to put our stuff away, because they are going to spray, but sometimes they don't'.*

There are good patrónes and there are bad patrónes, Federico tells me. These days there are more and more farmers with large extensions of land. These new patrónes care less for the wellbeing of their workers and more about their profit margin. During the course of my research I learned of cases where workers had not been paid, or not been given water. Many of the older workers complained that the relationships with some patrónes was not like it used to be. At the end of the season leaves are small and fiddly to pick and thread, consequentially it takes more time to produce one sarta. To ensure they finish the pick some patrónes withhold payment until the entire field is cleaned, forcing workers to put in many hours for little pay during the hottest days of the year. This new culture of employee-worker relationships is becoming more common as a different and younger type of farmer with larger extensions of land is replacing the traditional ejidatario. In spite of these changes, some improvements were also noted. Some workers described how the situation had improved since guidance and regulations about disposal of containers and provision of water were brought in. Obaldo discussed this:

*J. So the patrónes didn't [previously] say anything to you?*

*O. No, the patrónes just dumped [empty] containers wherever they wanted and someone used them to take water to work. Now they don't just dump them, they have to take them.*

*J. Does the use of pesticides bother you?*

*O. Well now they have meetings on the coast, they have a commissioner and he talks to the patrónes, he tells them they have to help with water, food and not to leave us to sleep in places where these chemicals are stored. And he tells them to give us treatments when we are ill. It is getting a bit better although in some places its still the same.*

The patrónes I spoke to could all tell me something about the risks of pesticides although mostly their knowledge was limited to the short term effects of

exposure. Efrain, who had personally experienced poisoning, told me about this in the context of what he knew about the harmful effects of pesticides:

*E: ... about 12 or 15 years ago I used some on tobacco, like the one I have now, about the same age, already big, there was this spring caterpillar that has horns and they gave us Lannate in liquid and I used it on about a hectare of tobacco. I came home, ate and vomited. I felt everything was spinning. This is the only time I think it has done me any harm, I have used it other times and I sometimes feel nauseous and sick and so yes, I am aware that it is harmful.*

*J: Do you think they could be harmful to the workers? For example the Huichols who come to pick tobacco, now, do you think they are at risk?*

*E: No, no, now there is no risk, because we are aware that after 72 hours it doesn't work anymore.*

*J: And do you think it leaves residue on the plant?*

*E: I think it does leave some, that's why they are using the bees, well I see them when they hand over the tobacco, it does have residues of the liquid that we use.*

*J: I would like to know if you think there are particular risks for women, in particular pregnant women.*

*E: No. Women have even given birth with me [on his plantations], there in the field, two women, and I, sometimes when I saw it I didn't believe it...*

Ramon explained to me that the tobacco companies gave them talks about the risks and effects of pesticide use. When I asked him what sort of information they were given, he replied:

*R: Well there were many chemicals that were very strong and really battered the insects...(...)*

*J: Did they tell you about the health risks of using these?*

*R: Ah, yes, when they are not used carefully there could be poisonings, I never got ill, one of my boys did when I let him use them, well he threw the stuff on and he got ill and that was it, and well, we didn't let the indigenous workers do this.*

*J: But what did you learn about the health effects?*

*R: Well, my son got ill, just a bit, and there were no bad consequences but there are people who get ill. They get over it and were given some remedy at home or in the Seguro [hospital], that's how they controlled it.*

*J: Do you think they can have medium or long term effects?*

*R: Not [to] me, but maybe to other people. When it affects people, they vomit*

*J: And do you think they still affect people when they are on the plant (...) on the leaf?*

*R: Well, it has been said that they remain on the leaf, but the bad thing is that we haven't studied chemistry and so we don't know.*

*(...)*

*J: And did you ever learn anything about women's health?*

*R: From what I remember, no. It's that these indigenous woman are really strong! No, even pregnant women come to pick tobacco and they don't care about the risks ...how many times were pregnant women picking and then suddenly they said to me that she was in a bad way, she's about to have a baby...*

In his study of tobacco farmers in South Carolina Benson notes how, 'many workers take pride in being reasonable and responsible employers'. Like these Santiago patrónes, the author describes how farmers commonly say that seasonal workers are part of the family having employed the same people for several consecutive years (Benson, 2008, p589). This complex working relationships is characterised by a superficial concern for the wellbeing of workers that disguises a deep belief in racial superiority. Benson employs the term *faciality* to refer to the 'face' of inferiority that is given to migrant workers and which becomes the justification for forms of everyday violence. Farmers in both Santiago and South Carolina allow their employees to live and work in conditions that would be completely unacceptable for themselves or their family. Linking back to structural violence, Benson writes 'Good feelings and working relationships are not easily disentangled from the paternalism that has been a core part of white identity on southern farms and helped justify racial

domination and socioeconomic inequities'. As I described in the previous chapter, many Huichol have given birth on the tobacco plantations, a situation patrónes nonchalantly justify through, among other things, reference to a different set of cultural practices '*that's how they like it*'; to physical resilience '*these indigenous women ...they are very strong and resistant*' and a particular set of gender relations '*there are husbands who don't let their wives be seen by a doctor*'. Thus their view that '*They [Huichol women] don't care about the risks*', is a position that is sustained by the specific 'faciality' that patrónes have given their employees, one which, like the racial stereotypes of Mexicans in Southern USA facilitates and justifies these everyday forms of violence. This faciality is essentially what Goffman refers to as a 'stigma theory', a 'ideology to explain inferiority ....rationalizing an animosity based on other differences' (Goffman, 1968, p5 ). The irony here of course is that the Mexican workers to whom Benson refers are the selfsame people who back home in Santiago employ Huichol Indians to work on their farms.

## 7.2 Pesticide use in the sierra

The Huichol workers who I interviewed were considerably more at risk to pesticides in their employment as migrant workers than they were at home. Nevertheless, some did use pesticides in their home communities and on their milpa. Some informants explained to me how these days travelling salespeople from the hardware stores of Huejuquilla and Valparaíso brought these products to the Sierra where they sold them the day Oportunidades is paid. Until 2009 the use of pesticides was prohibited in the governorship of Santa Catarina. Ironically the ban was lifted just as I began my fieldwork. Obaldo and his wife Marta (F68, Taimarita) talked to me about this on their rancho in Taimarita:

*O: We didn't use them until last year, because we weren't allowed. But then we found out the ban had been lifted and now we use them.*

*J: So, before they were banned?*

*O: Yes. But since the people up there never stopped using them, so we started. We should all be able to use them, that's why now it is allowed.*

Felipa, also from Taimarita, confirmed Obaldo's version of events, telling me:

*'Yes, we use them... we use them because my son is not here. And with the medicine the milpa grows with fewer weeds. We didn't use them before, but when the authorisation was given most people started using them'.*

Olivia (F27, Taimarita), Felipa's daughter-in law who was with us added:

*'The liquids, they use them wherever they want, nobody admits to using them. Its envy, they don't want us to use them but people envy other people's milpas'.*

It was not my intention to investigate whether or not my informants were using agrochemicals in the Sierra but I observed that most homes had a backpack for spraying crops and inadvertently I received contradicting information from some people. When I discussed the issue with Benito, from Pochotita, he told me '*I never used them, but many do because they don't want to clean their fields by hand, usually in August or at the end of July, now they use it all over the place, it drops on their hands and people don't really think about the risks involved*'.

I later interviewed Elvia, Benito's wife, at their home in Pochotita when Benito was away working in Fresnillo. Their daughter Esperanza was present on both occasions and she in fact presented me to her mother when I arrived at their Sierra home. Elvia was very talkative. When I asked her about whether or not they used chemicals on their milpa, she told me '*Sometimes we use them, sometimes we don't*'. I asked if Benito applied them she replied '*Yes, last year he used them, but none of those fertilisers, not the other things she is talking about*'.

Similar findings are described by Hunt et al in their analysis of pesticide risk perception among peasant families in Chiapas. The authors refer to several anomalies in what women had said and what they had observed both in terms

of chemical storage and domestic use of pesticides (Hunt, 1999). These anomalies may represent an element of courtesy bias, when the respondents produced the answers they believed the interviewer wanted to hear (Luaniala, 2009). In the case of the Huichol it is possibly also the case that there is no clearcut answer to this question, as Elvia told me '*sometimes we use them, sometimes we don't*'. Like the Nayarit farmers, they use them when there is need.

### 7.3 Huichol workers' knowledge and beliefs about pesticides risk

Like Obaldo, Elvia probably referred to the use of herbicides like Gramoxone, the product most frequently used in the barranca to deal with weeds. In these valley communities they do not need fertilisers and I did not hear of or notice anyone using the very harmful OP insecticides. I generally asked about *plaguicidias* a term which, in contrast to the more specific '*pesticidas*' refers in a wider sense to herbicides, fungicides, insecticides and pesticides. Because of language and translation issues it was not possible to ask about these agrochemicals in isolation nor to discuss these differences. This distinction had been clear with the farmers and patrónes who knew well what the difference was and could talk about the specific function of each. In general, my Huichol informants readily discussed pesticides with reference to their use and application in Nayarit. Those who spend most of the year working as migrant labourers were more knowledgeable. I was able to interview most of the full time migrants in Spanish which in most cases enabled a more fluid and in-depth conversation. Several informants who were full time migrants recalled the *Huichols and Pesticides* campaign of the 1990s and early 2000s which led to a ban on pesticide use in Santa Catarina. Three informants from Nueva Colonia, Jesus (41), Marco Antonio (34) and Federico Valadez (36) discussed this briefly with me. Federico's wife, K+paima , appeared as a child on the cover of the *Huichols and Pesticides* campaign video holding an empty 'highly toxic' pesticide container to her mouth as if she were drinking from the bottle. When I explained that the Huichols and Pesticides study had found a difference in blood cholinesterase levels before and after exposure they were interested. We

discussed the use of different types of pesticides, all admitted to using one or other of these in their community. '*In the Sierra we have to use them*', they explained. Land in the high mesetas of the Sierra is arid and dry; very cold in winter, with scorching dry sun in the summer. Don Fausto, the *Agente* from Pueblo Nuevo agreed that pesticides were harmful and thought they could affect the eyes and skin. He also explained that the soil was very poor and insects ate the roots of their maize so unless they used chemicals the land would simply not produce enough.

The details my informants shared about their understanding of the effects of pesticides did not suggest a clear pattern of beliefs, nor did they have a uniform relation to the illness explanatory model that I described in chapters 3 and 5. What did emerge was that their beliefs and understandings were largely determined by *the manner in which they gained this knowledge*, this being either 'acquired knowledge', things they have been told by others, or 'experienced based knowledge', understanding that has been generated through experience. If there is an overriding theme, it is one of uncertainty or of not knowing, sometimes grounded in a disbelief in what others have said because when my informants spoke about their own experiences, they expressed a good deal more belief than when they relied on information they had gained from others. Finally, although there was not a clear link between these understandings and the illness explanatory model, possibly because pesticides are so distant from traditional illnesses and ideas about causality, these understandings are mediated through Huichol culture and costumbre, their experience as life of a migrant labourer who sleeps in the open air next to the tobacco plant and his or her basic knowledge of the human body.

#### **7.4 Acquired knowledge, '*they say that...*'**

Access to information about public and environmental health is extremely limited for a population like the Huichol. Largely reduced to Oportunidades talks, posters on display at the clinics and the occasional specific health

campaign such as the cervical cancer and national vaccination weeks, none of these deal with issues such as environmental hazards. Information is written on the back of pesticide bottles but few migrant workers can read this. Although these containers use what are considered universal symbols, such as the skull and cross bones, as a representation of toxic substances such images do not necessarily have the same meanings for everyone, particularly not for Mexico's indigenous people. Like the skeleton, the skull is a common image of Mexican popular culture, used artistically and to represent religious-cultural events such as Day of the Dead, a national religious/cultural holiday. Salinas and Díaz who developed a workshop for training indigenous workers about the risks of pesticides describe how 'users, generally peasant farmers, do not identify the mortal risk of synthetic pesticides. ...[it is necessary to] emphasize that this icon [the skull and cross bones] can have diverse meanings, including festive and ironic like the skeletons painted by Posadas, or in the case of pesticides, it means that these are dangerous poisons'. (Salinas Alvarez, 2000, p2)

To support their campaign and training workshops Huicholes y Plaguicidias, carried out an epidemiological study of the effects of pesticide exposure on blood cholinesterase depression, taking a first sample of blood from families while they worked on tobacco plantations and a second sample 18 months later in the Sierra (Gamlin et al., 2007). This study and the subsequent campaign focused principally on how pesticides were affecting the health of Huichol migrant workers. A series of radio capsules were transmitted via the local INI radio station, *La Voz de los Cuatro Pueblos*, to spread the message about pesticides across the Sierra. Many informants recalled this campaign, remembered the activist Patricia Diaz or heard the radio transmissions. Obaldo, who tell us that he learned about pesticide harm from 'people like her', (referring to me) recalled:

*O: They tell us that it is illness and that's why it was prohibited. That's why our bones ache, that's why it was prohibited, because it causes lots of illnesses (...). Well before it was common for people to use the bottles to carry water. They said we shouldn't drink water from them because*

*they contain chemicals. That's what they said to us on the coast, they get heart illness, they get thin and can die in an instant.*

*Totupica: And who told you that?*

*O: People like her....*

The campaign also organised workshops in the Sierra, Maximo recalled these workshops and while he clearly took in some of the information his general message was that it was not understood well or that he did not really understand what was being said although the sessions were used as leverage to introduce the community wide ban on pesticide use:

*M: Well, I don't know, before they did workshops, there in the assemblies they told us that they were harmful but because we don't understand, we use them. Like I said, I don't really know, only when they gave workshops they said this. They said we could get illnesses from them, but even so, with those talks, they carry on using them and when we see that we also use them. I don't know, maybe that's why we are getting ill.*

*J: Who was giving the workshops?*

*M: Xauxeme<sup>25</sup>. They gave them in Las Latas and in other places, after three years they left them. They talked about all of this in the meetings, so that they didn't use them anymore. And we did leave them for a while, but the Wixaritari don't take any notice... they used them, used them and used them. Until everyone used them. That's where we went to learn about these things. The Wixaritari took in what they said, that's why we stopped using them for a while and now they are using them again. And with the people who have been ill, the doctors told us it was because of the chemicals. That's what they said to us in Guadalajara but it has never happened to me.*

The radio is an important means of communications, particularly in the rancherias. Several informants mentioned hearing messages about pesticides on the radio, Elvia described hearing on the radio how pesticides cause dizziness, and recalls one particularly notable case:

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<sup>25</sup> Xauxeme, from the community of Las Latas, is the primary school headteacher in Nueva Colonia and a key intermediary between Teiwari NGOs and the community of Santa Catarina.

*J: Can they cause harm to a pregnancy or unborn baby?*

*E: Yes, I have heard that people get ill from agrochemicals, on the Jesus Maria radio. Once I heard that they put a baby in a hammock to one side of where they were going to spray a maize field with pesticides. In the afternoon, the baby started to cry, it lasted five days then died. That's why we don't let our children near.*

Lola and Leonardo mention leaflets, possibly referring to leaflets distributed by the Huichols and Pesticides NGO, suggesting the need to use full protective equipment:

*LL: Yes, leaflets have arrived where it says they are dangerous and should be avoided, that's all they say.*

*J: That you should avoid exposure?*

*L: Yes, the owner should give you all the [protective] equipment if you are going to fumigate.*

#### **7.4.1 Doubt and uncertainty about what they have been told**

Several informants could name a series of possible problems but expressed doubt about them. Two older informants were particularly doubtful about what the teiwaris told them regarding agrochemicals. When I ask Felipa what sort of problems they can cause, she replies:

*F: Well I don't know, they just say they can make you weak and then we can't think or reason well, maybe it can affect us in some other way. When we go out we eat all these foods treated with chemicals and I say that since before that we were affected, because teiwaris have always used agrochemicals and here too, when we eat maize that has been treated it affects us. That's what they say but who knows.*

Cirilo talked about what he had been told but said that since he had never seen any of this happen, he doubted it:

*'Well, in the assembly they tell us that we can't use herbicide or fertilizer, that its harmful to us, they tell us that it can cause death. The symptom is a cough and the products we buy are already damaged and they can also cause illness, but who knows. I haven't seen anyone die*

*from these chemicals. They also tell us that corn has these chemicals but... I haven't known anyone and no one has told me of anyone who has died from these chemicals and also all of the products that come from outside [the Sierra] have a lot of chemicals, because the teiwaris work with them, and now, I don't know if this is why we are dying'.*

Others recalled information they had been given by a patrón, although it appeared that not all patrónes said that pesticides were harmful. It seemed they received conflicting information and were not sure what to make of it as Angélica told me:

*J: And how have you learned that pesticides are harmful?*

*A: Well, some good patrónes they tells us that these pesticides are bad, that they are bad in themselves, the patrónes tell us, well some, others don't say anything at all.*

Inés expressed a similar opinion:

*'Yes, some bosses tell us and some don't. Sometimes they tell us this, that we should look after the children, and that's why the children are in schools, so they can care for them in the hostel.'*

### ***'Sabe'***

Not only did many informants appear to doubt the veracity of what they had heard or what they had been told, many simply did not know what to say. This lack of understanding was demonstrated in different ways, with perhaps the most common being silence. Reading this silence was not easy. In some cases it came across as the inability to articulate words and conversation on this topic and a consequent feeling of pena, while on other occasions and after much prompting the '*sabe*' or the silence was complemented with words. Whichever the case, I was often uncertain whether the interviewee genuinely did not know what to say to me, or was simply too ashamed to say anything, concerned that their poor Spanish or uncertainty would embarrass them.

Anita, a young female mother of six, one of the women I spent most time with during the 2010 picking season, was always timid and we met several times before she would so much as raise her head to greet me. On the final occasion, at her request, we prepared a meal together and she spoke about how she wished she could do something more interesting with her life. Anita's rancho belongs to the Agency of Taimarita but is actually located a very steep two hour walk from the main village, in a picturesque but difficult to reach spot. The prearranged interview took place at the end of the day, after we had worked on the milpa together and prepared food. Although Anita agreed to the interview early in the day, when the time came she was reluctant to answer any questions. Her first response was to tell me that 'she had already told me this' when were in Nayarit, recalling the conversations that we had shared. I explained to her again the purpose of the research and why I wanted to interview her. Although she agreed, she did not consent to an audio recording and many of my questions were simply met with silences. The conversation was translated by Totupica:

*J: In your opinion is there any way that agrochemicals can affect health?*

*(silence, the question is repeated in Huichol and Anita simply responds 'hauki')*

*Totupica: She says she doesn't know.*

*J: Have you ever been told anything?*

*Totupica: She says that the bosses don't say anything, actually there are times when they are eating and they begin to spray. She don't know what sort of pesticides they use.*

*J: Ana, do you know if agrochemicals can affect a pregnant woman or her baby?*

*Totupica: She doesn't know what to tell me because nothing has happened to her, so she can't say anything to me. She says babies have been born in the tobacco and tomatoes and nothing has happened. One of her brothers was born in the tobacco and nothing happened to him.*

While most of my informants had some comments to make about their experience with pesticides or could recount information they had been told by someone else, when I introduced prompts to ask about the problem of pesticides and reproductive health this was regularly met with silence or 'sabe's. Anita's father, Rogaciano and his wife Angelina had talked a great deal about their very problematic experience with reproduction but towards the end of the interview when we asked whether they thought pesticides might be harmful to an unborn baby they fell silent:

*J: Do you know whether there is anything that can harm an unborn baby? Anything external to the body?*

*A: I think so but I don't know.*

*(long silence)*

*J: I don't know what you think, whether you think agrochemicals can be harmful to unborn babies and the reproductive process. Do you know of anything that can harm an unborn baby during pregnancy?*

*(long silence)*

*J: Do you know whether pesticides can affect health in general in any way?*

*R: I don't know*

*(...)*

*A: Before they didn't use agrochemicals and I had never seen this (the use of chemicals) and nothing had ever happened to anyone:*

In this final example the interviewees, sisters K+paima and Estela knew the translator, who in this one case was a primary school teacher from Nueva Colonia and felt confident enough to interrupt the interview regularly to ask *me* questions. If I asked a question to which they did not know the answer, they turned the tables and asked me to explain. So as the interview progressed we talked about different methods of contraception, informed consent, sterilization and domestic violence and they asked me to explain how pesticides intervened with sperm and egg during the reproductive process. Following this final

explanation I asked if they could think of how these pesticides might affect an unborn baby. Although they had listened attentively, this process remained quite confusing:

*J: How do they affect babies? Do you think they can?*

*K: You mustn't get close to herbicide because it can cause problems in the community, in women's health.*

*J: What effects do you think it can cause?... (long pause)....*

*E: ...we need people who can inform us about the illnesses that these agrochemicals can cause.*

These sisters who live in Nueva Colonia are recipients of Oportunidades. Like the other informants I have cited in this section, K+paima and Estela had either never been informed about pesticides or had not taken this information in. One explanation for this could be that I am underestimating the influence of their medical explanatory model on their understanding of pesticide risk. Such a position would argue that since the Huichol understand causality and risk as supernatural, they cannot easily see a link between pesticides and health. While this is plausible, I think the reason for this uncertainty and lack of understanding is more simply a question of not having received information, believed information, or experienced harm. I described above the lack of access to public health information in the Sierra and how the supposedly universal symbol of a skull and cross bones does not necessarily mean 'danger' or 'poison' to this population. This is accentuated by the problem of education and language: few of my informants speak fluent Spanish and even fewer are able to read and write. There is also quite simply no official information in the Sierra or on the coast about pesticide risk so these workers are reliant on informal sources. As I explained in chapter 2, the contract between tobacco company and farmer exonerates the former from any responsibility whatsoever for their tobacco pickers and these multinational corporations provide no information about the risks of pesticides to migrant labourers. There is also clearly an element of distrust in information that these indigenous workers are given. In

the concluding section of this chapter I will discuss reasons for this disbelief within the context of structural violence:

## 7.5 Pesticides and reproductive health: experience as understanding

The informants from this study are migrant labourers, many of whom spend their entire year working away from home, returning to the Sierra only to plant their maize and attend essential ceremonies. Several people I spoke to had given birth on tobacco plantations. Many others had spent a large proportion of their lives moving with their young families between agricultural plantations, giving them ample opportunity to experience for themselves the effects of exposure to agrochemicals. Some of them described positive experiences, while others talked of harm. In this section I will discuss data on migrants' experience of sickness, wellbeing, pregnancies and births on the plantations and how this has shaped their understanding of pesticide harm.

