

## **Complementary feeding: Attitudes, knowledge and practices of urban families in Northern Thailand**

**Aims:** Urban families in middle-income countries are currently facing cultural and lifestyle transition. Changing from an agricultural to an industrial society may affect family roles and childcare practices. This present study aims to reveal family attitudes, knowledge and practices focusing on complementary feeding. **Methods:** A cross-sectional study was conducted in three Child Health Clinics [*removed for blind peer review*]. Self-administered questionnaires were given to families caring for healthy infants and children less than 18 months of age during October to November 2016. **Results:** One-hundred and eight respondents completed questionnaires. The study found different attitudes and knowledge gaps between the respondents who were mothers and other family members ('others'). The 'others' were less likely to value complementary feeding as a crucial factor promoting child growth and development. Moreover, they had misperceptions about the benefits of animal-based protein and were less confident in their ability to feed the child properly. Most families reported timely introduction of complementary food, using proper milk products and encouraging age-appropriate feeding methods. However, there were undesirable practices including delaying introduction of animal-based protein, inadequate food diversity, the use of seasoning, feeding pre-masticated food and offering food as a reward. **Conclusion:** These findings suggest nutritional education should be extended to all caregivers involved in complementary feeding to improve the adherence to feeding recommendations.

**Keywords:** Complementary feeding; Parental attitudes; Caregiver; Urban family; Thai family

## Main document

### Introduction

The period between conception and the end of the second year of life is regarded as a window of opportunity during which a variety of endogenous and exogenous factors can exert lasting effects on growth and developmental outcomes.<sup>1</sup> Nutrition is considered one of the most important factors, with most research focusing on maternal nutrition and breastfeeding.<sup>1</sup> However, complementary feeding (CF) is also a crucial part of nutrition during the first one-thousand days.<sup>1</sup>

Although the World Health Organization (WHO) has provided international guidelines and programmes for infant and young child feeding, there is a huge difference in implementation and practices between countries.<sup>2</sup> Apart from geographical and economic factors, CF is also influenced by cultural background, beliefs and knowledge of parents about appropriate practices.<sup>3</sup>

Thailand is classified by the World Bank as an upper-middle income country.<sup>4</sup> It is currently facing a double burden of malnutrition, similar to many countries in Asia. Nowadays, stunting and wasting among young children persists but has declined in severity whereas overweight and obesity have increased rapidly.<sup>5,6</sup> According to the Thai National Health Examination Survey (NHES) 2014-5, stunting and wasting was present in 5.7% and 5.6% of preschool-aged children, respectively, compared with 6.3% and 2.7% in the previous survey (NHES 2008-9) while the prevalence of overweight and obesity increased from 8.5% to 11.3% in the latest survey.<sup>7,8</sup> In addition, micronutrient deficiency, particularly iron and zinc, remains a challenge. The evidence shows that 32.2-41.8% and 2.5-9.9% of pre-school aged children had iron deficiency

and iron deficiency anaemia, respectively<sup>9</sup> while 57% of school-aged children had zinc deficiency.<sup>10</sup>

Currently, poverty and unaffordability of food are less likely to be the main reasons for nutritional problems in Thai children.<sup>11,12</sup> On the other hand, nutrition education, access to accurate sources of health information and changing attitudes or lifestyles may be more likely causes. Urban families can be considered to represent the transitional situation in Thailand. In 1985, Knodel et al<sup>13</sup> found that women who lived in urban areas had shorter breastfeeding duration and earlier introduction of complementary foods compared with national statistics. However, a recent survey of working mothers in Bangkok showed 78.6% of them exclusively breastfed for at least 3 months.<sup>14</sup> Although the breastfeeding rate has improved, it is unclear whether attitudes and knowledge about infant and young child feeding (IYCF) especially CF have also changed. The number of working mothers has tended to increase in urban families, hence other people (i.e., father, grandparents, and babysitters) may act as caregivers and their attitudes and knowledge should also be evaluated. Recently, Thai CF guidelines have been launched to promote good practice in IYCF in Thailand (Appendix 1). However, it is likely that the success of the guidelines may be influenced by family context and attitudes about CF. Therefore, the present study was conducted in *[removed for blind peer review]*, the most developed city in northern Thailand, to demonstrate attitudes, knowledge and current CF practices of mothers and other caregivers living in an urban area.

## Methods

This manuscript has been reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement. The cross-

sectional study was conducted at Child Health Clinics (CHCs) of which two were tertiary hospitals and the other was a community facility. Data were collected during October to November 2016. Ethical approval was obtained from the Ethics committee of [removed for blind peer review]. The self-administered questionnaire was given to the family at the time of visiting the clinics for routine immunization as well as growth and development monitoring. The questionnaire was anonymous and contained no sensitive questions.

