

Leadership on the Commons: Wealth Distribution, Co-provision and Service Delivery

MATHEW KURIAN* & TON DIETZ**

*Development Planning Unit, University College London, UK; **African Studies Centre, Leiden, The Netherlands

Online Appendix

Assumptions and Weights: Household Endowment and Interest Scores

Weights. Four criteria guided allocation of weights in construction of household endowment scores: 1) per-acre productivity of corn/rice and wheat under non-irrigated conditions; 2) per-acre productivity of corn/rice and wheat under irrigated conditions; 3) average milk production by buffaloes in summer, monsoon and winter months; 4) average milk production by cows in summer, monsoon and winter months.

Assumptions. In devising weights for caloric value of cereal crops and average milk production, we made five assumptions: 1) each adult requires a minimum of 2,300 kilocalories (Kcal) per day; 2) annual average Kcal requirement for an adult individual would therefore be approximately 850,000 Kcal; 3) a kilo of cereal like corn, wheat or rice contains on average 3,500 Kcal; 4) cow's milk contains 700 Kcal per litre; 5) buffalo milk contains 900 Kcal per litre.

Cereal crops caloric equivalent. Household level assessments of crop and milk production were undertaken for which the following measures based on production under irrigated and non-irrigated conditions were used: 1) one ha of rice or corn in the monsoon season under non-irrigated conditions would yield 3000 kilos on average; 2) one ha of wheat in the winter season under non-irrigated conditions would yield 12 kilos; 3) under non-irrigated conditions, annual average yields per ha are approximately 4,250 kilos (3,000 + 1,250); 4) a yield of 4,250 kilos per ha under non-irrigated conditions is equivalent to approximately 15 million Kcal per year (4,250* 3,500); 5) 15 million Kcal would sustain 17.5 members of a family following our earlier assumption of minimum caloric requirement per individual per year; 6) under irrigated conditions one ha of corn in monsoon season yields 4,500 kilos per ha; 7) under irrigated conditions one ha of wheat in the winter season yields 4,000 kilos per ha; 8) under irrigated conditions, total yield per ha is approximately 9500 kilos (4,500 +4,000); 9) a yield of 9500 kilos per ha under irrigated conditions yields a caloric equivalent of 33 million Kcal per year (9,500* 3,500); 10) assuming a minimum annual calorie equivalent of 850,000 per individual, 33 million Kcal would sustain 39 members of a family.

Milk production and calorie equivalent. In summer months, an adult buffalo produces five litres of milk per day. During the monsoon period, production is 10 litres per day and in winter; it dwindles to four litres per day. However, as no milk is produced in a few weeks in a year we assume that average annual milk production is approximately 2,000 litres. Two thousand litres of buffalo milk translates into a caloric equivalent of 1.8 million Kcal annually, thus the 1.8 million Kcal can sustain 2.5 persons annually. On the other hand, during the monsoon period a cow produces 750 litres of milk on average. During the summer season, production is 450 litres. Therefore, total annual milk production by a cow

would be in the range of 1200 litres, which translates into a caloric equivalent of 840,000 Kcal. This 840,000 Kcal could sustain one family member annually.

Based on average food productivity assessments for cereal crops and milk, we calculated household endowment scores as follows:

$$(7Lr + 14Li + 2.5B + 1C + 0.5C + 0.1G)/H.H.Size;$$

Where Lr = ha of rain fed land, Li = ha of irrigated land, B= number of adult buffaloes, C= number of adult cows, Ca= number of camels, G= number of goats, H.H. Size= number of members in a household. If a household score equals one, it means that the household can only feed its members with grown food and home produced milk assuming all land is used for food production and half of all adult animals are milk producing.(For a detailed discussion on caloric terms of trade, see Dietz et al., 2001.)

Table A1. Parameters for calculation of interest scores

Parameter	Non-irrigated land	Irrigated land	Increase by a factor of
Food (wheat)	1,250 Kg/ha	2,500 Kg/ha	2
Wheat from 1 acre can feed	17.5 people	39 people	2
Fodder grass can sustain	2.5 people if milk is consumed	5 people if milk is consumed	2

Source: Kurian & Dietz, 2004.

Table A2. Household water interest score calculation

Area irrigated by dam	Score
Less than 1 acre (<0.4 ha)	1
Between 1 and 3 acres (<0.4–1.2 ha)	2
Between 3 and 5 acres (1.2–2 ha)	4
Greater than 5 acres (> 2 ha)	8
Alternative sources of irrigation for dam-irrigated land:	
Tube well	1
Kuhl	2
None	4
Land irrigated outside dam command area:	
Greater than 3 acres (> 1.2 ha)	1
Between 2 and 3 acres (0.8–1.2 ha)	2
Between 1 and 2 acres (0.4–0.8 ha)	4
Between 0.5 and 1 acre (0.2–0.4 ha)	8
None	16

Source: Kurian & Dietz, 2004.