### 7.5.1 Positive experience of exposure and work

Female informants who had worked while pregnant, mostly spoke of unproblematic pregnancies and healthy children. Pregnancy and childbirth are normalized aspects of life among the Huichol. Some expressed concern about the effects of work itself but on the whole these positive outcomes contradicted the idea that some aspects of work were harmful. Obaldo and Marta had ten children, two of whom died of infectious diseases in the Sierra. Marta described to me how their trips to the coast were intercalated with pregnancies:

*J: How many children do you have and how were your pregnancies and births?*

*O: I don't remember...(turning to Marta) how many are alive?*

*M: Well, if they were here we could count them...but they aren't. There are eight alive, they were ten in total, one died from tsipurikiya (measles) and another from ir+kariya (whooping cough). They took two of our children, they were about a year and a half old.*

*T: So, there were ten in total, including those who died? And were your pregnancies normal?*

*M: I got pregnant OK, without any problems.*

*O: When she was pregnant we went to work on the coast.*

*M: And I tell the women here, ‘how can you not go to work if I worked?’. I didn’t have any problem with my children, they were all born here, I went to work when I was pregnant and when I came back to my rancho they were born (...)*

*T: And none were born on the coast?*

*M: No, I went pregnant and I came back pregnant and they were born here.*

Anita spoke frankly telling us that she simply did not know what effect pesticides might have. She in fact described the *positive* side of working on the plantations, telling us that '*in truth I don’t know if it’s good or bad, nothing has ever happened to me and I have never been to work while pregnant, they work well and live well there...*'. In contrast, Angélica, a full time migrant who had not lived in the Sierra for more than four years, was more aware of the risks of exposure to agrochemicals. Four of her five children were born while she was working on plantations, the first in Zacatecas and the final three in Nayarit but she did not identify this as a risk factor for harm during pregnancy:

*J: So the four youngest were born during picking season while you were working in agriculture?*

*A. Yes.*

*J: ... And what do you think the risks are during pregnancy and for the unborn baby? I mean, a risk is something that could cause harm or problems. What do you know about things that could be risks for a pregnant woman and her baby?*

*A. Well, they shouldn’t drink, that’s it, if you drink it’s a risk for pregnancy and also they shouldn’t take pills and they should eat well, because if you don’t eat well then they say a baby will be born with less weight, not big enough... they should eat well.*

Angélica's words reflect information she has received during ante-natal visits, but few other informants received ante-natal care. When I ask her about the risks of pesticides Otilia tells me '*Well, the baby could be born sick and with bad health. That's what they say but who knows if it's true*'. Like Otilia, Cecilia, refers to having *heard* that pesticides could harm an unborn baby but expresses doubt about this:

*C: Yes, like that [pregnant] I picked tobacco. It's that some men are really critical...if I don't work they get angry.*

*J: And do you think this can affect an unborn baby?*

*C. Well yes, it's what they have told me, but I haven't seen anyone [ill]. But it is what they say, that you can get ill, but here they are using them. (Cecilia)*

### 7.5.2 Experience of illness

Unsurprisingly interviewees who talked most about experiencing illness while working in contact with pesticides were the families who spent more time working away from the Sierra. These were the young men and couples for whom migrant labouring was their way of life, many of whom spent only short periods in the Sierra. Angélica, her sister Leocadia and their two families rarely returned to the Sierra while in the case of Jorge and Olivia, he spends most of the year travelling between agricultural plantations while she mostly remains in the Sierra. The tobacco harvest is particularly suited to family migration and the fact that accommodation and work are side by side facilitates childcare while the *trabajo de ensarte* (treading tobacco leaves) that must be done sitting down, is easily managed by children, nursing or pregnant women. Angélica spoke in detail about how pesticides had affected her and her children:

*J: Do you think there is any way that working in agriculture, or on the tobacco can affect your health, your reproductive health or the health of your children?*

*A: Well in the tobacco they all use poison, liquids, all that stuff, they say for the maggots, for the...what are they called? Plagues, those plague*

*things. That's really difficult because it smells bad, it affects you, like your head aches and all that and sometimes blood comes out of your nose, that's it...*

*J: Do you know anyone who this has happened to?*

*A: My youngest, it happens to her when she smells it, Estrella.*

*J: Blood comes out of her nose?*

*A: When she smells that liquid, well, when they use liquid we have to go away so that we can't smell it, when the smell has gone we come back to the ramada. They also use it on tomatoes, when you are working you shouldn't eat tomatoes because they use liquid, I mean, sometimes that's why we get ill, something can die because of this and because they eat these fruits, I mean tomatoes, covered with liquids (...). The patrón tells us that it's not true, I just think they lie...(...)*

At the beginning of this section I cite Jorge talking about how exposure to chemicals affected his mother's sight, he also talked about how his children had become ill while on the coast, illness that he blamed on their contact with contaminated soil:

*Jorge: But there are also men who, we complain a lot, but since we can't speak good Spanish we abandon women and well we are too embarrassed to ask the patrón to take us to the hospital, so the baby has to be born this way.*

*J: And do you think these chemicals affect the baby?*

*Jorge: Of course, some kids have died after getting ill. The other day this boy [nods to his 18 month old son, Muvieri] got ill soon after we arrived, it came from over there and he didn't like it, you know how they play in the soil, it lasted two days then he got a temperature and I was telling my wife to take him back this week, if he gets ill it would be better to take him, but she didn't want to.*

Many spoke of these acute and immediate effects of exposure to pesticides and there were several references to vomiting, headaches and irritated eyes. Jorge also talked about *goma*, the black sticky resin referred to by Benson as 'gooey bits of tobacco' (Benson, 2008) which coats the leaves and rubs off onto worker's hands and clothing and how this irritated the eyes; while his brother

Julio described an illness incident that lead to vomiting, diarrhoea and a swollen hand. Like Jorge, Julio thought it would be better to return home and look for a mara'akame than stay on the coast. He didn't see a doctor and tells us that he was eventually cured by a mara'akame, '*No, I didn't go to hospital I saw [someone from] the same race that cures in my rancho, they know you and they do you a limpia and tell you how you can get well*'.

In some cases it is apparent that my informants made an independent association between agrochemicals and health outcomes and there were moments, such as those recalled by Angélica and Elvia, when they described being directly affected by pesticides. Others talked about illness on the coast with less certainty. Julio and Maximo speculated that pesticides could have affected their child's illness but express a genuine uncertainty about the cause. I did not directly tell any of my informants that I was researching their understanding of pesticides but instead emphasised my interest in women's and reproductive health, but information spreads like wildfire between the Huichol and word very quickly passed among the tobacco pickers that a tewiari was asking questions about pesticides and pregnancy. By the time I conducted my in-depth interviews most people had heard that I wanted to know what they could tell me about pesticides. As I have described above, many did not respond to my question or admitted that they did not know but some were forthcoming and seemed eager to share their knowledge and experiences. I assume there was an element of predilection in their responses, whereby their knowledge that I was investigating pesticides influenced their description of illness events. As my fieldwork progressed it also became evident to me that pesticides were not a serious concern for these workers, even those who spent the entire year working in agriculture. Some of them, like Anita, did not seem to notice their presence. This apparent nonchalance to pesticides could be a combination of their overriding concern for earning a living and their belief that the risks to which they are potentially exposed while working on the coast are negligible when compared to the threat of harm from non-fulfilment. I will return to the

first of these points in the concluding section of this chapter. In relation to the second, one of the very major concerns in the lives of these migrant workers is fulfilling their religious obligations, of which, for many, this trip to the coast is part.

The question of the extent to which their understanding of pesticide risk is determined by their illness explanatory model is omnipresent. Both employers and migrants mentioned that while working on the coast they continued to rely on mara'akate if they were ill and during pregnancy. In fact Julio, Jorge and Maximo all talked about the need to return to the Sierra if they or their children became ill, suggesting that being close to a medical centre or hospital was not a key consideration in their wellbeing. This may simply reflect their desire to be at home when they feel ill. It could also be the case that at home they are better able to access all elements of traditional medical care including mara'akame, scared sites, herbal treatments and possibly the deities themselves.

With the exception of Angélica and her extended family who had ostracised themselves from their Sierra lives and culture, all of my informants speak at some point about seeking mara'akate to cure illness. Julio told how he sought a shaman when he became intoxicated with pesticides while Jorge and Maximo talked about seeing a mara'akame when their children became ill. In each case the discussion occurred within the context of pesticide use and exposure but without making a direct association between illness and pesticides. In these latter cases there was clearly some uncertainty on the part of my informants about their child's illness and they entertained the idea that pesticides might have been a causal factor. Like the Azande and their belief in witchcraft, Huichol belief in the supernatural origins of illness by no means contradicts empirical knowledge of cause and effect. The fact of their belief in the role of deities and fulfilment in illness prevention and cure does not imply that they cannot understand that pesticides can also cause illness. This understanding is of course mediated and limited by their personal, cultural and communal knowledge and education about biological processes and functions. While they

may have some understanding of the biomedical cause and effect relationship, through personal experience and through what other people have told them, they are concerned with what could be considered their distal cause, the supernatural. Since this is the real cause, a mara'akame must be sought to prevent another illness event.

## 7.6 What are pesticides and how do they enter the body?

The term 'medicine' used by both Felipa and Lucía is a direct translation from the Huichol term *Uaye*, a word that is used to refer to pesticides or agrochemicals of some sort as well as to all types of pharmaceuticals. *Uaye* is a broad all-encompassing term that covers any substance, applied or consumed, with the aim of improving the health or wellbeing of any living thing. It can equally be translated as medicine (Alka Seltzer, antibiotics, Vick Vapour Rub, CafeAspirina, Anti-Alacrán to name a few of the *Uaye* well known in the Sierra and barranca) and as pesticides, herbicides, fertilizer or any other agrochemical. In this sense *uaye* are substances for preventing or curing illness in humans, animals or in plants, suggesting a very different meaning to the negative connotations attached to pesticides when these are viewed as toxic chemicals. Although most people used the term *uaye* when the interview was conducted in Huichol, some of those whom I interviewed in Spanish used the word '*veneno*' which translates as venom or poison. In the case of Enrique, an analogy was made with scorpion venom. None of my interviewees used the term 'medicine' to refer to pesticides when I interviewed them in Spanish. This translation was given by my research assistants.

This dual meaning of *uaye* further complicates understanding of pesticides and is probably also reflected in the experience based belief that these chemicals have a curative effect on their maize fields at home. I have discussed the types of information our interviewees had received from others about the effects of pesticides. In some cases this information was *validated* by personal experiences in the field. Some of my informants noticed harmful exposure

through contact with soil, others through their sense of smell. Others expressed their understanding by making analogies with an experience they had, sometimes illustrating how they thought these chemicals entered the body. My informants' knowledge about how pesticides might affect different organs or parts of the body or even an unborn baby was framed by their own biosocial understandings of their bodies and how these worked. In this final section I will discuss these analogies and descriptions.

### 7.6.1 Pesticides as infection

In a very general sense, some informants talked about pesticides as they would talk about an infection. The term 'infected' was sometimes used to talk about the *effect* of pesticides, an effect that was often simply described as *illness*, an illness that could move around the body. Enrique from Pueblo Nuevo, made an interesting analogy between pesticide infection and scorpion bites, suggesting that chemicals entered and moved around the body in much the same way as the venom of a scorpion:

*J: (...) which parts of the body does it affect?*

*E: In the heart. Either in the, what they call lung, in the lung also. I mean, first it infects the lung and then afterwards the heart, I mean they go together (...). It could be, because otherwise...*

*J: A while ago you said it reaches the blood, how does it enter the blood?*

*E: In the blood, when it reaches the heart, from the blood, I mean there are veins that reach the heart and they transmit it, it enters into another vein and then it enters another as well, then the heart is full of veins too and then it can go where it likes. You know when a scorpion bites you, well you know, it spreads to other parts. It could be like that, venom is the same thing, it is the same, imagine it bites you [a scorpion] when the venom reaches your heart then imagine it penetrates all the veins and the blood is poisoned.*

A similar analogy was made by Maria (39 NC), with reference to mosquitoes, which she described as transmitters of pesticides, '*Sometimes mosquitoes bite*

*children, and it's that the mosquitoes land on the tobaccos that have chemicals and then afterward they infect people. Maybe that's why we become ill'.*

While it is possible that the infect/affect/effect overlap is a linguistic confusion of second language Spanish speakers (myself, my informants and translators included), the conversations presented above suggests that they did see the *effect* of pesticides to be some form of *infection* in the body. In their study with latino farmworkers Rao et al found that one third of women thought pesticides were some sort of an infection(Rao et al., 2007).

The idea that agrochemicals are a poison that behaves like the venom of a poisonous animal is recurrent and is expressed in similar terms to the idea of infection (in the sense of contagion), suggesting a belief that once infected with this venom/infection it can spread illness to other parts of the body. Jorge spoke of how his mother developed an eye problem because of years of continual exposure to this poison and how he now seemed to have 'caught it':

*Jorge: (...) last year they operated on my mother, the problem she had with her eyes and now it's infecting me, my eye on this side is redder, see that I have it on this white side, who knows how long it will take.*

*J: What does your Mum say about the problem with her eyes, why does she think she has it?*

*Jorge: The doctor there told us that yes, it comes from the tobacco, from the liquid and that when it is picked they spray it with poison, you sweat and it gets in your eyes and causes harm and that's where the illness comes from that little by little causes harm. Don't you remember the doctor asked us how many years we had been in this work...?*

### **7.6.2 The 'illness' of pesticides**

Although some informants mentioned specific effects, on the whole pesticides were simply described as causing illness. Many referred to the possibility that pesticides could make you sick as opposed to defining the nature of the effect, giving the impression that they saw pesticides as a generic causal factor, as Maximo explained:

*'Yes, here it is very risky for a pregnant woman, that's why I don't bring my wife, because what we touch and pick up, it's all chemicals. Also there in the Sierra some people use herbicides, they also cause illness, that's why I work alone, when I put my herbicide on the coamil she is at home.'*

Angélica talked about how another young woman miscarried as a consequence of the 'illness of this liquid', which she described as headache, nausea and vomiting:

*'Yes, a woman there in Amapa was working and this caused her harm, even, I think even she miscarried I think for the same reason, for the illness of this liquid, because she was working on the tomatoes, picking tomatoes and she got a headache and started to feel sick, sick like wanting to vomit and she felt ill and that was it. After that they took her to hospital but she had already had pains in her stomach and all that and she couldn't do anything else. Yes, that was it...'*

Although my informants largely expressed confusion or incomprehension in terms of *how* pesticides actually caused harm, many had felt ill or pain while working on plantations and for some, like Julio, this 'illness' was confirmation that pesticides are harmful:

*J: What do you think are the main health risks of working in agriculture?*

*Julio: Well yes, illness affects a lot, well they use a lot of liquids and it all contains chemicals, it affects illness in any job, tomato, tobacco, and causes a lot of illness.*

*J: What type of illness?*

*Julio: Well this, what happened to me, the vomit, it's what you get, like a stomach or headache, don't know what it affects there, when you are picking and the dust flies up and this goes inside, through the nose or mouth, you breathe it and this is what it does, the soil and dust that flies up. Here it's worse because we sleep in the fields and you aren't covered and the smell of tobacco this affects.*

*J: And can this have an effect on reproductive health, in the long term*

*Julio: Well they say it can give you rheumatism and cramp, this shows it affects you, with time your bones get worn, they creak and you get*

*like cramp, you can't walk properly, well the soil has a lot of liquid that affects.*

*J: And is there any specific effect on women or children?*

*Julio: And the kids get nausea and vomit and the illness begins. That's what I know on my part.*

*J: Have you ever applied it?*

*J: Yes, I have worked in everything, I always migrated, before I applied the liquid and the water, I sprayed tobacco with liquids when it is young, then the hand gets numb because the liquid gets on the hand, then it gets better.*

Others, like Otilia suspected that their feelings of illness might have been caused by exposure to chemicals, '*I think that it's bad because sometimes I feel pains in my hands and body*' she said. But, as we can see from the following statement by Galindo, this 'cause effect' relationship is unconvincing, while he entertains the idea that pesticides are causing harm he remains convinced that only the costumbre can cause illness in women and children:

*J: How do you think these products can affect the body, how do they enter and how do they affect your health? What do you understand about this?*

*G: A year ago, it like entered in several parts of my body, it hurt my bones like, for example, my muscles and I don't know if that's why, maybe it was caused by the illness or by the insecticide or something else, but I don't know what illness it was. I don't know if that's where it came from but sometimes the patrón asked us to 'put the herbicide between the plants and use fertiliser' and you don't know if this illness comes from there... I mean... it's just that sometimes they are just part of the costumbre, and only that can affect the baby, or the woman can get ill, they are things from, from the Huichol culture.*

### 7.6.3 Smell and illness

When we asked informants how they thought these 'illnesses' might have entered the body many mentioned the 'smell' and that smelling these substances provoked feelings of sickness or caused illness. Agrochemicals smell strongly because vomit inducing and strongly smelling substances are added to

them to reduce the risk of consumption, or in case they are consumed, to accelerate oral expulsion. Irrespective of the nature of their 'illness', many informants thought that these had or could enter their body through their strong smell although some, like Elvia answered with considerable uncertainty:

*'Sometimes they give a headache. Maybe because of the smell and sometimes stomach ache, if the smell is too strong it can cause something, or, I don't know... Afterwards you get better, maybe something can happen to you if you smell a lot, but I don't know.'*

Leonardo talked of the smell harming the body and the brain, he told me '*I think it's a risk because it's really strong, because of the smell that harms the body and the brain*'. Mention of the harm caused by *smell* was evident throughout discussion on pesticides, as much in relation to reproductive health as to sensations of vomiting and nausea. This became clear in our interview with Maximo:

*T: ...and if, for example, you use pesticides having her [in reference to his wife] close to you, how do you think the chemical reaches her stomach and the baby?*

*M. Well, they say that from the smell, that's why I don't take her when we are sowing and we use it. But when we've finished and the smell is gone then she does go and tend the maize field. They tell us that this chemical makes us ill, the smell also reaches the baby in the stomach. What I don't know is if it reaches the baby when you spray the milpa.*

Enrique gave a detailed explanation of how he thought pesticides entered the body through eating contaminated food. Although he did not see how this would affect an unborn baby, he did think that smell, or 'aspiration', during pregnancy could affect it, suggesting that if the woman was inhaling pesticides then the baby was too:

*J: Can you tell me, from what you know, how insecticides, can affect a pregnancy?*

*E: Through the food we eat. Because you pick a product that has pesticides on it, for example a tomato, (...) chili, I mean you are... erm...*

*we as labourers are in the fields picking chili, tomato, from there, as they have these products they have all the chemicals, right? And also there are other products that don't go quickly, so let's say they have just applied the liquid with one of these chemicals, from a product that doesn't go away quickly and the patrón says to you 'you can pick now', and you pick and it can infect you.*

*J: And how does this affect the body, for example during pregnancy?*

*E: Through food, what we eat. Let's suppose you are in the field, where there is chili and tomato and you pick something to make your food and the rest and all that, though the food, you can get infected but not really quickly, little by little, little by little, little by little you can become infected until it reaches the moment that it enters all the blood and so that is when the illness can begin, right?*

*J: Ok. What do you know about the growth of the baby? I mean, what I want to ask you is, can you identify or explain how, in what way, this type of exposure can for example affect a baby?*

*E: I think that you cannot affect the baby through food, it affects the person but not the baby because the baby is covered, it can breathe but anyway it's not affected. It can only be affected by aspiration, right? Then it can be affected, when the woman goes to where there is a lot of chemicals and where it smells a lot, right? Then it can affect the baby, right? Otherwise it doesn't affect it. Then yes, as she will be absorbing all she can smell then it can even affect the baby, otherwise no.*

#### **7.6.4 Soil**

The other frequently cited source of harm from pesticides is soil. Eating, smelling, inhaling, touching and the very general day to day *convivencia* with soil that has seen dozens or perhaps hundreds of separate chemical applications. The topic of soil was particularly mentioned by families with small children such as Angélica (cited in the introduction to this chapter) and Jorge and Olivia, cited below:

*J: You mention that the soil has chemicals, how do you know they are there?*

*Jorge: Well the soil doesn't feel right, when you sweat it sticks to you and you get itchy and it affects you a lot, it makes the kids feel bad when they eat.*

(...)

*J: And here, Olivia, when you are working outside the Sierra what are the things that can cause harm?*

*Jorge: Well here you are at risk a lot, when they spray with liquid and the smell of tobacco and soil, it causes harm when they eat soil, sometimes, or when it gets in food and for not being careful they get really ill.*

*J: Does the soil feel different here and in Taimarita?*

*Jorge: Well, here the soil has a lot of liquids, I don't know what it has, when you eat a bit of this soil your stomach starts to hurt and maggots come out and harm children.*

(...)

*J: What do you know about these chemicals, and you, Jorge, what do you know about how they enter the body?*

*Jorge: Like I said to you, that's how it makes us feel the illness. Working I sit him [his son] on the ground, on tobacco and I get him up with soil on. Sometimes you are too lazy to wash your hands and that's how it affects you, well you pick up tortillas with dirty hands and well, that's how I have become ill, but I've never been to see a doctor, only a mara'akame, or to buy medicine. And here the maggots are born and sometimes you get a stomach ache, that hurts you, I think it's from the soil. At home I don't use things like this and here you feel it straight away and you don't have anywhere to work. Well at least here you get food. At home I have to sow, and here... this is the second time we've come from Taimar' to work here and then I am going to Zacatecas, that's how I have worked all my life, working the land and I have eaten things...*

These descriptions of how pesticides can affect or *infect* the body and cause illness reflect the syncretic understandings that these migrant workers have of illness causality. Theirs is a syncretism that combines an incomplete understanding of the biological workings of the body, including concepts such as infection and contagion and the process of illness in general, with the traditional explanatory model where causality lies in the supernatural realm. In chapter 5, I described how the Huichol explanatory model has incorporated the biomedical model of illness on its own terms with the latter model seen through

the lens of the former. Pesticides are clearly of non-Huichol origin and the ‘illness of pesticides’ cannot be easily explained by a traditional explanatory model. In theory, these are illnesses that have not been caused by the deities, as are for example, ‘illness of the deer’, ‘illness of maize’ or the ‘illness of kieri’. Although, like all forms of misfortune, these ‘new illnesses’ occur because of non-fulfilment. I say in theory because in practice, these tobacco pickers seem to have a doubtful belief that lies somewhere between the two explanatory models. Perhaps because of the chemical, western, artificial nature of the pesticides themselves, these Huichol migrants do not seem to fully sign up to the idea that the harm they cause could be due to non-fulfilment, demonstrated by the fact that many of them describe first-hand experience of cause and effect. Even so, they continue to rely on mara’akate to cure illnesses that befall them while working on the coast. This syncretism reflects the very dynamic nature of their understanding of illness and causality.

### **7.7 Conclusions: working *in harm’s way***

In this chapter I have described what the Huichol know about pesticide risk and the different types of knowledge that they have, knowledge that is acquired and knowledge that they gain through experience. The latter of these forms of knowledge shares similarities with the authoritative knowledge that women in particular hold in relation to reproduction, built on a combination of experience and their own cultural and social knowledge.

Many of these workers appear to be at a crossroads, they migrate continually between two worlds and hesitate to situate their understanding of illness, pesticides and causality in either, reflecting what is perhaps a transitional form of knowledge which fluctuates between two explanatory models. Jorge told me that while on the coast he had '*never been to see a doctor, only a mara’akame or to buy medicine*', suggesting a complex syncretism but one that is also affected by their social and economic position on the coast, a position that is perhaps better explained by theories of structural violence.

Although the knowledge of these migrant workers is based largely on their own experience, many describe feeling the health effects of pesticides, their practices and behaviour in relation to this appreciation of risk is determined by social and economic needs. As Benson also notes in his study of tobacco migrants in southern USA, a series of interlocking factors ensure that these migrant workers are particularly in harm's way (Benson, 2008). The working and living conditions of these migrants ensure that they are continually exposed to pesticides 24/7, the 'piecework' system of payment and the fact that they have no accommodation away from the plantations ensures that they work all the daylight hours and into the night, there are no washing facilities so that they can wash the goma off their hands and clothing so they sleep covered in pesticide residue. These are working conditions that are not contemplated by 'experts'. These conditions are the immediate and everyday forms of violence to which these Huichol workers are exposed and they are violent because they put these workers particularly in *the way of harm*, causing illness. They are endured because of economic need but they exist because of broader structural factors that I will discuss in the concluding chapter of this thesis.

## Chapter 8 Conclusions

This thesis aimed to explore how Huichol migrant labourers understand the relationship between pesticides and reproductive/maternal child health. The Huichol, along with the Tarahumara, Cora and Tepehuano groups with whom they share the Sierra Madre mountain range, are possibly the least acculturated of Mexican indigenous groups and their traditional lifestyle has always attracted intense interest. From an academic perspective this fascination with Huichol culture has meant that research with this ethnic group has been dominated by studies of their history, spirituality, mythology and ritual with a corresponding neglect of contemporary life experiences, wellbeing or social and economic arrangements.

Since little is known or has been written about the health and specifically r/mch practices, beliefs and knowledge of this ethnic group, I began by exploring these concepts and locating them within a wider understanding of Huichol ethnomedicine. Thus, to achieve my aim of exploring *how* Huichol migrant labourers understand the relationship between pesticides and r/mch, I asked the following questions:

- v) *What are the knowledge and practices of Huichol men and women regarding traditional and modern medicine and healthcare?*
- vi) *What knowledge do Huichol men and women have of the reproductive process?*
- vii) *What perception of risk do Huichol women and men have in relation to reproduction, maternal and child health?*
- viii) *What knowledge do Huichol women and men have about the potentially harmful effects of pesticides?*

The participants in this study largely belong to families from the most marginalised valley communities of Tuapurie, localities such as Taimarita and

Pochotita that rarely receive visits from teiwari and have been mostly ignored in ethnographies. These are the communities that are least well served by education and health services and where they are no real employment opportunities. All of my informants or their spouses were working on the tobacco harvest in the picking season of 2010 and many of them live a life of perpetual migration.

### **8.1 Contribution to knowledge**

The major contribution of this thesis is to generate understanding of how, in spite of the major role that costumbre plays in their lives, structural injustices are the key determinants of the health and wellbeing of Huichol people, particularly the groups of migrant labourers who were the focus of this study. In contrast to the majority of literature about this ethnic group, I have made contemporary social and structural issues central to this analysis, using the concept of structural violence to explore both practices and knowledge/beliefs. Thus this study has filled several gaps in our understanding of the medical and reproductive knowledge, beliefs and practices of the Huichol demonstrating how, although spirituality, culture and traditions continue to heavily influence every aspect of Huichol life, these concepts are insufficient to explain current practices in relation to health care. Below I describe the new understandings that have emerged from each of my specific research objectives.

- i) *What are the knowledge and practices of Huichol men and women regarding traditional and modern medicine and healthcare?*

The focus of this question was to analyse Huichol knowledge and beliefs about medicine and health *in relation to their current practices*. Existing literature on Huichol ethnomedicine concentrates primarily on supernatural and religious elements, neglecting the form in which these communities have adapted to increasing contact with western medical systems. My analysis goes beyond this, to discuss how the Huichol incorporate knowledge of modern medicine into

their traditional explanatory model. I looked beyond their costumbre to describe and explore the impact of social structures and relationships with institutions and healthcare providers. Central to my analysis is the role of structural violence in the health practices of this community and I propose that unequal relationships with the national medical system and healthcare providers also contribute to the on-going importance of traditional medicine in their lives. Thus, I found that practices and experience impact on knowledge/beliefs and that it is insufficient to argue that the Huichol EM is determined only by their costumbre.

The Huichol explanatory model that I encountered is syncretic, incorporating western healthcare into its traditional system. While I would agree with existing theory that this EM is essentially personalistic, I add that this is accompanied by a dubious and uncertain knowledge in the curative powers of western medicine, belief that is upheld in the knowledge that the real origins of illness are supernatural. Thus, I conclude that biomedicine exists within the traditional EM, as a western form of magic that can allay the symptoms and physiological manifestations of illnesses which essentially have supernatural causes. This goes further than existing studies of Huichol medicine which describe this as an almost exclusively traditional system of beliefs.

In terms of Huichol uptake of medical services and their health behaviour and practices I draw on theories of structural violence to explain why, aside from their beliefs in the supernatural origins of illness, my Huichol informants use western healthcare sparingly. To my knowledge the concept of structural violence has not been used to describe the relationship between mestizo healthcare providers and indigenous communities in Mexico and specifically has not been used to explore the issue of shame. This research brings to the discussion of indigenous health care in Mexico an exploration of how structural factors impact on men and women at an individual level manifesting themselves as shame. Both men and women talk of not using health centres and hospitals because they are ashamed to do so, citing everyday forms of violence:

recriminations, criticisms, intimidations and neglect that are used by healthcare providers and which contribute to their feelings of shame, a condition that Bourdieu describes as symbolic violence, 'as they contribute to their own domination by accepting the limits that are imposed' (Bourdieu, 2004).

*ii) What knowledge do Huichol men and women have of the reproductive process?*

Very little research has been conducted with Huichol people about r/mch, and this thesis contributes mainly to two areas of knowledge about this. Firstly, I describe what women do know about the reproductive process and how this knowledge is *authoritative*. Secondly, I analyse practices from the perspective of structural violence, considering the role that social and structural relationships have on their authoritative knowledge and their practices.

Huichol r/mch practices have not been explored ethnographically nor has the concept of Authoritative Knowledge been used to describe these. I propose that the knowledge and beliefs of this group regarding r/mch are authoritative because, to use Jordan's definition, they are 'internally consistent and mutually beneficial practices and beliefs' about pregnancy and birth, that are developed to 'manage the physiologically and socially problematic aspects of parturition in a way that makes sense in that particular cultural context' (Jordan and Davis-Floyd, 1993). The authoritative knowledge of my informants stands out among that of the majority of Mexican indigenous groups because this ethnic group has a tradition of birthing alone, or accompanied only by a family member. Thus, in response to my question of '*What knowledge do Huichol men and women have of the reproductive process?*', the answer is very little of a biomedical nature, but considerable *authoritative knowledge* gained through their own and their culture's experiences of reproduction as a whole. The religious/cultural influence on their authoritative knowledge of r/mch is also great and while many women have experienced miscarriages and most have survived the death of one or more of their children, they almost unanimously associated these problems with supernatural causes.

I also identify how structures also play a role in the formation of this authoritative knowledge. Women have learned to give birth alone because they have historically had no choice but to do so and I argue that Huichol women continue to give birth alone because the unequal relationships between the Huichol community and health services combined with linguistic problems and material poverty, among other things, contributes to feelings of shame. Women are too ashamed to give birth in a health centre and in chapter six I used the concepts of structural, symbolic and everyday violence to explain the permanence of current practices regarding r/mch. This adds an important new layer of understandings to ethnographies of birth in Mexico.

I also described the continued importance of the Huichol medical EM in these practices and beliefs and in terms of my third question, '*What perception of risk do Huichol women and men have in terms of r/mch?*', the answer is that they do not fear the process of reproduction, pregnancy or birth itself or see it as a health risk. Reproductive/maternal child health has not been medicalised in their EM, for the Huichol the greatest risks are supernatural. By participating in the necessary ceremonies and conventions they can ensure fulfilment, there is little they can do to avoid witchcraft. Kieri, or a malevolent mara'akame, may cause them harm because of envy, jealousy or because they hold a grudge against them. There is little they can do to prevent this, except keeping their children close by them and distancing themselves from mara'akate, especially at fiestas. Thus, this thesis has contributed to our knowledge about Huichol practices and beliefs regarding r/mch and analysed this using the concepts of structural violence and authoritative knowledge, incorporating the role of the Huichol medical EM that I defined in Chapter 5.

I have argued that Huichol knowledge about r/mch is authoritative because it makes sense in their *particular cultural context* and it is built on experience. The concept of authoritative knowledge is useful to help explain how this ethnic group construct their knowledge about wellbeing in a general sense. In terms of my fourth question, '*What knowledge do Huichol men and women have about the*

*potentially harmful effects of pesticides?*', the answer is that, like their understanding of r/mch, their knowledge of the biological effects of pesticides is minimal, but they do have a spectrum of understandings that are built on experience. In Chapter 1 I described what is known about how indigenous and latino migrant labourers understand pesticides. The majority of this literature is descriptive rather than analytical and does not explain how people have constructed their knowledge. In this final section of the thesis I discuss what these Huichol migrants know, and *why* they have this understanding of pesticides. Once more I use the concept of structural violence, this time explaining how Huichol migrant workers are particularly in harm's way while working on tobacco plantations in Nayarit. Some recent studies have used the concept of structural violence to explore migrant labour in the US (Benson, 2008, Quesada, 2011), but they have not specifically looked at pesticide risk and to my knowledge there are no studies that have been conducted in Mexico or with indigenous people that analyse wellbeing using this concept.

Thus while the Huichol EM plays a role in their understanding, their experience-based knowledge of pesticides is largely gained through working as migrant labourers. As I explained in Chapter 7, many participants mention having been told about the harmful effects of pesticides or having somehow acquired this information from a teiwari, but mostly they have little trust in this and draw on experience to answer questions on pesticides. This knowledge is influenced as much by their negative experiences as by their positives ones and many refer to the fact that although they have been told that pesticides are harmful, since they have never experienced this, they don't know whether it is true.

Finally, I brought together knowledge generated on the Huichol EM and knowledge about r/mch, with understandings about pesticides and analyse these from the perspective of structural violence to answer my principal research question, *what do Huichol migrant labourers know about the relationship between pesticides and reproductive health?* This is an important question because there is considerable evidence demonstrating that pesticides

are harmful to r/mch, but we do not know whether agricultural workers know about this nor do we know what understandings these workers do have. To my knowledge this question has not been explored with migrant labourers anywhere. It has certainly not been explored with migrant workers in Mexico.

In the opening chapter of this thesis I discussed the scientific evidence of an association between pesticides and r/mch. This 'expert knowledge' (Wynne, 2004, Blok et al., 2008) is not common knowledge and most people cannot be expected to know whether and in what ways pesticides affect r/mch. Some of the pesticide sellers I interviewed in Santiago knew that they could be harmful to pregnant women, but legitimately proclaimed that they would not expect pregnant women to be working on plantations. I did not expect my informants to understand the role of pesticides as hormone disrupters nor to be able to provide a scientific explanation of how pesticides interrupt the process of reproduction. This 'expert' knowledge is not accessible to them. I hoped to find some idea of the types of effects that pesticide exposure could cause, for example some reference to elevated numbers of miscarriages, difficulty conceiving or numerous children with cleft lip and palate. A study conducted in the state capital of Nayarit found an association between congenital malformations and farm labour (Medina-Carrillo et al., 2002), concluding that a determining factor was pesticides and on a pilot visit to the region in 2006 I had met three Huichol children with cleft lips during three days of visits to plantations. So I had found reason to believe that the workers themselves may have noticed a pattern of cause and effect. Although this study did not aim to identify a link between exposure and outcome by, for example, measuring birth intervals or identifying a significant number of congenital malformations, my data does suggest that there is a high rate of miscarriage and very high rates of infant mortality among this group. In both cases my informants cite supernatural causality. Belief in supernatural causality also appears to influence my informants' reluctance to think that modern chemicals such as pesticides can be the true cause of harm. Bringing together something so entirely external

to their culture and traditions as pesticides with something so intrinsic to their system of beliefs as is the mythical and spiritual nature of reproduction is problematic. Reproductive problems are clearly a ‘mal de aqui’ but pesticides are an external agent, a chemical substance that does not originate in the Huichol world, so how do they relate one to the other? Unlike the layering of their syncretic medical model where biomedicine, pills, hospitals and medical doctors can work alongside their traditional forms of cure, there does not seem to be a layering of causality, where biomedical explanations of causality can sit alongside their supernatural counterpart. As I explained in Chapter 5, the syncretic EM incorporates western medicine into its own system to the extent that this does not interfere with the traditional explanatory model or the social and moral origins of illness. Effectively, the Huichol EM incorporates the curative forms of biomedicine but not its explanations of causality, this will always remain supernatural.

In hoping that my informants would have some knowledge of the r/mch effects of pesticides, I was ultimately relying on them sharing the epidemiological concept of cause and effect. As I explained in Chapter 5, this is not the case and one of my principal contributions to knowledge is demonstrating that the Huichol idea of illness causality confuses their understanding of the effects of pesticides. This modern chemical substance does not fall easily into their syncretic explanatory model of illness. None of my informants spontaneously mentioned knowledge of a link between exposure to pesticides and r/mch although, on prompting, some of them could describe ways in which they thought pesticides could reach an unborn baby. These prompted responses about pesticides and r/mch could be explained by courtesy bias as I will discuss in the following section. It could also be a simple case of my informants putting two and two together, as I began talking about pesticides and r/mch it may have occurred to them that this was what happened to them.

Curiously, positive experience or lack of bad experience also shaped their understanding of pesticides. A second key contribution to knowledge is my

analysis of how experience has shaped their understanding. Many women, like Anita, positively felt that their child could not be affected. They had given birth on plantations to healthy babies or they had worked and returned home to give birth to a healthy baby without problems. Angelina had suffered multiple miscarriages and stillbirth but she did not find any link between these and her or her husband's migrant labouring. On the contrary, she was sure that her problems had been caused by the plant/god Kieri. Ultimately theirs is an authoritative knowledge about pesticides and r/mch. It is not built on what 'experts', patrons or teiwari tell them, it is generated though their own positive and negative experiences and their cultural and social understanding and knowledge. My informants in fact express a disbelief in expert knowledge, grounded in a distrust in teiwari whose relationship with them has historically been characterised by racial supremacy/inferiority, domination and exploitation. Structural violence helps explains Huichol distrust in expert knowledge, effectively influencing their paradigm of knowledge construction. But this is not the whole story and this distrust is buttressed by the fact that for many of these workers the epidemiological concept of cause and effect has no meaning.

Thus the third key contribution to knowledge is my description and analysis of how structural violence also influences both their authoritative knowledge and practices. There is a moral and social choice element to their construction of knowledge. These migrant labourers do not conceive of pesticides as harmful because they need to work and because, relative to other risks, the possible effects of these are minimal. Firstly their perception of risk is seated within a set of community and cultural values that rank fulfilment above all else. As Talavera describes in his ethnography of tobacco migration, this serves an economic as well as a spiritual need (Talavera, 2003). While costumbre is not the reason for their work or the reason for knowledge, this form of employment complements their cultural responsibilities and enables them to fulfil them. Secondly, their economic needs are great and their options for employment are so few that they

have little choice but to work in these conditions: not working and not earning money would be a far greater risk to their wellbeing. Their economic and cultural needs predominate and are the principal determinants of both their wellbeing and of how they conceive of this. Health, as it is seen from the standpoint of *western public health and medicine*, is not an immediate priority.

## 8.2 Limitations

My findings are necessarily a first approach to understanding these issues and my conclusions are limited by the breadth and depth of my research, as well as a number of practical and methodological decisions.

Firstly, from an ethnographic perspective, my principal limitation was linguistic. The data generated by interviews conducted in Spanish was far richer than interviews conducted in Huichol. My bilingual research assistants were young and inexperienced and their knowledge of the issues that we were researching was poor, thus they were not confident enough to ask probing or leading questions. The combination of these aspects meant that the responses I received from my monolingual informants were largely confined to their answers to questions in the interview guide.

Secondly, there are a number of potential biases. My informants did not spontaneously mention knowing of a link between pesticides and r/mch. While I conclude that this is probably because of the manner in which they construct their knowledge, it may also have been because of a series of methodological and practical problems that introduced bias. For logistical reasons, that I described in Chapter 2, my study was confined to a small number of communities and these families knew each other well. I used the same semi-structured interview guide with all of these informants and many came to know the content of this before I interviewed them. Thus towards end of my fieldwork some of my informants began to tell me about a link between pesticides and reproductive health. By repeatedly using the same semi-structured interview

guide in a small region I may have introduced courtesy bias: my informants knew what I wanted to know before I asked them and they were giving me the answers that I sought. In addition, simply by using a fixed interview guide, I had pre-determined the content of responses. If they saw the causal factors of problems such as miscarriage as anything other than pesticides or costumbre, they did not tell me this. Thus this particular research method limited the breadth of information I obtained and potentially biased responses towards certain issues. If I had relied on un-structured interviews and participant observation I may have identified other concerns and explanations.

From a public health perspective I was limited by the fact that I did not seek to find a causal link between pesticides and r/mch with this population, ultimately leaving me with a series of unanswered questions. Not only was I not able to establish this link but neither could I do more than hypothesize about what it really is, from an epidemiological perspective, causing such high rates of infant mortality and miscarriage. Thus I have identified the existence of these problems but I have not been able to explain what is causing them.

Finally, because of time constraints and because it was necessary to tread with caution, I was not able to explore a number of key issues that may have influenced my conclusions. These include but are not limited to i) the problem of gender inequality within Huichol communities, ii) the community decision to lift the ban on pesticides, iii) child labour and decisions regarding which children work and which attend school, and finally iv) detailed exploration of knowledge about the *biological* process of reproduction.

Because of these limitations, the conclusions that I will now discuss are only a partial exploration of how Huichol men and women understand the relationship between pesticides and r/mch.

### **8.3 Structural violence and public health policy**

In the application of the concept of structural violence to the context that I am studying I argue that the Huichol are more at risk to the effects of pesticides because of political, economic, socio-historical and legal factors that, to use Farmer's words, put them *particularly in the way of harm* (Farmer, 2004).

In 'An Anthropology of Structural Violence' Farmer discusses how history and political economy influenced the course of the AIDS epidemic in Haiti, linking modern medical anthropology to the large scale social and economic structures in which affliction is embedded. Through numerous essays that deal with this concept Farmer indicates the various 'axes of oppression' (Farmer, 2005), the layers on which structural violence operates to sustain inequality, injustices that become embodied in the experiences of people who live in poverty. These include structural forms of racism, gender inequality, legal, social and historical, political and economic. The core of these structural inequalities is their ability to diminish the agency of its victims. The author makes an analogy with Bourdieu's habitus, 'a structured and structuring principle', describing structural violence as 'structured and *stricturing*', as it 'constricts the agency of its victims'. As I discussed in previous chapters, Bourdieu explains how structural violence operates through the Habitus to generate everyday and symbolic violence, with the latter being the embodiment of the structural form (Bourdieu, 2004). Everyday violence exists in their ongoing conditions of exploitation, relationships with health workers and employers while symbolic violence is manifested in this population in their feelings of shame and humiliation.

Another central element of theories of structural violence that is of much relevance to the context of this study, is the critique of how cultural difference can blind us to the structural causes of afflictions, an issue that Benson makes reference to in his discussion of tobacco pickers in the USA (Benson, 2008). Applied to this context it is arguably the case that an excessive focus on traditional explanatory models, ritual and culture obscures the fact that the

causes and magnitude of affliction among this population are structural. As I discussed in Chapter 3, anthropological studies of the Huichol are heavily biased toward the symbolic and religious aspects of Huichol life, detracting from their real experiences of poverty, exploitation and marginalisation. In the past few years the Huichol have taken centre stage in Mexican cultural politics. Supported by campaigning groups they are taking their fight for cultural access and rights to an international level. This recent support to a hitherto little known indigenous group contrasts starkly with the Zapatista movement that articulated its fight around issues of structural injustice, poverty, maternal mortality, economic oppression and a history of racism. These migrants' belief in the supernatural origins of illness and misfortune also serves to obscure the structural origins. While they clearly identify the teiwari, the state and national government, the tobacco companies and, to a lesser extent, the researcher as their oppressors, the Huichol have yet to develop an articulated discourse on political and economic injustice.

One of the various layers, or 'axes', on which these Huichol farmworkers are served injustice and are hence particularly exposed to pesticide harm, is political. The Huichol migrant labourer has no political representation from their ethnic group on a national, state or even municipal level and the tobacco workers' union leader who should be fighting their corner in Nayarit operates instead as a pawn for the transnational tobacco companies. This union leader, true to the clientilistic nature of Mexican politics, gains politically and financially from negotiating contracts that are favourable to the corporations, as opposed to advancing the conditions of farmers and workers, while tobacco companies use coercive strategies to force down the price they pay to farmers. Here the political overlaps with the economic as this lack of political representation have several economic consequences that are embodied in their workers' wellbeing. The poverty of the patrones themselves, as they described in interviews, constrains their ability to provide further for their employees. These small farmers barely break even and are not in a position to provide accommodation

and washing facilities for their workers so that they are able to wash the pesticide laden tobacco resin from their clothes, hands or faces at the end of each day.

On the social and historical axis the Huichol occupy a lower rung of the social ladder than their mestizo neighbours, another factor that compounds their exposure to pesticides. This ingrained racism, wrought though centuries of colonialism, is reflected in an unequal status quo beyond that of employer and employee. The former assume working and living conditions that they themselves would find abhorrent, to be acceptable for their indigenous workers and justify this inferior level of existence with the belief that ‘that’s how they like it’, or ‘that’s how they are’. While the unjust contracts that are negotiated between farmer and tobacco company are a key reason for these appalling working conditions, racism also plays a part. Benson suggests that the faciality of Mexican farmworkers in South Carolina serves to construct white superiority (Benson, 2008). When a hurricane struck Santiago during the 2010 picking season workers were brought in from the fields. Farmers described driving their pick-up trucks to the plantations in the middle of the night to evacuate their workers. But instead of offering them space inside their homes they housed them in sheds, on their terraces, in a flea infested semi-constructed building, the derelict cinema that has lain in ruins for the past three decades and in out buildings they use to store agrochemicals and tobacco, spaces that could only be considered fit for animals. In spite of their good intentions and kind thoughts with regard to their indigenous workers, these employers see their workers as inferior humans, leaving them to give birth in tobacco fields, excrete in the open air and wash in polluted rivers, considering them too unclean to enter their homes or use their lavatories (Liffman, 2011, Pacheco de Ladrón, 1999). The flip side of this racist relationship serves to bolster Huichol *disbelief* in what they are told about pesticide harm. As I have described in earlier chapters, the Wixárika have a deep seated distrust in the teiwari grounded in centuries of racially based structural violence. The teiwari is their enemy and

they have a profound sense of suspicion that extends to this context. Essentially their belief or disbelief in the harmful nature of pesticides is also influenced by distrust in their informer.

On the legal axis the working conditions of these migrant labourers breaks regulations on maximum working hours per day, health and safety regulations, and both national and international child labour laws as well as those stipulated in contracts drawn up between farmers and tobacco corporations (Díaz Romo, 2002, Gamlin et al., 2007, Grammont, 1999). As is very often the case in Mexico regarding labour and environmental laws, the legal instances and legislations exist but they are not adhered to, while corrupt officialdom endorses the exploitative behaviour of economic powers (Cartwright, 2001, Gamlin, 2009, Lujan and Luis, 2005). British American Tobacco could not produce such cheap tobacco under these conditions in the USA, on the plantations to which many Nayarit farmers migrate once their own tobacco is harvested. Along with the lack of political representation, economic injustice and racial discrimination, these Huichol workers are also more at risk to pesticides because they do not have the support of the law. As Farmer states, these 'social forces structure risk' (Farmer, 2005, p315). In this case, the risk of pesticides causing harm.

The axis of poverty defines their need to work in these conditions and influences their perception of risk. Earlier I suggested that pesticides were not seen as an important health risk for these workers because they are primarily concerned with earning enough to be able to eat throughout the year, and because other risks in their lives take centre stage. Economic need predominates over their concerns for health, viewed from the public health standpoint as something that we can improve and influence through our practices and behaviour. Several actions could be taken by these workers to reduce their exposure to pesticides while they work on the coast, but all of these have an economic cost that they themselves would have to bear. The piecework system of payment ensures that they have no paid days off or rest time and both adults and children work well into the night, often labouring a 14-16hour day to

earn the equivalent of little more than the minimum wage of 70 pesos (approximately six dollars). Their economic need ultimately increases the period and intensity of their exposure to pesticides but their agency to change this is minimal, as Leocadia tells me '*What can we do? We have to work*'.

Finally, the structural factors that I have described above all constrain these workers' agency, undermining their ability to improve their own circumstances, *usurping their right to health*. Structural violence denies this population the right to health and to a healthy environment with each of the axes in some way putting this population of migrant workers particularly in harm's way. The structures and legislation that should protect and support these workers already exist, but this particular combination of injustices ensures that they do not benefit indigenous workers.

Such historical and deep seated structural relationships cannot be changed overnight, a sustained process of cultural change and political will is necessary. Because of the distal nature of structural change any real solution must involve actions on several levels or timeframes: long term, medium term and short term.

#### **8.4 Policy: distal, intermediate and proximate challenges**

##### *Distal/long term*

Firstly, I have highlighted the different axes on which these structures affect migrant workers and changing the manner in which they operate should remain a long term goal. Change is necessary on a national and international level and research such as this should seek to discursively address injustices. Clearly articulating this position and communicating these injustices, in particular seeking to influence key national structures such as the PRONJAG, BAT and Ministry of Health, should be the priority.

##### *Intermediate/medium term*

Without neglecting the distal challenge of structural change, in the medium term it is possible to strengthen existing structures and institutions and to generate a body of knowledge that enables them to operate more effectively. Mexico takes its people's health seriously and, as a middle-income country, it recognises the importance of continual improvement in the nation's health. The problem is that many sectors are excluded from these advances, their needs are poorly assessed and political underrepresentation means that strategies designed for them are often inappropriate. Good epidemiological and ethnographic research and intervention studies about both pesticides and reproductive health would be useful tools for influencing health policy on a local and national level. For example, good epidemiological research exposing the relationships between pesticides and health on agricultural plantations is needed to generate effective environmental health policy and counter the political influence of agrochemical and agricultural corporations such as Monsanto and British American Tobacco. In the Huichol homelands good local epidemiological data is needed about r/mch so that programmes can be targeted to their specific needs and designed specifically for their environment and their costumbre.

I have mentioned throughout that there is a real lack of ethnographic literature that explores and analyses the contemporary socioeconomic conditions in which the Huichol live. Research of this nature is needed to re-focus knowledge about this culturally rich and unique but highly marginalised indigenous group. Interventions should focus on bringing social and economic benefit in addition to cultural preservation and anthropological research should seek to highlight these needs.

### *Proximate*

In the short term some of the elements that put Huichol migrant workers particularly in harm's way and that prevent indigenous people from exercising their right to health can be addressed.

Firstly, actions can be taken to address the quality of health care both in the Huichol homelands and in Santiago. Changing racist attitudes within the medical profession is a long term process, but in the short term work can begin on a local level to address the issues of shame as a barrier to health seeking. The post of medical doctor in the sierra has tended to be considered a form of punishment, allocated to the most poorly trained and underachieving medical students. As well as specific training to work with indigenous communities, decision making processes could be altered so that the medical personnel who work in these regions have the cultural sensitivity that is required of these settings and populations.

Local health systems could better address the specific needs of the Huichol by creating a post of cultural mediator, and by introducing bilingual Huichol health promoters or nurses who are able to accompany patients to health centres so that language is not a cause of embarrassment. Such a person could also work on a community level with families in the rancherias to ensure that they seek timely medical treatment be this for r/mch or any other health concern.

Secondly, actions could be taken in the field to remove workers from a position of harm. While knowledge of the risks of pesticides and a greater understanding of the reproductive processes would be advantageous, such knowledge is of little use for preventative purposes if workers are not in a position to change their situation. Government institutions with the role of supporting migrant workers are already in place. In Nayarit the problem is that the triangle of union representative, farmers/workers and governmental bodies is inoperative. Union leaders do not support the farmers/workers to ensure that these are in turn supported by the PRONJAG. Here the problem is largely one of corruption that requires multi-agency and international lobbying and political pressure to make these institutions functional as they have been in the past, and this should become a long term goal. In the short term, effective and low cost solutions such as the provision of washing facilities and accommodation would make a huge difference to the working conditions of these migrants. If they

were exposed to pesticides only 12 hours per day instead of 24, this may have a significant impact on their wellbeing.

For the past decade Mexico has experienced sustained high rates of economic growth. Medium levels of expenditure such as these are affordable since both the Huichol homelands and the tobacco growing region of Santiago are small. However the experiences of these Huichol migrants are likely to be shared with many other communities in Mexico and policies that improve the quality of healthcare for indigenous communities should be rolled out nationwide. Essentially these three levels are inseparable and need to work together. While these short term goals are realistic and achievable, both economically and politically, they will not be effective or sustainable in isolation from the medium and long term strategies and local initiatives need to be taken to a national level.

## **Appendices**

### **i. Pesticides and reproductive health, what is known?**

This review was not intended to be exhaustive or to systematically assess all of the research that is currently available on this problem and here I do not aim to assess the weight of evidence in favour of a positive association between pesticides and reproductive health, but rather to identify studies that have found an association and describe the types and quality of evidence

### **Search methods**

Scientific papers published since 1995 were reviewed to answer the following questions regarding the relationship between pesticides and maternal-child health:

- i) What effects do pesticides have on the reproductive process?
- ii) Are there any clearly defined periods within which pesticides are most harmful?
- iii) What evidence is there of this among agricultural workers in Mexico?
- iv) What do agricultural workers know about the risk of exposure to pesticides?

To identify these papers three different search strategies were used, details of which are given in Table 1.

Table 1: Search and exclusion terms

<b>Search terms</b>	<b>1. General</b>	<b>2. Mexico</b>	<b>3.Risk</b>
Limit, Medline search	'Humans' & 'Title and abstract'	'Humans' & 'Title and abstract'	'Humans' & 'Title and abstract'
Limits, Web of Knowledge search	'Title'	'Title'	Topic (pesticides) /Title (risk+)
Pesticides AND	X	X	X
Pregnancy	X		
Congenital malformations	X		
Reproductive Health	X		
Mexico	X	X	
Risk and belief			X
Risk and knowledge			X
Risk and perceptions			X
<b>Exclusion criteria</b>			
Papers NOT published in English, French, Spanish or Portuguese	X	X	X

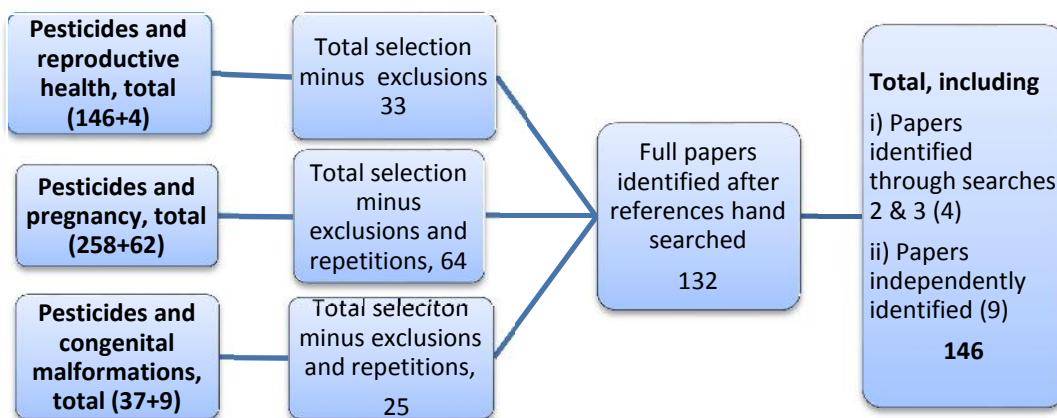
<b>Search terms</b>	<b>1. General</b>	<b>2. Mexico</b>	<b>3.Risk</b>
Studies of non-agricultural exposures	x		x
Studies that do NOT <i>measure</i> in some way a reproductive health (RH) outcome (also intervention studies that test novel preventive mechanisms/experimental studies that assess new forms of measurement even if studying RH).	x		
Commentaries and discussion papers.	x	x	x
Outcomes related to assisted reproduction (such as In Vitro Fertilisation).	x	x	n/a
Cross sectional studies of 'risk factors' using secondary datasets where pesticides are not a main focus.	x		n/a
Studies conducted with Non Latino/Hispanic populations		x	x
Risk assessments	x	x	x

*Search 1.*

A general search was conducted using Medline (Pubmed) and The Web of Science using the search terms 'pesticides and congenital abnormality',

'pesticides and pregnancy', and 'pesticides and reproductive health' with the limits of 'human health' and 'abstract or title' to identify general papers that report on research into the effects of pesticides on reproductive health (these were not MeSH search terms). Abstracts of all relevant papers were read and articles of key papers were studied in full where available. The reference lists of key selected studies were hand searched. Google Scholar was used to find individual papers that were not easily available. A total of 516 papers were identified in the initial search, 394 were eliminated using the exclusion criteria given in Table 1. After further examination, elimination of duplicate studies and the inclusion of papers identified through other searches and sources, a total of 146 papers remained.

**Figure 2: General search (1), papers identified (Medline and The Web of Science)§.**



§ Numbers in the first layer (given in brackets) refer to numbers originally given by each search engine, (Medline + Web of Knowledge). This rule also applies to search 3.

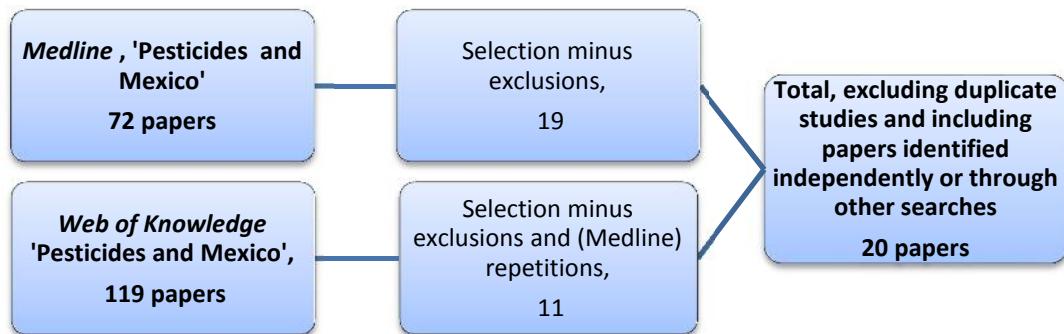
This general search strategy identified few papers on research conducted in Mexico, so a more exhaustive strategy was adopted to explore the breadth and depth of research into pesticides that has been conducted in Mexico.

### *Search 2.*

A search using only the terms 'Pesticides and Mexico' identified an initial 192 papers, using both Pubmed (72) and the Web of Knowledge (119). Exclusion

criteria were minimal and all papers that looked at a cause and effect association between pesticides and health were included. After these criteria were applied and duplicates were eliminated, twenty papers remained.

**Figure 3: Research papers on pesticides and reproductive health in Mexico identified using Medline and The Web of Knowledge.**



### *Search 3.*

A third search was conducted to identify papers that look at how people understand pesticide risk. Medline and The Web of Knowledge were searched using the terms 'pesticides, risk and beliefs', 'pesticides risk and knowledge' and 'pesticides risk and perception'. Together the searches brought up 505 papers, of which 30 remained after duplicates were removed and exclusion criteria used (see box 1 and figure 3). Studies with non-Latino<sup>26</sup> participants were eliminated on the grounds that they are culturally distant from the study population of this research, although I worked on the premise that studies conducted with farm workers in the USA would be relevant in that a very high proportion of these are of Mexican or Latin American origin<sup>27</sup>. The reference

<sup>26</sup> The terms Hispanic and Latino are used largely in the USA to refer to people of Spanish American or Latin American origin, these terms are inclusive of indigenous/native Latin American people such as the Huichol of Mexico, Southern Mexican and Guatemalan Maya and the Quechua of Peru, irrespective of their lack of Spanish or Portuguese ancestry.

<sup>27</sup> A 2001-2 US Department of Labor (Department of Labour) study found 75% of US Agricultural to be of Mexican origin, see

lists of these papers were searched and a number of books and relevant non peer review studies were also identified.

**Figure 4: Research on pesticides and risk identified using**  
(Medline + The Web of Knowledge)



*Papers on understanding of pesticide risk are summarised in the introductory chapter of this thesis.*

**ii. What effects do pesticides have on the reproductive process?**  
**Search 1. Summary of findings on the general effects of pesticides and reproductive health and birth outcomes.**

*Congenital malformations*

Numerous studies have shown that the foetus is particularly sensitive to environmental toxins, including pesticides, because it is undergoing periods of rapid growth and organ development and even very low levels of exposure can have harmful effects (Peiris-John and Wickremasinghe, 2008, Dunn et al., 2003, Jurewicz et al., 2006, Woolf, 2002a, Kwong, 2002, Garry, 2004).

Several types of malformations have been associated with maternal and/or paternal exposure to pesticides during and before pregnancy. These mostly fall into 5 categories: orofacial defects, malformations of the Central Nervous System (CNS), limb reduction or abnormalities, Neural Tube Defects (NTDs) such as anencephaly and spina bifida and anti-androgen related defects such as cryptorchidism and hypospadias, penile length and position of the anus (Adan et al., 2008, van den Hazel et al., 2006, Engel et al., 2007, Rull et al., 2006, Torres-Sanchez et al., 2008, Lacasana et al., 2006, Fernandez et al., 2007, Carbone et al., 2006, Stemp-Morlock, 2007).

Most of the studies used ecological as opposed to biological data as a measure of exposure, with maternal or paternal proximity to spraying, residential proximity to agricultural production, employment as agricultural labourers or directly spraying crops with agrochemicals indicative of an increase in congenital abnormalities. When abnormalities are found to be associated with male exposure, this occurs in the time leading up to pregnancy and El Helaly et al (El-Helaly et al., 2011) found an increased risk of congenital malformations (OR: 3.42) in children born to fathers who had been occupationally exposed to pesticides during the peri-conception period. None of the studies reviewed identified a specific time window for male exposure.

A larger proportion of the studies that look at pesticides and congenital malformations associate this with maternal exposure. A Danish study (Wohlfahrt-Veje et al., 2011) enrolled women who had been referred to the Department of Occupational and Environmental Medicine for working in greenhouses while pregnant, into a longitudinal study of birth outcomes, and found a significantly higher prevalence of cryptorchidism than in the control group of unexposed mothers. In contrast, a case report presents evidence of three female farm workers who gave birth to babies with congenital malformations. The three women who had been working for the same tomato grower in Florida gave birth within 8 weeks of each other. All three were working during the period of organogenesis (days 14-59 of pregnancy). Two of

the three abnormalities were orofacial whilst the third child was born with the far more serious Tetra Amelia (absence of limbs) (Calvert et al., 2007).

Several studies did use biological samples to study exposure. One such study found an association between persistent elevated levels of pesticides in breast milk and cryptorchidism (Damgaard et al., 2006) and found an association between placenta blood of newborns, maternal and paternal exposure data and the same outcome (Fernandez et al., 2007). A more recent large scale study of NTDs which measured the placenta blood of babies born with NTDs, found a dose-response increase in anencephaly and spina-bifida where higher concentrations of Persistent Organic Pollutants (POPs) were associated with a higher risk of malformations (Ren et al., 2011).

#### *Pregnancy loss/miscarriage/Time to Pregnancy (TTP)*

As I mention above, congenital malformations (CM) are frequently also the cause of pregnancy loss, miscarriage and still birth or neonatal death. Bell et al report on the findings of a study into foetal death due to congenital abnormalities among mothers living in close proximity to pesticide applications in California (Bell et al., 2001). The study examined five pesticide classes and found a 'consistent pattern' with exposure during the 3<sup>rd</sup> and 8<sup>th</sup> week of pregnancy leading to foetal death from congenital abnormalities. A large study of non-agricultural exposure of DDT (dichlorodiphenyltrichloroethane) confirmed these findings (Venners et al., 2005).

Numerous interlinked effects can occur in relation to pregnancy loss and pesticides, all probably variations on the theme of miscarriage due to congenital or embryonic malformations but studied and measured in different ways. Since miscarriage, particularly before pregnancy has been identified, is difficult to measure, several authors measured time to pregnancy (TTP) and workplace exposure data and found an increase in time to pregnancy among female agricultural workers (Bretveld et al., 2006, Abell et al., 2000, Thonneau et al.,

1999). Increased TTP was also found in the wives of male greenhouse workers exposed to pesticides, suggesting a reduction in male fertility also affects time to pregnancy (Petrelli and Figa-Talamanca, 2001).

Most studies of pregnancy look at exposure in the female workforce, but one study by Garry et al. found an association between increased risk of miscarriage (1.6-2 fold increases) during the spring, when herbicides are applied and a declining number of male births among the spouses of pesticide applicators, suggesting the loss of male foetus (Garry, 2004). The authors associate these linked findings with male exposure to pesticides, suggesting that malformed spermatozoa are the cause of these problems.

There is also considerable research on declining male fertility that studies biological samples, measured mostly in terms of sperm count and quality, that is probably also a factor in miscarriages and TTP. A study of male Malaysian farmworkers found reduced concentrations and motility of sperm and greater sperm abnormalities among farm workers who had been exposed to pesticides than among farm workers who did not come into contact with pesticides (Hossain et al., 2010). Two other studies found an association between sperm parameters and urinary pesticide levels and the poorest semen quality was found among subjects with the highest exposure to OP pesticides (Perry et al., 2007, Perez-Herrera et al., 2008) Findings such as these are supported by experimental studies with animals (Choudhary et al., 2008, Joshi et al., 2007, Ngoula et al., 2007).

**iii. Are there any clearly defined periods within which pesticides are most harmful?**

There is substantial evidence to support the hypothesis that maternal and paternal exposure to pesticides can interfere with sperm, egg and foetus development and adversely affect the process of embryogenesis resulting in congenital malformations, child developmental delays and spontaneous abortions as well as pre-term births and low birthweight (Acosta-Maldonado et

al., 2009, de Siqueira et al., 2010), although addressing specific questions of exposure timeframes and types of pesticides is more difficult. Pathways to foetal pesticide exposure are varied and multiple and this may happen before, during or after conception. Pesticides can affect sperm production and since men continually produce spermatozoa this can happen at any time after puberty. Women produce their eggs in vitro, thus in theory, pesticides can alter the development of a woman's ovum while she is still in her mother's uterus (Nilsson et al., 2008).

Many studies hypothesise that the most delicate time for the unborn baby in terms of harm from environmental exposures is during the first three months of pregnancy (Kristensen et al., 1997, Dunn et al., 2003, Nurminen, 1995). Dunn and Nurminen both document an association with sperm and ova mutagenesis, while Garcia and Stemp-Morlock suggest the possibility that pesticides can be harboured in the women's body, having built-up over the years, and released during pregnancy (Garcia, 1998, Stemp-Morlock, 2007). Others suggest the window of harm is smaller. As described above, Bell et al suggest the largest risk for foetal death, is between the 6<sup>th</sup> and 8<sup>th</sup> weeks of pregnancy, a time when many women are still unaware that they are pregnant (Bell et al., 2001).

Several studies have looked as the possibility of developmental delays in neonates who were born to exposed parents and in these cases exposure is not necessarily early on in pregnancy. Young et al found a positive association between exposure to OP pesticides and an increase in abnormal reflexes (Young et al., 2005). A Brazilian study that used an index of pesticide use as the exposure variable, found associations between increased pesticide use, low birth weight and prematurity, suggesting that exposure in late pregnancy can reduce nutrient transfer to the foetus through placenta calcification (de Siqueira et al., 2010). Their data suggest an incremental relationship between pesticide use during pregnancy and low birth weight. A Mexican study conducted with agricultural communities in the northern state of Chihuahua also found an association between birth weight and prematurity, placental calcification and

exposure to agrochemicals (Acosta-Maldonado et al., 2009). These studies suggest on-going low dose exposure during pregnancy is harmful to the foetus in a more generalised manner throughout pregnancy.

### **(iii) What evidence is there of this among agricultural workers in Mexico?**

As is the case elsewhere, numerous studies conducted in Mexico found indication of elevated levels of pesticide in the blood and the body but do not link these directly to health outcomes. These are studies that used biomarkers in the blood (Gamlin et al., 2007, Tinoco-Ojanguren and Halperin, 1998), breast milk (Martinez-Valenzuela et al., 2009) and cells (Rodas-Ortiz et al., 2008) to assess exposure but did not directly associate these with measured medical or biomedical outcomes. To some extent this reflects the fact that Mexico is a country with limited technological or economic capacity for conducting costly chemical assays or complex epidemiological studies, as I discuss later in this chapter.

The Mexican National Institute of Public Health (INSP) has been coordinating a study of NTDs since 2000 and has published a series of papers demonstrating their relationship with different risk factors, socio-economic status, previous miscarriage and type of employment (Blanco Munoz et al., 2005, Blanco-Munoz et al., 2006, Lacaiana et al., 2006). A positive association between employment in agricultural work and risk of anencephaly was identified by analysing data from the Epidemiological Surveillance System of Neural Tube Defects, focussing on exposure during the three months before and one month after a woman's last menstrual period (Lacaiana et al., 2006). More recently the same research team has studied men from Morelos state working on flower plantations. Among their early findings are that occupationally exposed men have lower LH (hormone) serum levels when exposed to larger amounts of DETP (diethyl phosphate –a compound found in OP pesticides) measured in urine metabolites (Blanco-Munoz et al., 2010). In a separate publication the same research team report an association between DAP (dialkylophosphate) metabolites in urine

and TSH and T(4) hormones (Lacasana et al., 2010) suggesting that the OP pesticides used in these plantations act as endocrine disruptors. Recio et al found similar association between serum levels in sex hormones and exposure to OPs (Recio et al., 2005).

A number of smaller studies conducted in Mexico found associations between aspects of reproduction and exposure to pesticides. In a second study also in Morelos state but with a different population, Torres Sanchez et al found an association between anogenital distance in newborns and urine metabolites measured in pregnant women during the first trimester of pregnancy, concluding that occupational exposure to pesticides can affect the anal position of male infants, while in Campeche state, southern Mexico, Sanchez Peña et al found an association between OP metabolites in the urine and reduced sperm quality and maturity among agricultural workers (Torres-Sanchez et al., 2008, Sanchez-Pena et al., 2004).

In Chihuahua state in the north of Mexico, women who had been exposed to pesticides because they lived in an agricultural region or because their husbands worked in agriculture during the last trimester of pregnancy were found to have higher placental maturity than unexposed women. The authors of this study suggest this as an explanation for low birth weight among the newborns of exposed mothers, where the maturing of the placenta has restricted nutrient transport from the mother to the child (Acosta-Maldonado et al., 2009). Pesticides in umbilical cord blood were also studied in Veracruz State. Here samples of maternal blood, serum, adipose tissues and umbilical cords were analysed for the presence of DDT (Herrero-Mercado et al., 2011). The population studied were not specifically agricultural workers but urban and household spraying is common in this region to combat dengue.

A small number of studies have looked at non health related outcomes. Pesticide use is being studied in Morelos state and the INSP ([Mexican]National Institute of Public Health) research team has identified the types and proportions of OPs

and other EDCs that are being used (Schilmann et al., 2010). This data is useful for understanding which specific pesticides are causing most harm. Use of protective equipment was studied in Mexico, Guerrero and Puebla states where authors reported that only 2% of farmers correctly handled and used pesticides on a regular basis (Munoz and Albores, 2011).

**Table 2: Research on pesticides and health in Mexico**

<b>Author and Date</b>	<b>Location</b>	<b>Study design and Population</b>	<b>Exposure measure</b>	<b>Outcome measure</b>	<b>Findings/comments</b>
Rojas Garcia et al, 2011	Pesticide selling, Nayarit	Case control, pesticide retailers	Questionnaire on exposure	Complete blood analysis and self reported symptoms	AChE and haematological parameters lower in pesticide retailers than control group.
Lacasaña et al, 2010	Flower pickers, Morelos state	Cross sectional study flower growers	Pesticides measured in urine metabolites	Thyroid hormones	Increase in TSH and T(4) hormones correlated with increase in DAP (dimethylphosphate –an OP Pesticides).
Blanco Muñoz et al, 2010	Flower growing, Morelos state	Cross sectional study of flower growers	Pesticides measured in urine metabolites	Male hormone levels	DAP metabolites found to affect levels of inhibin B ( p=0.02) that can effect spermatogenesis.

<b>Author and Date</b>	<b>Location</b>	<b>Study design and Population</b>	<b>Exposure measure</b>	<b>Outcome measure</b>	<b>Findings/comments</b>
Martinez Valenzuela et al, 2009	Sinaloa state.	Case control agricultural workers and urban controls.	Years working in agriculture and exposed to Ops.	Nuclear abnormalities measured in buccal mucosa cells.	Significant differences between exposed and unexposed ( $p=0.001$ ) suggest indiscriminate use of pesticides causes genotoxic damage.
Acosta Maldonaldo et al, 2009	Chihuahua state	Cross sectional study pregnant women	Residential exposure to pesticides during third trimester pregnancy.	Placental maturity, birth-weight and prematurity.	Pesticide exposure positively correlated with Placenta Maturity Index and associated with birthweight and gestational age.
Rodas Ortiz et al, 2008.	Yucatan state	Case control study of breast feeding mothers	n/a	OP and PCB (Polychlorinated biphenyls), pesticides in Breast milk swabs.	Pesticides are present in high levels in human breast milk, possibly a depuration mechanism for OPs.

<b>Author and Date</b>	<b>Location</b>	<b>Study design and Population</b>	<b>Exposure measure</b>	<b>Outcome measure</b>	<b>Findings/comments</b>
Torres Sanchez et al, 2008	Four municipalities Morelos state.	Cross section pregnant women	Urine metabolites in pregnant woman	Anogenital distance (AGD) in new-borns	Increases in pesticide metabolites during first trimester associated with reduction of -0.02 (p= 0.02) AGD in male offspring.
Cortes Genchi et al, 2008	Guerrero State	Cross sectional study agricultural workers	Type of agricultural activity, washing and changing clothes.	Illness symptoms- headaches, itchiness, numbness etc.	23% of workers presented symptoms of intoxication, this was higher among workers over 42 years.
Gotlin et al, 2006	Nayarit state	Cross sectional study child workers	Occupational exposure to pesticides	AChE (AcetylCholinEsterase)	33% of children had AChE depression of at least 15% during picking season when exposed to OP pesticides.

<b>Author and Date</b>	<b>Location</b>	<b>Study design and Population</b>	<b>Exposure measure</b>	<b>Outcome measure</b>	<b>Findings/comments</b>
Lacasaña et al, 2006	Nationwide, using Epidemiological Surveillance system of NTDs.	Case control study children born with anencephaly	Occupational exposure to pesticides (measured with questionnaire)	Congenital malformations (anencephaly)	Highest risk of anencephaly after maternal exposure (OR =4.57), risk for males highest when they applied pesticides (OR=2.50).
Recio et al, 2005.	Durango state.	Longitudinal study male agricultural workers	OP pesticides	Serum levels of sex hormones	OP pesticides disrupt endocrine activity with most effects in FSH and LH hormones.
Rendon Von Osten et al, 2004.	Campeche state	Cross sectional study in four farming communities	Use pesticides in subsistence farming.	AChE activity and Self reported symptoms poisoning.	AChE significantly lower than the reference group in 2/4 communities ( $p=0.05$ ). Carbamate pesticides more strongly associated with

<b>Author and Date</b>	<b>Location</b>	<b>Study design and Population</b>	<b>Exposure measure</b>	<b>Outcome measure</b>	<b>Findings/comments</b>
					symptoms than OPs.
Sanchez Peña, 2004.	Durango state	Cross section male agricultural workers with different activities	Pesticides measured in urine metabolites.	Sperm motility, morphology, concentration, viability and maturity.	Significant association between urinary pesticides and DNA fragmentation index ( $p=0.002$ ), measured in semen.
Medina Carrillo et al, 2002	Nayarit state.	Case control hospital study of births.	Agricultural labour.	Congenital malformations (CM) (all types)	Mothers employed in agriculture are more likely to have given birth to children with malformations than mothers in other types of employment (OR =3.61).
Guillette et al, 1998	Yaqui Valley, NW Mexico	Anthropological case control study of children	Environmental exposure to pesticide run off	Numerous cognitive and intelligence measures	Children from the exposed group

<b>Author and Date</b>	<b>Location</b>	<b>Study design and Population</b>	<b>Exposure measure</b>	<b>Outcome measure</b>	<b>Findings/comments</b>
				and growth.	performed worse in memory, stamina, coordination and ability to draw a person.
Tinoco Ojanguren, 1998	Chiapas state	Cross sectional study in peasant communities	Occupational exposure to pesticides	AChE	AChE enzymes significantly lower during periods of exposure ( $p=0.0001$ ).
Studies in non agricultural settings					
Herrero Mercado et al, 2011	Veracruz state.	Paired analysis of maternal and child biological samples	None specified	Presence of pesticides in maternal blood serum, adipose tissue and umbilical cords.	Organochloride pesticides and DDT found in all samples, demonstrating how these chemicals are carried across the umbilical cord to the

<b>Author and Date</b>	<b>Location</b>	<b>Study design and Population</b>	<b>Exposure measure</b>	<b>Outcome measure</b>	<b>Findings/comments</b>
					unborn child.
Studies with non health related outcomes					
Blanco- Muñoz et al, 2011	Agricultural workers in Mexico, Puebla and Guerrero states	Case control study mothers of children born with anencephaly	Use of personal protective equipment	n/a	Agricultural workers found to handle 59 commercial brands of pesticides with 33 active ingredients. Only 2% handled them correctly.
Gonzalez Arias et al, 2010.	Use of pesticides in Nayarit state.	Descriptive study of pesticides use.			Insecticides are most used pesticides in Nayarit, of these 7% are OP chemicals. The most used chemical is Endosulfan.
Schilmann et al, 2009	Flower farms in Morelos state.	Cross sectional study of pesticides use.	n/a	n/a	Identified clear pattern of seasonal pesticide use

<b>Author and Date</b>	<b>Location</b>	<b>Study design and Population</b>	<b>Exposure measure</b>	<b>Outcome measure</b>	<b>Findings/comments</b>
					of 23 pesticides.

*What is known about pesticides in Nayarit and Jalisco states?*

According to the Mexican National Direction of Epidemiology, in 2009 Nayarit had the highest recorded levels of pesticide poisonings in Mexico. The state also consistently records the nation's highest or second highest numbers of congenital malformations, mostly cleft lip and palate (Dirección General de Epidemiología, 2009). Three of the 17 studies of the health effects of pesticides were conducted in Nayarit. A prospective hospital based study of births in Nayarit found that women who work in the agricultural sector were 3.61 times more likely to give birth to a malformed baby than women who were not agricultural workers ( $=R\ 3.16\ 95\% CI\ 2.05-6.36\ p=<0.05$ ). These risks increased among women who lived close to agricultural fields where pesticides had been applied (Medina-Carrillo et al., 2002). A large study of pesticide exposure among tobacco workers in the Santiago Ixquintla region measured serum levels of AChE (acetylcholinesterase) in workers during the tobacco harvest (exposed) and compared these to post harvest measures (unexposed). The authors found a significant reduction in levels of AChE during the harvest which was more marked in farmers who applied the pesticides than among the workers who picked them and more marked among young indigenous women than men (Díaz Romo, 2002). A second analysis of this data focussing on children found AChE declined by at least 15% among 76% of the children and by more than 15% amongst the remainder of children during the harvest season (Gamlin et al., 2007). Acetyl Cholinesterase is an enzyme involved in neurotransmission, when it is depressed or inhibited the neurotransmitter AcetylCholine builds up, impeding the process of neurotransmission. The effects of this can range from short term cognitive problems to permanent neurological damage or developmental delay (Chen, 2012). This 15% cut off point is significant in that it is cited as being the level at which neurological harm can be caused (Kwong, 2002). Because of its sensitivity to chemicals such as Organophosphates, AChE is mostly used as a biomarker of exposure where measuring the actual presence of neurotoxins such as pesticides is difficult or expensive as opposed to as a measure of harm.

Two other studies that look at pesticides in Nayarit were identified. Rojas Garcia et al conducted complete blood analyses of a cross section of pesticide sellers in the state and asked about self-reported health (Rojas et al., 2000). The authors found a significant difference ( $p=0.0001$ ) between the serum cholinesterase (BuChE) levels of pesticide sellers ( $n=83$ ) and controls ( $n=98$ ), with lower levels of ChE associated with more reported symptoms, specifically phlegm and unexplained chills. The study also looked at protective equipment and found an association between less protection and more reporting of weakness ( $p=0.05$ ). Haemoglobin levels were also significantly lower among pesticide sellers. This study is well complemented with a study of pesticides use in Nayarit, although the study did not look at the effects of pesticides it studied the types and compounds more frequently used and found that the most commonly used pesticides were insecticides, that 7% of these were Ops. The most commonly used substance was endosulfan, an organochloride and known EDC (Gonzalez Arias, 2010).

### **The inconclusive nature of evidence: systematic reviews and meta-analysis**

The research presented above focuses on studies that found a positive association between pesticides and health problems. However, evidence that continued low-medium level exposure to pesticides, such as that experienced by agricultural workers, is harmful to reproductive health, continues to be weak and even contradictory. Review papers that have specifically studied the reproductive health effects of contaminants on women (Mendola et al., 2008, Garcia, 2003, Stillerman et al., 2008), larger and more general systematic reviews of the health effects of pesticides (Wigle et al., 2008, Wigle et al., 2007) and meta analyses with similar research questions (Turner et al., 2011, Wigle et al., 2009, Romitti et al., 2007), describe the different associations between pesticides and diverse health outcomes and toxicity routes. However, despite identifying a large number of studies that find a positive relationship, they affirm that evidence remains inconclusive or ‘weak’. This lack of definitive

evidence has major consequences at the level of international policy making, national and local environmental regulation and policing of pesticide use. One of the most significant was the 2006 World Health Organisation declaration that DDT, an Organophosphate insecticide, should continue to be used in the home to combat malaria, on the basis that the possible effects of pesticides are less of a health risk than malaria itself. As with other pesticides, evidence that the DDT used in the home to combat malaria vectors is harmful to human health, continues to be contradictory (see for example Bouwman et al., 2011, Van Dyk et al., 2010 and Bimenya et al., 2010 for discussion of this issue).

Authors of these reviews and meta-analyses agree that a lack of evidence that pesticides are causing harm to the reproductive system does not suggest that these are largely benign. On the contrary, this research has been conducted by researchers who wish to prove an association so that this can be used as political/policy leverage and emphasises that further, more advanced and more long term research is needed in order to identify how and what sort of harm pesticides cause (Wigle et al., 2007, Wigle et al., 2008). Garcia, for example, talks about there being 'inadequate evidence for either establishing a relationship or rejecting it', while Romitti who conducted a meta-analysis of pesticides and orofacial clefts and found a 'modest but marginally significant risk of clefting', suggests future studies can be improved in order to validate this finding (Romitti et al., 2007). Stillerman concludes that evidence that environmental exposure can cause adverse pregnancy outcomes are 'suggestive' of an association but that further research is needed (Stillerman et al., 2008). Others argue that research into pesticides and reproductive health is quite simply still in its infancy, suggesting that science is still exploring the complexities of hormones and the endocrine system and how these can be affected by, for example, EDCs (Jacobs, 2001, Lyons, 2000).

This assertion that research into pesticides and human reproduction is still in its early stages is supported by the fact that *in vitro* and *in vivo* studies are

providing more conclusive evidence that pesticides are interfering with animal reproductive processes (Tiemann, 2008, Tiemann and Danicke, 2007). New research that helps us understand these relationships is continually emerging on three distinct scientific levels: *in vitro* research with chemical compounds and pesticides, *in vivo* studies with live laboratory animals and in the field or clinic and epidemiological studies with exposed humans. *In-vitro* (experimental studies using laboratory vessel) biochemical research is currently analysing chemical substances in the environment for evidence that they are potentially harmful to the human endocrine system. Orton et al added to the list of potentially harmful pesticides by analysing potential 'candidates'. These were tested *in vitro* for androgen receptor antagonism (whether they have the potential for endocrine disruption) and nine previously untested pesticides were found to have anti-androgenic activity (Orton et al., 2011). The authors strongly recommend *in-vivo* testing of these nine pesticides concluding that the lack of human bio-monitoring data for environmentally relevant pesticide presents a barrier to current risk assessment of pesticides to humans. A study with similar findings was conducted in relation to three types of pyrethroid pesticides not previously known to have EDC effects (Sun et al., 2007).

A recent *in-vivo* study of laboratory mice found evidence that male mice develop chromosomal abnormalities affecting their reproductive system after in-utero exposure to the fungicides Vinclozolin and Methoxychlor (OPs used in insecticides), and that these abnormalities can be passed on intergenerationally (Nilsson et al., 2008). The authors found chromosomal reproductive system defects in exposed mice leading to reduced fertility. These defects were also found to be epigenetic, affecting second and third generations of offspring. In the female mouse line they identified an elevated number of abnormal pregnancy outcomes leading to death caused by a condition similar to preeclampsia in humans. The authors of this study conclude that 'environmental factors can induce an epigenetic transgenerational phenotype through an apparent reprogramming of the male germ line'. A transgenerational increase in

pregnancy abnormalities, multiple foetal death and early onset of labour were also been found in rats exposed to vinclozolin (Stouder and Paoloni-Giacobino, 2010).

Finally, a prospective case controlled study of neural tube defects (NTDs) in a Chinese population found an incremental association with levels of largely OP pesticide compounds in placenta blood. Higher levels of DDT and other pesticide compounds in the placenta was not only associated with a 4.25 fold increase in NTDs, but this risk increased when larger amounts of the chemical were found (Ren et al., 2011). Using the lowest quartile of chemical concentration as a baseline, concentrations in the fourth quartile presented a 11.7 fold increased risk of NTDs. As the authors argue, previous studies of NTDs have tended to rely on self-reported or ecological exposure and have not been large enough to identify a dose response. A large scale study of garment workers in China exposed to DDT also found an increased risk of pregnancy loss of 1.17 (CI 1.05-1.29), which they defined as a termination of pregnancy *before* clinical detection of pregnancy, among exposed compared to unexposed women (Venners et al., 2005). Prospective studies of this size are extremely difficult to implement which is the main reason why they are so rare.

These three studies are on the cutting edge of research into pesticides and reproductive health outcomes although, as I discussed above, they are supported by a large quantity of smaller, weaker or less decisive research. Pesticides affect reproduction largely through the endocrine system. By operating as synthetic hormones EDCs mimic the actions of endogenously generated hormones or chemical messengers and confuse the system (Jacobs, 2001). The endocrine system, comprising many organs and producing different hormones, is extremely weak in the developing foetus, allowing foreign substances to easily permeate cells and pass the thin brain-blood barrier (Eskenazi et al., 2007). EDCs can disrupt the regulation of cell growth, metabolism, reproduction and development and because developing foetus' are

so susceptible, this can happen at very low levels of exposure. Unlike plant based hormone mimicking substances such as soya that are excreted within hours or days, EDCs have a long half-life (the period of time that they are retained in the body) and can be stored and accumulate in bones and tissue for many years. DDT for example, has been found excreted in breastmilk as long as 4.2 -5.6 years after exposure (Smith, 2000).

It should be unsurprising that pesticides have these effects on the reproductive system since this is what they are designed to do to pests, but proving that they also have this function in humans is complex, there are many confounding factors and our knowledge of this biological system remains incomplete. Since people do not begin reproducing until after puberty, many of the effects caused by exposure *in utero* or during early childhood will not be evident until puberty is completed. Below I discuss the many complexities of establishing the effects of pesticides on the reproductive system, beginning with the biological assessment of pesticide exposure and then discussing the difficulties of associating these measurements with health outcomes that may not happen anywhere near the time of exposure.

#### *Measuring pesticide harm*

In order to demonstrate that pesticides are causing harm to the reproductive system and reproductive outcomes, studies need to find a positive association between exposure and health outcomes. Although there are numerous means of testing the hypothesis of cause-effect relationship, the nature of pesticide exposure makes establishing causality very difficult since both exposure and outcomes are complicated to measure (Garcia, 2003, Garry, 2004, Wigle et al., 2009, Peiris-John and Wickremasinghe, 2008).

Exposure can be established by linking pesticide presence in the environment or things we come into contact with, with measurable health outcomes such as congenital malformations, pregnancy intervals or reductions in sperm count. It

can also be measured using biomarkers (measurable biochemical alterations in the body) such as blood or plasma cholinesterase or by directly measuring its presence in the body by analysing blood, urine, saliva or hair. As in this study, exposed populations are often migrant workers. This makes baseline (unexposed) measurements very difficult to obtain because data must be collected in two different times and places (before they migrate and later when they are working) while longitudinal studies, the only accurate means of assessing the health effects of workers, are complicated to conduct with high proportions of participants often lost to follow-up (Sosan et al., 2010).

The most frequently used biological indicators of exposure are biomarkers and one of the most commonly used to assess exposure is AChE, with the reduction of AChE levels suggesting exposure to pesticides. This ‘depression’ can be assessed by measuring levels of AChE in blood plasma, serum or erythrocytes before and after exposure. Although the test is simple to perform, identifying AChE *depression* is complicated because of the large inter-individual variation in AChE levels and the lack of a standard ‘normal’ level. This inter-individual variability means that an individual change in AChE can only be measured against itself, through before and after testing.

The 1995-7 study conducted by the NGO Huichols and Pesticides found AChE declining to as much as 40% below its original level (Gamlin et al., 2007, Díaz Romo, 2002), suggesting a huge variation in levels of depression. AChE levels are as much due to environmental factors as to individual variation and both body size and nutritional status can have an impact. AChE depression may be a useful indicator of the neurotoxic effects of certain pesticides but it remains difficult to link this biomarker to physiological outcomes such as reductions in sperm count, miscarriage, congenital malformations or long term neurological damage since these need to coincide with the event (in this case, depression of AChE). This is particularly complicated in the case of migrant workers because of the seasonal nature of their work. In the case of these Huichol workers they

may, for example, be exposed between January and April then miscarry in June, when they are no longer exposed to pesticides and their AChE levels have returned to normal.

Other measurements include 'pesticide load' that can be assessed through urine metabolite or blood analysis and will tell us precisely which compounds have been or are present in the body. Metabolite measurement, probably the most accurate measure of exposure, is exceedingly expensive and so has rarely been conducted in sufficient quantities to be able to demonstrate a significant association with health outcomes, particularly in poorer countries. Again, these measurements will not give a direct indication of the health effects of exposure and are equally fraught with methodological difficulties such as the short half-life of pesticides in urine and saliva. The 'half-life' of pesticides can be as short as a few hours, while serious outcomes often cannot be demonstrated until considerably later, thus in the case of cancers or congenital malformations, by the time the problem has been identified, the pesticides have probably long since left the body.

Measuring 'outcome' is equally fraught with methodological difficulties. For a study to reveal a clear causal relationship it needs to combine exposure measurements with health outcomes, yet, with the possible exception of male sperm count and spontaneous abortion, because most effects are chronic, uncommon or only identified years later, these rarely coincide. Unless the person is permanently exposed to pesticides, medium and long term effects such as congenital malformations and on-going fertility problems are more likely to occur in the months or years following exposure. These outcomes and exposures can only be linked with long term epidemiological or surveillance data.

In addition to the issue of timing, other problems with assessing causality include the 'rarity' of events such as congenital malformations (CMs). To identify an increase in the rates of CMs among, for example, a sample of

agricultural workers or a large cohort in an agricultural area would need to participate over a relatively long period of time. For this reason most studies linking pesticides and congenital malformations have been conducted using secondary data sets such as census or hospital data, but recall or ecological data as an indicator of exposure provides less robust results than could be generated using biomarkers. Events such as spontaneous abortion are less rare, but a large sample would still be needed to make any statistical analysis meaningful. These many methodological difficulties do go some way to explaining why research into the effects of pesticides on human reproductive health is still considered weak or inconclusive, lacking the scientific weight needed to influence international policy guidelines.

#### **iv. Questionnaires**

##### **Cuestionario para jornaleros del tabaco (Versión 4)**

Fecha:

Nombre de Entrevistador:

Introducción: este debería incluir todos los puntos abajo mencionados

Hola! Soy Rosa/Juan Antonio....de la comunidad de Pueblo Nuevo y trabajo con el Comité de Salud Werika de Tuapurie. Estamos aquí investigando sobre el trabajo agrícola y sus riesgos para la salud de niños y mujeres embarazadas y quisieramos saber lo que usted sabe de esto.

El estudio tiene como objetivo desarrollar un programa comunitario de prevención y educación sobre los riesgos del trabajo agrícola en la salud y fue presentado ante la Asamblea Comunitaria de Tuapurie en Noviembre del año pasado, como una de las actividades del Comité de Salud Werika, presidido por Juan Antonio González González..

Quisiéramos hacerle unas preguntas sobre la salud y sobre su trabajo. Cualquier información que nos pueda dar sería una gran ayuda. No hay respuestas buenas o malas y esta no es una prueba de ningún tipo. Si hay preguntas que no quiera contestar o si ya no quiere seguir respondiendo, por favor avísenos/me. Más adelante en la entrevista quisiéramos grabar sus respuestas para poder acordarnos mejor de ellas; pero sólo si usted nos lo permite.

Por último, su participación no va afectar su trabajo aquí en el tabaco y no vamos a compartir la información que nos dé con otras personas, pero sí presentaremos un informe en la Asamblea de Tuapurie a principios del año que viene.

Si tiene alguna pregunta por favor díganos.....

¿Quiere participar?

¿Podemos seguir con las preguntas?

## **I. Cuestionario**

### **A) .Observaciones**

- 1) Nombre del ejido.....
- 2) ¿Dónde duerme? (¿tienda de campaña? ¿Debajo de las sartas? ¿al aire libre?).....  
.....
- 3) Presencia de algún contenedor de agroquímicos o ‘mochila’ para la aplicación de químicos. SI / NO
- 4) Anota otras situaciones o condiciones que observes (enfermos, bañándose en agua de riego, relacionados con la higien).....  
.....  
.....  
.....

### **B. Información general**

- 1) Nombre del/la jornalero/ra  
.....
- 2) Edad (puede ser aproximada).....
- 3) Sexo: Mujer /Hombre
- 4) Comunidad de origen.....
- 5) Años de escolaridad (¿hasta qué año estudiaron?).....
- 6) ¿Sabe leer y escribir?.....
- 7) ¿Quien o quienes te acompañan?

- a. Esposo o esposas.....
  - b. Numero de hijos y hijas con edades y sexo incluido. (EJEMPLO: 'i) Niño 3 años, ii) Niña 5 años ).  
 i)..... ii)..... iii) ..... iv).....  
 v)..... vi) ..... vii)..... viii).....
  - c. Número total de *otros* familiares (hermanos, primos, cuñadas, tíos, sobrinos etc)  
 i) TOTAL NIÑOS..... ii) TOTAL  
 ADULTOS.....
- 8) ¿Actualmente tienes cargo en tu comunidad de origen? SI/ NO  
*a) (si la respuesta es SI) ¿Qué cargo tienes?.....*
- 9) ¿Cuánto dinero esperan poder llevar a la Sierra cuando termine el corte? (puede ser una aproximación).....
- 10) ¿Para qué van a usar el dinero que ganen en el corte de tabaco?.....

### **C. Información laboral**

- 1) ¿Cuándo llegó a la costa (aproximadamente?).....
- 2) ¿Hasta cuándo se van a quedar?.....
- 3) ¿Cómo viajó a la costa?  
 a. Modo de transporte.....  
 b. Ruta.....
- 4) ¿Cuál es el nombre del patrón con quién está trabajando?.....
- 5) ¿Es la primera vez que viene a cortar tabaco? Si/ No

*Si la respuesta es Sí entonces pasa a la pregunta 6; si la respuesta es No, entonces pide que te respondan las preguntas a) y b). únicamente para quienes responden *NO* a la pregunta*

- a. ¿Aproximadamente cuántas veces ha venido al corte de tabaco?.....
- b. ¿Cuándo vino por primera vez?.....
- 6) ¿A cuánto se está pagando la sarta aquí? .....
- a. ¿Aproximadamente cuántas sartas hacen por día?.....
- 7) ¿Cuantas personas de su grupo familiar están trabajando?  
Total niños..... Total adultos.....
- 8) ¿Dónde se quedan a dormir?  
.....  
.....  
.....
- 9) ¿Dónde se Bañan?.....
- 10) ¿El patrón les da agua potable o comida? SI/NO  
Especifica que.  
.....
- 11) Dónde consiguen su  
comida?.....  
.....
- 12) ¿Si se enferman aquí en la costa, qué hacen?.....  
.....

- 13) ¿Sus hijos asisten a los centros Florece durante el día? SI/ NO.
- a. Qué edades tienen los niños que atienden el centro Florece? (*ej Niña 3 años*)
- b. 1..... 2..... 3.....  
4..... 5..... 6.....
- 14) Participan en otras cosechas? (por ejemplo el frijol, chile, tomate o caña?)  
¿Qué?....., ¿Dónde?.....
- 15) ¿Que otros ingresos tienen? (Oportunidades, venta de artesanía, ganado u otro).....  
.....
- 16) ¿Utilizan algún agroquímico, fertilizante u otros productos en su milpa?  
.....  
.....

## **II. Listas libres.**

---

Nos gustaría saber cuáles son las principales enfermedades que padecen ustedes y sus hijos.

*Aquí lo que queremos son listas, que mencionan por nombre todas las enfermedades o problemas que, según ellos, son los más frecuentes o importantes.*

### **1. Enfermedades generales**

Podrías empezar por mencionar las enfermedades más comunes que sufre su comunidad, tanto cuando están en la Sierra como cuando viajan a otras partes.

- 1.....
- 2.....
- 3.....
- 4.....
- 5.....
- 6.....
- 7.....
- 8.....
- 9.....
- 10.....

**2.6. En su opinión cuales son los principales causas de enfermedad en su comunidad?**

Lista de posibles causas

- 1.....
- 2.....
- 3.....
- 4.....
- 5.....
- 6.....
- 7.....
- 8.....
- 9.....
- 10.....

**3. Enfermedades infantiles.** Podrías mencionar las principales enfermedades que sufren los niños y los bebes de su comunidad.

Lista de enfermedades infantiles

- 1.....
- 2.....
- 3.....
- 4.....
- 5.....
- 6.....

- 7.....
- 8.....
- 9.....
- 10.....

**4. En su opinión, cuales son los principales *causas* de problemas de salud de niños, niñas y bebes?**

Lista de posibles causas

- 1.....
- 2.....
- 3.....
- 4.....
- 5.....
- 6.....
- 7.....
- 8.....
- 9.....
- 10.....

**LEER ESTA PARTE:** Ahora quiero preguntar sobre los problemas que hombres y mujeres pueden tener relacionados con el proceso de embarazo. Esto incluye el proceso de concepción (el momento de hacer el bebe), las partes del cuerpo que usamos para hacer bebes, el embarazo mismo y cuando nace el bebe.

### **5. Problemas de salud reproductiva**

Primero, ¿conocen de algunos problemas relacionados con la salud de las partes del cuerpo que tenemos para la reproducción?

Lista de enfermedades:

- 1.....
- 2.....
- 3.....
- 4.....
- 5.....
- 6.....
- 7.....
- 8.....
- 9.....
- 10.....

### **6. Problemas de salud durante el embarazo.**

En cuanto al embarazo mismo. ¿Cuáles son los principales problemas que tienen en la salud relacionada con el proceso de embarazo y del parto?

Lista de enfermedades:

- 1.....
- 2.....
- 3.....
- 4.....
- 5.....
- 6.....
- 7.....
- 8.....
- 9.....
- 10.....

**7. En su opinión, cuales son los *causas* de los problemas de salud relacionados con el proceso de reproducción y del embarazo mismo?**

Lista posibles causas:

- 1.....
- 2.....
- 3.....
- 4.....
- 5.....
- 6.....
- 7.....
- 8.....
- 9.....
- 10.....

Y, POR ÚLTIMO a lo mejor saben que se usan plaguicidas y fertilizantes en el cultivo de tabaco, y queremos saber qué saben ustedes de los efectos que ellos pueden tener en la salud .

**8. Saben de algún problemas de salud relacionados con el contacto con las plaguicidas y fertilizantes (agroquímicos?)**

**Lisa de enfermedades:**

- 1.....
- 2.....
- 3.....
- 4.....
- 5.....
- 6.....
- 7..... 8
- .....
- 9.....
- 10.....

Muchísimas GRACIAS!!!!

### **III. Preguntas abiertas (segunda, tercera o cuarta visita).**

*Para esta parte es importante:*

- 1) *Sentir que la persona a quien se entrevistas siente algo de confianza en nosotros.*
- 2) *Pedir permiso para usar la grabadora; aquí es muy importante que le recuerdes que sólo se hará con su permiso y que es para que tú puedas recordar mejor las respuestas que te den.*
- 3) *Explicar que lo que queremos es que nos contestan según sus propias conocimientos y experiencias.*
- 4) *Recordarles que esto no es una prueba, no hay respuestas correctas ni incorrectas, lo que nos interesa es saber lo que ellos piensan.*

*Puedes hacer las preguntas de diferente manera, e indagar sobre el tema utilizando diferentes palabras.*

*Si dan respuestas muy breves sería importante darles un poco más explicación sobre la pregunta (incluso dar ejemplos) y pedirles mas información, por ejemplo preguntando ‘nos puedes decir algo más sobre esto’, o ‘puedes explicar un poco más sobre lo que dices acerca de este asunto...’.*

**PRENDER GRABADORA** (*recuerda que es sólo en caso de que ya te hayan dado su consentimiento, NUNCA si te han dicho que no quieren grabadora*).

- 1) Tiene usted hijos o hijas? Podrías platicarnos un poco sobre como estuvieron sus embarazos?
- 2) Tuvo algún problema en embarazarse?
- 3) Tuvo algún problema con sus embarazos?
  - a. Si la respuesta ante 2 o 3 es ‘si’, pregunta qué hizo?
- 4) En su opinión ¿cuáles son las principales causas de problemas en la salud reproductiva y en la salud materno-infantil? (*dar explicación de términos en caso de ser necesario*).
- 5) a) En su opinión ¿qué tendrían que hacer una mujer y un hombre para tener un embarazo sano?  
b) En su opinión ¿qué tendrían que hacer una mujer y un hombre para tener un bebe saludable?
- 6) ¿Qué sabe de los riesgos en la salud por el uso de plaguicidas?
- 7) En su opinión ¿existe alguna manera en que los plaguicidas que utilizan en estas plantaciones de tabaco podrían llegar a afectar su salud y la salud de sus hijos o futuros hijos?

- 8) En su opinión, ¿existe alguna manera en que los plaguicidas podrían afectar a un bebe que aún no ha nacido? (Si su respuesta es positiva, sigue con la preguntas a)
- a. ¿De qué manera podrían afectar los plaguicidas a un embarazo o a un bebe que aún no ha nacido?
  - b. ¿Hay momentos durante el embarazo en que los plaguicidas pueden causar más daño?
  - c. ¿Han sabido de alguien que haya tenido problemas durante su embarazo?  
¿Nos puedes platicar un poco más sobre esto?
  - d.
- 9) ¿Qué otras cosas pueden causar enfermedades en los bebes durante el embarazo?

## Bibliography

- AGUIRRE BELTRÁN, G. 1991. *Regiones de refugio : el desarrollo de la comunidad y el proceso dominical en Mestizoame\0301rica, Me\0301xico, D.F., Fondo de Cultura Econo\0301mica.*
- AGUIRRE BELTRÁN, G. 1994a. *Antropología Medica*, Mexico City, Instituto Nacional Indigenista/ CONACULTA.
- AGUIRRE BELTRÁN, G. 1994b. *Programas de salud en la situación intercultural*, México D.F., Fondo de Cultura Económica/ Instituto Nacional Indigenista/ Gobierno del Estado de Veracruz.
- ANDERSSON, N., PAREDES, S., LEGORETTA, J.LEDOGAR, R. 1992. Who pays for measles? The economic arguments for sustained immunization. *Health Policy and Planning*, 7, 352-363.
- ANGUIANO FERNÁNDEZ, M. El cambio de varas entre los Huicholes de San Andrés Cohamiata, Jalisco. *Anales de Antropología*, 2011.
- ARCURY, T. A., QUANDT, S. A., CRAVEY, A. J., ELMORE, R. C. & RUSSELL, G. B. 2001. Farmworker reports of pesticide safety and sanitation in the work environment. *Am J Ind Med*, 39, 487-98.
- BABB, S. L. 2001. *Managing Mexico : economists from nationalism to neoliberalism*, Princeton, N.J. ; Oxford, Princeton University Press.
- BAER, H. A., SINGER, M. & JOHNSEN, J. H. 1986. Toward a critical medical anthropology. *Soc Sci Med*, 23, 95-8.
- BAER, R. D. & PENZELL, D. 1993. Research report: susto and pesticide poisoning among Florida farmworkers. *Cult Med Psychiatry*, 17, 321-7.
- BAEZ JORGE, F. 1996. Kauymáli y las vaginas dentadas (Aproximación a la mitología huichola desde la perspectiva de un héroe civilizatorio). *La Palabra y el Hombre*, octubre-diciembre 1996, 101-119.
- BAEZ JORGE, F. 2009. Coordenadas etnologicas e historicas de las cosmovisiones mexicanas. *Contrapunto*, 4, 44-63.
- BALDWIN, J. D. 1988. Factors affecting AIDS-related sexual risk-taking behavior among college students. *The Journal of sex research*, 25, 181.

- BANDURA, A. 1997. *Self-efficacy : the exercise of control*, New York, W.H. Freeman.
- BARTOLOMÉ, M. A. 1997. *Gente de costumbre y gente de razón: las identidades étnicas en México*.
- BARTOLOMÉ, M. A. 1998. *Autonomías étnicas y estados nacionales*.
- BECKER, M. H., MAIMAN, L. A., KIRSCHT, J. P., HAEFNER, D. P. & DRACHMAN, R. H. 1977. The Health Belief Model and prediction of dietary compliance: a field experiment. *J Health Soc Behav*, 18, 348-66.
- BECKER, M. H., RADIUS, S. M., ROSENSTOCK, I. M., DRACHMAN, R. H., SCHUBERTH, K. C. & TEETS, K. C. 1978. Compliance with a medical regimen for asthma: a test of the health belief model. *Public Health Rep*, 93, 268-77.
- BENÍTEZ, F. *Los indios de Me\0301xico. (Tercera edición\0301n.)*, Me\0301xico: Ediciones ERA, 1971, 70.
- BENÍTEZ, F. 1968. *Los indios de Me\0301xico. (Segunda edición\0301n.)*, Me\0301xico: Ediciones ERA.
- BENÍTEZ, F. 1972. *Tierra incognita*, Me\0301xico, Ediciones Era.
- BENSON, P. 2008. EL CAMPO: Faciality and Structural Violence in Farm Labor Camps. *Cultural Anthropology*, 23, 589-629.
- BETTINGHAUS, E. P. 1986. Health promotion and the knowledge-attitude-behavior continuum. *Prev Med*, 15, 475-91.
- BHATIA, J. C. & CLELAND, J. 1995. Self-reported symptoms of gynecological morbidity and their treatment in south India. *Stud Fam Plann*, 26, 203-16.
- BIESELE, M. 1997. An ideal of unassisted birth: Hunting, healing, and transformation among the Kalahari Ju/'hoansi. *Childbirth and authoritative knowledge: Cross-cultural perspectives*, ed. RE Davis-Floyd & CF Sargent, 474-92.
- BLANC, A. W., T 2005. Monitoring low birth weight: an evaluation of international estimates and an updated estimation procedure. *Bulletin of the World Health Organization*, 83, 178-185.
- BLANCO MUNÓZ, J., HERNANDEZ MUÑOZ, R., MONTIEL CERVANTES, A. L., HUERTA PEREZ, L., MEDINA CORONA, S., OJEDA VELAZQUEZ, M., CRUZ VALDEZ, A., DUBON TOME, F. J., RODRIGUEZ MARTINEZ, M. L., RECIO PEREZ, J. & ET AL. 1994. [Maternal mortality in the Huichol area of Jalisco state, Mexico. The Study Group on Maternal Mortality]. *Salud Publica Mex*, 36, 263-8.

- BLOK, A., JENSEN, M. & KALTOFT, P. 2008. Social identities and risk: expert and lay imaginations on pesticide use. *Public Understanding of Science*, 17, 189-209.
- BONFIL BATALLA, G. 1996. *Me\0301xico profundo : reclaiming a civilization*, Austin, Tex., University of Texas Press.
- BOURDIEU, P. 1977. *Outline of a theory of practice.(Esquisse d'une théorie de la pratique)*. Transl. by Richard Nice.(Repr.).
- BOURDIEU, P. 2004. Gender and symbolic violence. In: SCHEPER-HUGHES, N. B., P (ed.) *Violence in war and peace*. Oxford: Blackwell.
- BOURGOIS, P. 2002. The Violence of Moral Binaries. *Ethnography*, 3, 221-231.
- CAMPOS, R. 1992. *La Antropología Medica en Mexico*, Mexico Instituto Mora/ Universidad Autonoma de Mexico.
- CARLSON, E. D., ENGBRETSON, J. & CHAMBERLAIN, R. M. 2006. Photovoice as a social process of critical consciousness. *Qualitative Health Research*, 16, 836-852.
- CARTWRIGHT, E. 2001. *Espacios de enfermedad y sanación. Los Amuzgos de Oaxaca, entre la sierra sur y los campos agrícolas de Sonora*, Sonora, Mexico, El Colegio de Sonora.
- CASILLAS ROMO, A. 1996. The shaman who defeated e'tsa sickness. In: SHAEFER, S. F., P. (ed.) *The People of the Peyote. Huichol history, religion and survival*. Albuquerque: University of New Mexico Press.
- CASILLAS ROMO, A. 2000. *Nosología Mitica de un Pueblo. Medicina Tradicional*, Guadalajara, University of Guadalajara.
- CASTLEDEN, H., GARVIN, T. & FIRST NATION, H. 2008. Modifying Photovoice for community-based participatory Indigenous research. *Soc Sci Med*, 66, 1393-1405.
- CASTRO, R. 2000. *La vida en la adversidad: el significado de la salud y la reproducción en la pobreza*, Cuernavaca, Morelos, Universidad Nacional Autónoma de México.
- CASTRO, R., CAMPERO, L., HERNANDEZ, B. & LANGER, A. 2000. A study on maternal mortality in Mexico through a qualitative approach. *J Womens Health Gend Based Med*, 9, 679-90.
- CDI. 2009. *Los indicadores socioeconómicos* [Online]. Comision Nacional de Desarrollo de los Pueblos Indígenas. Available: [http://www.cdi.gob.mx/index.php?option=com\\_content&task=view&id=215&Itemid=54](http://www.cdi.gob.mx/index.php?option=com_content&task=view&id=215&Itemid=54) [Accessed 17-09-2012 2012].
- CDI. 2012. *Indicadores sociodemográficos de la población total y la*

- población indígena por municipio, 2005.* [Online]. Comision Nacional para el Desarrollo de los Pueblos Indígenas. Available: <http://www.cdi.gob.mx/cedulas/2005/JALI/14061-05.pdf> [Accessed 17-09-12 2012].
- CENTRAL INTELLIGENCE AGENCY, C. 2012. *World Factbook, Mexico* [Online]. Available: <https://www.cia.gov/library/publications/the-world-factbook/geos/mx.html> [Accessed 17/09/2012 2012].
- COMISION NACIONAL PARA EL DESARROLLO DE LOS PUEBLOS INDIGENAS, C. 2012. *Indicadores y estadísticas* [Online]. [Accessed 11/09/2012 2012].
- COMISION NACIONAL PARA EL DESARROLLO DE PUEBLOS INDIGENAS, C. 2010. La mortalidad materna indigena y su prevencion. . Mexico.: Comision Nacional para el Desarrollo de los Pueblos Indigenas, Programa de Naciones Unidas para el Desarrollo (PNUD), Gobierno Federal.
- CORDOVA, A. 1977. *La ideología de la revolución Mexicana*, Mexico City, Era.
- CORONA, S. 2008. Políticas educativas y libros de la SEP para indígenas. *Revista Electrónica Sinéctica*, 1-14.
- CORONADO SUZÁN, G. 1992. Educación bilingüe en México: propósitos y realidades. *International Journal of the Sociology of Language*.
- COVE, S. & PELTO, G. H. 1993. Focused ethnographic studies in the WHO programme for the control of acute respiratory infections. *Med Anthropol*, 15, 409-424.
- CROCKER SAGASTUME, R., COSÍO GONZÁLEZ, A., LÓPEZ LÓPEZ, M., RUIZ DOMÍNGUEZ, L., ANDRADE UREÑA, D. & GUTIÉRREZ GÓMEZ, Y. 2004. Interculturalidad alimentario-nutricional en la etnia Wixarika de México. *Revista Española de Salud Pública*, 78, 691-700.
- CRUZ, C., DE LA TORRE, R. & VELÁZQUEZ, C. 2006. *Evaluación externa de impacto del Programa Oportunidades 2001-2006: informe compilatorio*, Instituto Nacional de Salud Pública México.
- CSORDAS, T. J. 1988. Elements of charismatic persuasion and healing. *Medical anthropology quarterly*, 2, 121.
- CSORDAS, T. J. 1990. Embodiment as a Paradigm for Anthropology. *Ethos*, 18, 5-47.

- CURTIS, K. M., SAVITZ, D. A., WEINBERG, C. R. & ARBUCKLE, T. E. 1999. The effect of pesticide exposure on time to pregnancy. *Epidemiology*, 10, 112-7.
- D'SOUZA, M. S., SOMAYAJI, G. & SUBRAHMANYA NAIRY, K. 2011. Determinants of reproductive health and related quality of life among Indian women in mining communities. *J Adv Nurs*, 67, 1963-75.
- DAVIES, C. A. 1999. *Reflexive ethnography : a guide to researching selves and others*, London, Routledge.
- DAVISS, B. A. 1997. Heeding Warnings from the Canary, the Whale, and the Inuit. *Childbirth and Authoritative Knowledge: Cross-Cultural Perspectives*. Robbie E. Davis-Floyd and Carolyn F. Sargent, eds, 441-472.
- DE COCK, J., WESTVEER, K., HEEDERIK, D., TE VELDE, E. & VAN KOOIJ, R. 1994. Time to pregnancy and occupational exposure to pesticides in fruit growers in The Netherlands. *Occup Environ Med*, 51, 693-9.
- DEIN, S. 2007. Explanatory models and oversystematization in medical anthropology. In: LITTLEWOOD, R. (ed.) *On knowing and not knowing in medical anthropology*. California: Left Coast Press.
- DÍAZ DEL CASTILLO, B., CORTE\S, H. M. D. V. D. O. A. & LOCKHART, J. I. M. W. 1844. *The Memoirs of the Conquistador Bernal Diaz del Castillo, written by himself, containing a true and full account of the discovery and conquest of Mexico and New Spain [under Corte\S]. Translated ... by John Ingram Lockhart*, London, J. Hatchard & Son.
- DÍAZ POLANCO, H. 1996. *Autonomía regional: la autodeterminación de los pueblos indios*.
- DÍAZ ROMO, P. 2002. *Plaguicidas, tabaco y salud*, Proyecto Huicholes y Plaguicidas.
- DIGUET, L. 1992. *Por tierras occidentales entre sierras y barrancas*.
- DOUGLAS, M. 1973. *Natural symbols*.
- DUNN, A. M., BURNS, C. & SATTLER, B. 2003. Environmental health of children. *J Pediatr Health Care*, 17, 223-31.
- DURIE, M. 2004. Understanding health and illness: research at the interface between science and indigenous knowledge. *Int J Epidemiol*, 33, 1138-43.

- DURIN, S., ROJAS CORTES, A. 2005. El conflicto entre la escuela y la cultural Huichola. Translape y negociacion de tiempos. *Relaciones*, 148-190.
- ECKERSLEY, R. M. 2007. Culture, spirituality, religion and health: looking at the big picture. *Med J Aust*, 186, S54-6.
- EJÉRCITO ZAPATISTA DE LIBERACIÓN, N. 1994. *EZLN documentos y comunicados: 1o de enero/8 de agosto de 1994*.
- ELMORE, R. C. & ARCURY, T. A. 2001. Pesticide exposure beliefs among Latino farmworkers in North Carolina's Christmas tree industry. *Am J Ind Med*, 40, 153-60.
- EVANS-PRITCHARD, E. E. *Witchcraft, oracles and magic among the Azande*, [S.l.] : OUP., 1937 (1977).
- EVANS-PRITCHARD, E. E. 1972. *Witchcraft oracles and magic among the azande*, [S.l.], O.U.P.
- FABREGA, H., JR. 1975. The need for an ethnomedical science. *Science*, 189, 969-75.
- FAJARDO, H. 2003. Monetizacion de la economia indigena. El caso de los promotores wixaritari. *Revista del Seminario de Historia Mexicana*, 4, (none).
- FAJARDO, H. 2006. Y a nosotros, ¿cuándo nos van a examinar? La detección y atención del cáncer cérvico-uterino en comunidad indígena. Un asunto colectivo. . *Colección Monografías*.
- FAJARDO SANTANA, H. 2007. *Comer y dar de comer a los dioses terapeuticas en encuentro: conocimiento, proyectos y nutricion en La Sierra Huichola*, Lagos Moreno, Colegio de San Luis, Univerisdad de Guadalajara.
- FARMER, P. 1999. *Infections and inequalities : the modern plagues*, Berkeley ; London, University of California Press.
- FARMER, P. 2001. *Infections and inequalities : the modern plagues*, Berkeley ; London, University of California Press.
- FARMER, P. 2004. An Anthropology of Structural Violence. *Current Anthropology*, 45, 305-325.
- FARMER, P. 2005. *Pathologies of power : health, human rights, and the new war on the poor*, Berkeley, Calif. ; London, University of California Press.
- FARMER, P. E., NIZEYE, B., STULAC, S. & KESHAVJEE, S. 2006. Structural violence and clinical medicine. *PLoS Med*, 3, e449.

- FERNANDEZ HAM, P. 1993. [Infant mortality in the indigenous population: backwardness and contrasts]. *Demos*, 12-3.
- FERNÁNDEZ HAM, P., SANDOVAL ARRIAGA, A 2003. Políticas de población y pueblos indígenas. *Demos*, 26-27.
- FOSTER, G. M. & ANDERSON, B. G. 1978. *Medical anthropology*, New York ; Chichester, Wiley.
- FRANKENBERG, R. 1993. Risk: anthropological and epidemiological narratives of prevention. *Knowledge, power, and practice: The anthropology of medicine and everyday life*, 219-42.
- FREYERMUTH ENCISO, G. 2003. Las mujeres de humo : morir en Chenalhó : género, etnia y generación, factores constitutivos del riesgo durante la maternidad. México : Miguel Angel Porruá.
- FREYERMUTH, G., SESIA, P. 2009. *La Muerte Materna. Acciones y estrategias hacia una maternidad segura.*, CIESAS (Centro de Investigacion en Estudios Superiores en Antropologia Social), Casa Chata.
- FURST, P. T. 1966. *Myth as history: the Jimson weed cycle of the Huichols of Mexico*.
- FURST, P. T. 1967. *Huichol conceptions of the soul*.
- FURST, P. T. 1972. El concepto Huichol del alma. In: FURST, P. T. N., S. (ed.) *Mitos y Arte Huichol*. Mexico: SEP (Secretaría de Educación Publica).
- FURST, P. T. 1996. Myth as history, History as myth: a new look at some old problems in Huichol origins. In: SCHAEFER, S. B., FURST, PETER. (ed.) *People of the peyote. Huichol indian history, religion and survival*. Albuquerque: University of New Mexico Press.
- FURST, P. T. 2007. *Visions of a Huichol shaman*.
- GALTUNG, J. 1969. Violence, peace, and peace research. *Journal of peace research*, 6, 167.
- GAMLIN, J. 2009. Child labour in Latin America: theory, policy, practice. *The International Journal of Sociology and Social Policy*, 29, 118.
- GAMLIN, J., DIAZ ROMO, P. & HESKETH, T. 2007. Exposure of young children working on Mexican tobacco plantations to organophosphorous and carbamic pesticides, indicated by cholinesterase depression. *Child Care Health Dev*, 33, 246-8.

- GARCIA, A. M. 1998. Occupational exposure to pesticides and congenital malformations: a review of mechanisms, methods, and results. *Am J Ind Med*, 33, 232-40.
- GARCIA CHONG, N. R., SALVATIERRA IZABA, B., TRUJILLO OLIVERA, L.E., ZUNIGA CABRERA, M. 2010. Mortalidad infantil, pobreza y marginación en indígenas de los altos de Chiapas, México. *Ra Ximhai*, 6, 115-130.
- GARRO, L. C. 2000. Cultural meaning, explanations of illness, and the development of comparative frameworks. *Ethnology*, 305-334.
- GARRY, V. F. 2004. Pesticides and children. *Toxicol Appl Pharmacol*, 198, 152-63.
- GARRY, V. F., HARKINS, M. E., ERICKSON, L. L., LONG-SIMPSON, L. K., HOLLAND, S. E. & BURROUGHES, B. L. 2002. Birth defects, season of conception, and sex of children born to pesticide applicators living in the Red River Valley of Minnesota, USA. *Environ Health Perspect*, 110 Suppl 3, 441-9.
- GLEDHILL, J. 1995. *Neoliberalism, transnationalization and rural poverty: A case study of Michoacán, Mexico*.
- GODOY, J. V. H., R. 2007. Territorio wixarika. Invasion perpetua con nuevos disfraces.. *Ojarasca*, 131.
- GOFFMAN, E. 1968 *Stigma: notes on the management of spoiled identity*, Penguin
- GONZALEZ ROMAN, F. 2002. *La Condición Actual de la Mujer en Nayarit*, Tepic, Nayarit, Universidad Autonoma de Nayarit
- GONZÁLEZ SOBRINO, B. 2008. *Una lectura del cuerpo humano como entidad biológica y simbólica en el Gran Nayar*, Mexico, Instituto de Investigaciones Antropologicas, Universidad Nacional Autonoma de Mexico.
- GOOD, B. 1994a. *Medicine, rationality and experience*, Cambridge, Cambridge University Press.
- GOOD, B. 1994b. *Medicine, rationality, and experience : an anthropological perspective*. Cambridge: Cambridge: Cambridge University Press.
- GRAMMONT, H. C. 1999. *Empresas, reestructuración productiva y empleo en la agricultura mexicana*, Instituto de Investigaciones Sociales de la UNAM.
- GUTMANN, M. C. 2007. *The meanings of macho : being a man in Mexico City*, Berkeley, University of California Press.

- HECKATHORN, D. D. 2002. Respondent-Driven Sampling II: Deriving Valid Population Estimates from Chain-Referral Samples of Hidden Populations. *Social Problems*, 49, 11-34.
- HUNT, L., TINOCO OJANGUREN, R., SCHWARTZ, N., HALPERIN, D. 1999. Balancing risks and resources: applying pesticides without using protective equipment in Southern Mexico. In: R.A., H. (ed.) *Anthropology in Public Health*. New York: Oxford University Press.
- INSTITUTO NACIONAL DE ESTADISITICA Y GEOGRAFIA, I. 2005. *Censos y conteos de poblacion y vivienda* [Online]. Mexico: INEGI. Available: [http://www3.inegi.org.mx/sistemas/iter/entidad\\_indicador.aspx?ev=4](http://www3.inegi.org.mx/sistemas/iter/entidad_indicador.aspx?ev=4) [Accessed Various 2011].
- ITURRIOZ LEZA, J. L., GÓMEZ LÓPEZ, P. 2006. *Gramática Wixarika 1*, Muenchen, LINCOM
- ITURRIOZ LEZA, J. L. & RAMÍREZ DE LA CRUZ, J. 2012. *El proceso de traducción entre español y huichol*;
- JAMES, S., REDDY, S. P., TAYLOR, M. & JINABHAI, C. C. 2004. Young people, HIV/AIDS/STIs and sexuality in South Africa: the gap between awareness and behaviour. *Acta Paediatrica*, 93, 264-269.
- JÁUREGUI, J. 2003. *Flechadores de estrellas: Nuevas aportaciones a la etnología de coras y huicholes*.
- JENSEN, M. & BLOK, A. 2008. Pesticides in the risk society - The view from everyday life. *Current Sociology*, 56, 757-778.
- JORDAN, B. 1983. *Birth in four cultures*, Montre\0301al, Eden Press.
- JORDAN, B. & DAVIS-FLOYD, R. E. 1993. *Birth in four cultures : a crosscultural investigation of childbirth in Yucatan, Holland, Sweden, and the United States*, Prospect Heights, Ill, Waveland Press.
- KAUFERT, P. & O'NEIL, J. 1993. Analysis of a dialogue on risks in childbirth: clinicians, epidemiologists, and Inuit women. *Knowledge, power and practice: The anthropology of everyday life*. Berkeley: University of California, 32-54.
- KINDL, O. 2003. *La jícara huichola: un microcosmos mesoamericano*.
- KLEINMAN, A. 1978a. Concepts and a model for the comparison of medical systems as cultural systems. *Social Science & Medicine. Part B: Medical Anthropology*, 12, 85-93.
- KLEINMAN, A. 1978b. Concepts and a model for the comparison of medical systems as cultural systems. *Soc Sci Med*, 12, 85-95.

- KLEINMAN, A. 1981. The meaning context of illness and care: reflections on a central theme in the anthropology of medicine. *In: MENDELSOHN, E., ELKANA, Y. (ed.) Sciences and cultures.*
- KLEINMAN, A. 1995. Writing at the margin : discourse between anthropology and medicine. Berkeley; London: Berkeley; London : University of California Press.
- KLEINMAN, A. M. 1977. Depression, somatization and the "new cross-cultural psychiatry". *Soc Sci Med*, 11, 3-10.
- KOENIG, H. G. 2007. Religion, spirituality and medicine in Australia: research and clinical practice. *Med J Aust*, 186, S45-6.
- KRIEGER, N. 2008. Proximal, distal, and the politics of causation: what's level got to do with it? *Am J Public Health*, 98, 221-30.
- LAST, M. 1981. The importance of knowing about not knowing. *Social Science & Medicine. Part B: Medical Anthropology*, 15, 387-392.
- LEIGH, B., MWALE, T. G., LAZARO, D. & LUNGUZI, J. 2008. Emergency obstetric care: how do we stand in Malawi? *International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics*, 101, 107-111.
- LEMAISTRE, D. 1996. The deer that is peyote and the deer that is maize: the hunt in Huichol trinity,. *In: SCHAEFER, S. B. F., PETER. (ed.) People of the Peyote. Huichol indian history, religion and survival*. Albuquerque: University of New MexicoPress.
- LENKERSDORF, C. 1996. *Los hombres verdaderos: Voces y testimonios tojolabales*.
- LIFFMAN, P. M. 2011. *Huichol territory and the Mexican nation : indigenous ritual, land conflict, and sovereignty claims*, Tucson, University of Arizona Press.
- LIRA, R. 2013. *Unpublished PhD Thesis*. France patent application.
- LITTLEWOOD, R. 2007. *On knowing and not knowing in the anthropology of medicine*, Walnut Creek, Calif., Left Coast ; Oxford : Berg [distributor].
- LOCK, M. 1993. Cultivating the body: anthropology and epistemologies of bodily practice and knowledge. *Annual Review of Anthropology*, 22, 133.
- LOCK, M. M., SCHEPER HUGHES, N. 1996. A critical interpretative approach: Rituals and routines of discipline and dissent. *In:*

- SARGENT, C. F., JOHNSON, T.M. (ed.) *Medical anthropology, contemporary theory and method*. Westport, C.T.: Praeger.
- LÓPEZ AUSTIN, A. 1980. *Cuerpo humano e ideología*.
- LOPEZ, E. 1989. Women with high fertility in Mexico: orientations for a population policy. *Estudios Demográficos Urbanos*, 4, 75-115.
- LUANIALA, A. 2009. How much can a KAP survey tell us about people's knowledge, attitudes and practices? Some observations from medical anthropology research on Malaria in pregnancy in Malawi. *Anthropology Matters*, 11, 1-14.
- LUJAN, S. & LUIS, J. 2005. La calidad es nuestra, la intoxicación...¡ de usted. El Colegio de Michoacán, Colección Investigaciones, México.
- LUMHOLTZ, C. 1902. *Unknown Mexico: a record of five years' exploration among the tribes of the western Sierra Madre; in the tierra caliente of Tepic and Jalisco; and among the Tarascos of Michoacan*.
- MACPHAIL, C. & CAMPBELL, C. 2001. 'I think condoms are good but, aai, I hate those things': - condom use among adolescents and young people in a Southern African township. *Social Science and Medicine*, 52, 1613-1627.
- MADDEN, R. 2010. *Being ethnographic : a guide to the theory and practice of ethnography*, London, SAGE.
- MAHARAJ, P. & CLELAND, J. 2005. Risk Perception and Condom Use among Married or Cohabiting Couples in KwaZulu-Natal, South Africa. *International Family Planning Perspectives*, 31, 24-29.
- MARTINEZ, J. L., G. 2000. De la planificación familiar a la salud reproductiva. Madurez y retos para la nueva formulacion de un programa de la politica publica de salud y seguridad social. *Gestión y Política Pública*, 9, 397-412.
- MATA TORRES, R. 1982. *Matrimonio Huichol, integración y cultura*, Guadalajara, México, Universidad de Guadalajara.
- MEDINA-CARRILLO, L., RIVAS-SOLIS, F. & FERNANDEZ-ARGUELLES, R. 2002. [Risk for congenital malformations in pregnant women exposed to pesticides in the state od Nayarit, Mexico]. *Ginecol Obstet Mex*, 70, 538-44.
- MELLADO, V., ZOLLA, C. & CASTAÑEDA, X. 1989. *La atención al embarazo y el parto en el medio rural mexicano*, México, D.F., Centro Interamericano de Estudios de Seguridad Social.

- MENÉNDEZ, E. L. 1994. La enfermedad y la curación: qué es la medicina tradicional? *Alteridades*, 4, 71-83.
- MENÉNDEZ, E. L. 2002. *La parte negada de la cultura: relativismo, diferencias y racismo.*, Barcelona, Bellaterra.
- MENÉNDEZ, E. L. 2009. De racismos, esterilizaciones y algunos otros olvidos de la antropología y la epidemiología mexicanas. *Salud Colectiva*, 5, 155.
- MENÉNDEZ, L. E., GARCÍA DE ALBA, J.E. 1992. *Practicas populares, ideologia medica y participacion social : aportes sobre antropologia medica en Mexico* Guadalajara, Jal. , Universidad de Guadalajara, CIESAS.
- MEYER, L. 2005. *El Estado en busca del ciudadano: Un ensayo sobre el proceso político mexicano contemporáneo.*
- MIES, M. & SHIVA, V. 1993. *Ecofeminism*, Halifax, NS, Fernwood ; London : Zed.
- MIKHAIL, B. 1981. The health belief model: A review and critical evaluation of the model, research, and practice. *Advances in nursing science*, 4, 65.
- MORALES RODRÍGUEZ, J. A. 2004. *La Salud Reproductiva en Mujeres Wixaritari del Estado de Jalisco y su Contexto Geográfico.* Master in Public Health Epidemiology, Instituto Nacional de Salud Pública.
- MYERHOFF, B. G. 1974. *Peyote hunt : the sacred journey of the Huichol Indians*, Ithaca ; London, Cornell University Press.
- MYERHOFF, B. G. 1976. *Peyote hunt: The sacred journey of the Huichol Indians.*
- NADER, L. 2011. Ethnography as theory. *Journal of Ethnographic Theory*, 1, 211-219.
- NEIL, H. 1998. *The Chiapas rebellion: the struggle for land and democracy.*
- NEURATH, J. 2000a. El don de ver. El proceso de iniciacion y sus implicaciones para la cosmovisión Huichola. *Desacatos*, 005, 57-77.
- NEURATH, J. 2000b. Tukipa ceremonial centers in the community of Tuapurie (Santa Catarina Cuexcomatitlan): Cargo systems, landscape, and cosmovision. *Journal of the Southwest*, 81-110.
- NEURATH, J. 2002. *Las fiestas de la casa grande: Procesos rituales, cosmovisión y estructura social en una comunidad huichola.*
- NEURATH, J. 2003a. Cosmovisión y sexualidad en la fiesta Namawita Neixa en Keuruwita. In: JÁUREGUI, J. N., J. (ed.) *Flechadores de*

- estrellas.* Mexico: Instituto Nacional de Antropología e historia, Univerisidad de Guadalajara.
- NEURATH, J. 2003b. *Huicholes: Pueblos indígenas del México contemporáneo.*
- NEURATH, J. 2009. La boda del maíz y la fragilidad de la alianza. *Ciencias*, 34-40.
- NEURATH, J. & BAHR, D. 2005. Cosmogonic Myths, Ritual Groups, and Initiation: Toward a New Comparative Ethnology of the Gran Nayar and the Southwest of the U.S. *Journal of the Southwest*, 47, 571-614.
- NOAR, S. M. & ZIMMERMAN, R. S. 2005. Health Behavior Theory and cumulative knowledge regarding health behaviors: are we moving in the right direction? *Health Educ Res*, 20, 275-90.
- NURMINEN, T. 1995. Maternal pesticide exposure and pregnancy outcome. *J Occup Environ Med*, 37, 935-40.
- NUTBEAM, D. 1998. Health promotion glossary1. *Health promotion international*, 13.
- OBSERVATORIO MORTALIDAD MATERNA, O. 2010. *Mortalidad Materna en Mexico Numeralia 2010* [Online]. [Accessed 11/09/2012 2012].
- OBSERVATORIO MORTALIDAD MATERNA, O. 2012. *Indicadores nacionales* [Online]. [Accessed 11/09/2012 2012].
- OJARASCA 2007. Wixaritari de Tuapurie se oponen a la carretera Amatitan-Huejuquilla El Alto, Jalisco. Los razones de la comunidad. *Ojarasca*, 128.
- ORTIZ DE MONTELLANO, B. 2005. Medicina y salud en Mesoamérica. *Arqueología Mexicana*, xiii, 32-37.
- OSORIO, M. E. 1990. *Madres, médicos y curanderos: diferencia cultural e identidad ideológica.*, Mexico D.F, Mexico, Casa Chata.
- PACHECO DE LADRÓN, L. 1999. *Nomás venimos a malcomer. Jornaleros indios en el tabaco en Nayarit*, Universidad Autonoma de Nayarit.
- PACHECO DE LADRÓN, L. 2002. Género y sexualidad. Sexualidad y maternidad entre las wirrarikas de Nayarit, Mexico. In: GONZÁLEZ ROMÁN, F. (ed.) *La condición actual de la mujer en Nayarit*. . Tepic, Nayarit.: Universidad Autónoma de Nayarit.
- PELTO, J. P., PELTO, G.H. 1997. Studying knowledge, culture and behaviour in applied medical anthropology. *Medical anthropology quarterly*, 11, 147-163.

- PELTO, P. J. & PELTO, G. H. 1997. Studying knowledge, culture, and behavior in applied medical anthropology. *Med Anthropol Q*, 11, 147-63.
- PELTZER, K., MMUSI, S., PHASWANA, M. & MISI, T. 2006. Lay prototypes of illness among a nothern community in South Africa. *Social Behavior and Personality: an international journal*, 34, 701-710.
- PENN, H. 2002. The World Bank's View of Early Childhood. *Childhood*, 9, 118-132.
- PERRIN, M. 1994. Notes d'ethnographie huichol: la notion de ma'ive et la nosologie. *Journal de la Société des américanistes*, 80, 195.
- PINZÓN, S. M. & ZOLLA, C. 1994. *Diccionario enciclopédico de la medicina tradicional mexicana: Biblioteca de la medicina tradicional mexicana*/Instituto Nacional Indigenista, Instituto nacional indigenista.
- PLATT, L. 2002. *Parallel Lives?: Poverty Among Ethnic Minority Groups in Britain*.
- POSS, J. E. 2001. Developing a new model for cross-cultural research: synthesizing the Health Belief Model and the Theory of Reasoned Action. *ANS Adv Nurs Sci*, 23, 1-15.
- PRONJAG, N. A. W. S. P. 2010. *Diagnóstico del Programa de Atención a Jornaleros Agrícolas* [Online]. Available: [http://www.sedesol2009.sedesol.gob.mx/archivos/802567/file/Diagnóstico\\_PAJA.pdf](http://www.sedesol2009.sedesol.gob.mx/archivos/802567/file/Diagnóstico_PAJA.pdf).
- QUANG, L. & WOOLF, A. 2000. Children's unique vulnerabilities to environmental exposures. *Environmental Epidemiology and Toxicology*, 2, 79-99.
- QUESADA, J. 2011. Structural vulnerability and health: Latino migrant laborers in the United States. *Med Anthropol*, 30, 339.
- RAO, P., QUANDT, S. A. & ARCURY, T. A. 2002. Hispanic farmworker interpretations of green tobacco sickness. *J Rural Health*, 18, 503-11.
- RAO, P., QUANDT, S. A., DORAN, A. M., SNIVELY, B. M. & ARCURY, T. A. 2007. Pesticides in the homes of farmworkers: Latino mothers' perceptions of risk to their children's health. *Health Educ Behav*, 34, 335-53.
- READING, C. L., WIEN, F. & NATIONAL COLLABORATING CENTRE FOR ABORIGINAL, H. 2009. *Health inequalities and the social determinants of Aboriginal peoples' health* [Online]. Prince

- George, B.C.: National Collaborating Centre for Aboriginal Health. Available: <http://site.ebrary.com/id/10350507>.
- REED, K. B. 1972. *El INI y los Huicholes*, Mexico, Secretaria de Educación Pública.
- REGINO MONTES, A. 1999. Los Pueblos Indigenas: diversidad negada. *Chiapas*, 7, (none).
- REIGART, J. R. 1995. Pesticides and children. *Pediatr Ann*, 24, 663-8.
- RIMAL, R. N. 2000. Closing the Knowledge-Behavior Gap in Health Promotion: The Mediating Role of Self-Efficacy. *Health Communication*, 12, 219-237.
- ROSS, J. L., LASTON, S. L., PELTO, P. J. & MUNA, L. 2002. Exploring explanatory models of women's reproductive health in rural Bangladesh. *Culture, Health & Sexuality*, 4, 173-190.
- ROSSI, I. 1995. Le sacré à la recherche de son corps: trajectoires d'une culture chamanique amérindienne: Corps et sacré. *Religiologiques*, 12, 127-138.
- ROVIRA, G. 2002. *Mujeres de maíz*.
- SALAZAR, M. K., NAPOLITANO, M., SCHERER, J. A. & MCCUALEY, L. A. 2004. Hispanic adolescent farmworkers' perceptions associated with pesticide exposure. *West J Nurs Res*, 26, 146-66; discussion 167-75.
- SALGANIK, M. J. & HECKATHORN, D. D. 2004. Sampling and Estimation in Hidden Populations Using Respondent-Driven Sampling. *Sociological Methodology*, 34, 193-240.
- SALINAS ALVAREZ, S. D. R. P. 2000. *Taller de capacitación sobre riesgos en el uso de plaguicidas*, Mexico Centro de Derechos Humanos Miguel Agustín Pro Juárez, A.C.
- SANTOS GARCIA, S., CARRILLO DE LA CRUZ, T. 2008. *Taniuki. Curso de Huichol como Segunda Lengua*, Nayarit, Mexico, Consejo Nacional para la Cultura y las Artes (CONACULTA), Consejo Estatal para las Culturas y las Artes de Nayarit (CECAN).
- SANTOS, J. I., NAKAMURA, M. A., GODOY, M. V., KURI, P., LUCAS, C. A. & CONYER, R. T. 2004. Measles in Mexico, 1941-2001: interruption of endemic transmission and lessons learned. *J Infect Dis*, 189 Suppl 1, S243-50.
- SCHAEFER, S. B. 2001. *To think with a good heart : Wixarika women, weavers, and shamans*, Salt Lake City, University of Utah Press.
- SCHAEFER, S. B. & FURST, P. T. 1996. *People of the peyote : Huichol Indian history, religion, & survival*, Albuquerque, University of New Mexico.

- SCHEPER-HUGHES, N. 1992. *Death without weeping : the violence of everyday life in Brazil*, Berkeley ; Oxford, University of California Press.
- SCHEPER-HUGHES, N. & LOCK, M. M. 1987. The Mindful Body: A Prolegomenon to Future Work in Medical Anthropology. *Medical anthropology quarterly*, 1, 6-41.
- SCHEPER HUGHES, N. 1996. Small wars and invisible genocides. *Soc Sci Med*, 43, 889.
- SHAPIRO, J., RADECKI, S., CHARCHIAN, A. S. & JOSEPHSON, V. 1999. Sexual Behavior and AIDS-Related Knowledge among Community College Students in Orange County, California. *J Community Health*, 24, 29-43.
- SHELTON, A. 1987. Huichol Natural Philosophy. *Canadian Journal of Native Studies*, vii, 339-354.
- SHELTON, A. 1996. The girl who ground herself: Huichol attitudes towards maize. In: SCHAEFER, S. B. F., PETER. (ed.) *People of the Peyote, Huichol indian history, religion and survival*. Albequerque: University of New Mexico Press.
- SINGER, M. 1990. Reinventing medical anthropology: toward a critical realignment. *Soc Sci Med*, 30, 179-87.
- SINGER, M., BAER, H. A. & LAZARUS, E. 1990. Critical medical anthropology in question. *Soc Sci Med*, 30, V-VIII.
- SLOVIC, P. 1987. Perception of risk. *Science*, 236, 280-5.
- SMITH-OKA, V. 2009. Unintended consequences: exploring the tensions between development programs and indigenous women in Mexico in the context of reproductive health. *Soc Sci Med*, 68, 2069-77.
- STATISTICS, U. I. F. 2011. *USI Statistics in brief* [Online]. United Nations Educational Scientific and Cultural Organization. Available:  
[http://stats.uis.unesco.org/unesco/TableViewer/document.aspx?ReportId=121&IF\\_Language=eng&BR\\_Country=4840](http://stats.uis.unesco.org/unesco/TableViewer/document.aspx?ReportId=121&IF_Language=eng&BR_Country=4840)  
[Accessed 13/09/2012 2012].
- STAVENHAGEN, R. 1996. *Ethnic conflicts and the nation-state*, Basingstoke, Macmillan in association with United Nations Research Institute for Social Development
- TALAVERA, F. 2003. *Las venas del tabaco: la migración de los wixaritari en la costa de Nayarit* Undergraduate., Escuela Nacional de Antropología e Historia
- THOMAS, H. 2004. *The conquest of Mexico*, London, Pimlico.

- THROOP, C. J. 2002. Bourdieu and phenomenology A critical assessment. *Anthropological theory*, 2, 185.
- TORRES, J. D. J. & BARRAGÁN LÓPEZ, E. 2000. El hostigamiento a "el costumbre" huichol : los procesos de hibridación social. Zamora, México : El Colegio de Michoacán.
- TUIRAN, R., PARTIDA, V., MOJARRO, O., ZUNIGA, E. 2002. Fertility in Mexico. Trends and forecast. . United Nations Department of Economic and Social Affairs, Population Division. .
- TURNER, B. S. 2006. Body. *Theory, Culture & Society*, 23, 223-229.
- TUROK, A. 1998. *Chiapas: El fin del silencio*.
- ULIN, P. R., CAYEMITTES, M., METELLUS, E. 1995. Haitian women's role in sexual decision-making: The gap between AIDS knowledge and behaviour change.: Family Health International.
- VALADEZ, S. 1996. Wolf power and interspecies communication in Huichol shamanism. In: SCHAEFER, S. B. F., PETER. (ed.) *The people of peyote. Huichol indian history, religion and survival*. Univeristy of New Mexico Press.
- VALDÉZ GALLEGOS, J. G. 1983. *Ne Tertwame Warrarika: Mi libro Huichol-Primer Grado, Jalisco y Nayarit*, Mexico, Secretaria de Educación Pública, Dirección General de Educación Indígena.
- VARESE, S. 1983. *Indígenas y educación en México*, GEFE.
- VARGAS LLOSA, M. 1991. Mexico: The Perfect Dictatorship. *New perspectives quarterly*, 8, 23.
- VÁZQUEZ CASTELLANOS, J. L. 1992. Práctica médica tradicional entre indígenas de la Sierra Madre Occidental: Los Huicholes. . In: MENÉNDEZ LE, G. D. A. J. (ed.) *Prácticas populares, ideología médica y participación social. Aportes sobre antropología médica en México*. . Guadalajara: Universidad de Guadalajara/CIESAS.
- VERA, R. 2007. Los wixaritari de Jalisco rechazan leyes y programas impuestos por el gobierno. *Ojarasca*, 123.
- WEIGAND, P. C. 2000. Huichol Society before the Arrival of the Spanish. *Journal of the Southwest*, 42, 13.
- WIGLE, D. T., ARBUCKLE, T. E., TURNER, M. C., BERUBE, A., YANG, Q., LIU, S. & KREWSKI, D. 2008. Epidemiologic evidence of relationships between reproductive and child health outcomes and environmental chemical contaminants. *J Toxicol Environ Health B Crit Rev*, 11, 373-517.

- WILLIAMS, D. R. & STERNTHAL, M. J. 2007. Spirituality, religion and health: evidence and research directions. *Med J Aust*, 186, S47-50.
- WOOLF, A. D. 2002. Introduction: children's health and the environment. *Clinical Toxicology*, 40, 447-448.
- WORLD HEALTH ORGANIZATION, W. 2009. *Monitoring emergency obstetric care: A handbook.*, Geneva, WHO.
- WYNNE, B. E. 2004. May the sheep safely graze? A reflexive view of the expert-lay knowledge divide. Sage.
- YASUMOTO, M. 1996. The psychotropic Kieri in Huichol culture. In: SCHAEFER, S. B. F., PETER T. (ed.) *People of the peyote. Huichol indian history, religion and survival*. Albuquerque: University of New Mexico Press.
- YOUNG, A. 1976. Some Implications of Medical Beliefs and Practices for Social Anthropology. *American Anthropologist*, 78, 5-24.
- ZINGG, R. M. 2004. *Huichol mythology*, Tucson, AZ, University of Arizona Press.
- ZOLLA, C. 1988. *Medicina tradicional y enfermedad*, México, Centro Interamericano de Estudios de Seguridad Social.
- ZOLLA, C. 2005. La medicina actual indígena en el México actual. *Arqueología Mexicana*, xiii, 62-65.
- ZOLLA, C. 2007. *La Salud de los Pueblos Indigenas de Mexico* [Online]. Available:  
[http://www.nacionmulticultural.unam.mx/Portal/Derecho/CONSULTA/Salud/LA%20SALUD%20DE%20LOS%20PUEBLOS%20INDIGENAS-DEFINITIVO\(1\).pdf](http://www.nacionmulticultural.unam.mx/Portal/Derecho/CONSULTA/Salud/LA%20SALUD%20DE%20LOS%20PUEBLOS%20INDIGENAS-DEFINITIVO(1).pdf) [Accessed 11/09/2012 2012].
- ZOLLA, C., ZOLLA, EMILIANO 2004. *Los pueblos indigenas de Mexico. 100 preguntas.* , Mexico D.F., Universidad Nacional Autonoma de Mexico.