Families were included if their child was a term singleton, healthy and less than 18 months of age. The respondent could be the mother, father, grandparent or close relative involved in caring for and feeding the child. All respondents were asked to answer the questions related to their knowledge and attitudes, but only the respondents caring for infants aged 6 – 18 months old were eligible to answer the questions on practical aspects of feeding. The questionnaires were anonymized and the respondents were identified by a study number. If the respondent was illiterate, other family members or healthcare professionals were asked to help them complete the questionnaire.

For the purposes of this study, complementary foods were defined as “Any nutrient-containing food or liquids other than breast milk and infant formula” as defined by the European Food Safety Authority (EFSA) and the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition (ESPGHAN).<sup>15,16</sup>

According to the Thai National Guideline for CF, caregivers should introduce the first, second and third main meal at 6, 8 and 9-12 months of age. In this context, a ‘main meal’ was defined by a combination of staple foods and other food groups to provide a majority of calories and nutrients each day.

The self-administered questionnaire was divided into four main parts. The first part included general information about the respondents and their children. The second part consisted of questions covering basic knowledge and attitudes regarding IYCF. The remaining two parts focused on practical and behavioural aspects of CF. Since responses were expected to differ according to the infant's age, the study population was separated into three infant age groups based on published data<sup>17</sup> and followed the similar categories used in the recommendations from the Thai National guideline for CF (appendix 1). Infants who were 6-8, 9-12, and 13-18 months of age were classified as group A, B and C, respectively.

Statistical analysis was performed using the IBM SPSS Statistics programme (version 22.0; SPSS Inc., IBM Company, Chicago, IL, USA). Categorical variables were expressed as number and percentage while continuous variables were expressed as mean  $\pm$  SD or median (range) as indicated. Chi-square or Fisher's exact test were used for comparing categorical data while quantitative data were compared by Student's t-test or Mann-Whitney U test. A p-value of less than 0.05 was considered as statistically significant. If the respondents did not reply to all questions, the missing data were shown as "no answered". The initial aim of this study was to explore attitudes, knowledge and practices related to CF in Thai urban families, enrolling all eligible families who attended the clinics during the study period. However, since the ratio of non-maternal caregivers was unexpectedly high, a post-hoc calculation was performed to estimate the effect size that could be determined comparing the non-maternal caregiver and maternal caregiver groups, based on the percentage of respondents who agreed that CF is an important factor promoting infant growth. When using 80% power and 0.05 significance level, the % difference between these groups was 28%<sup>18</sup>

## Results

One-hundred and eight families were recruited to the study. All respondents answered the questions related to their knowledge and attitudes about CF while only 72 of them were eligible to answer the practical questions. All respondents were literate and answered the questionnaire by themselves. More than half of all respondents were the infant's mother while 38% of them were another family member ('others') including father, grandparent and close relatives who lived in the same home. Among all respondents, 60.2% were the self-defined primary caregiver. The most common age group was 30-39 years old but the 'others' had significantly more seniors than the maternal group. In addition, 65% of all respondents were well educated, having at least a degree. According to the monthly income, most families would be classified as middle-class. Furthermore, there was a significantly higher ratio of housewives in the group of mothers compared with the 'others' ( $p < 0.01$ ). Among all respondents, nearly half lived inside the city and 53% lived in an extended family. The majority of infants and young children were first born, with equal proportions of boys and girls (Table 1).

As shown in Table 2, a majority of respondents stated ages for the optimal timing of introduction and for starting the second and third main meals that were consistent with the Thai National guideline (appendix 1). However, for the second main meal, the 'others' reported a significantly earlier age compared with the 'mothers' (6 vs 8 months,  $p = 0.040$ ). Furthermore, the results showed most of the respondents considered that animal-based protein (ABP) were different from plant-based protein (PBP), however their attitudes toward ABP were negative rather than positive. A lower percentage of the 'others' replied that ABP is a good source of iron and zinc compared to the 'mothers' (7.3% vs 22.4%,  $p = 0.034$ ).

When focusing on the difference between respondents who self-defined as primary caregivers and non-primary caregivers, knowledge of ABP as a good source of iron and zinc was also significantly lower in non-primary caregivers compared with primary caregivers (7.0% vs 23.1%,  $p = 0.048$ ) (supplementary table).

Around 50% of all respondents thought that advice from healthcare professionals was the most reliable source of information about IYCF. Considering important factors promoting child growth and development, almost all of the respondents identified exclusive breastfeeding for 6 months. However, the ‘mothers’ considered appropriate CF as an essential factor more than the ‘others’ (76.1% vs 56.1%,  $p = 0.017$ ).

Current milk intake is shown in Table 3. More than 50% of all respondents in group A reported using only breast milk along with CF compared to around 30% in group B and C. Among group C, a majority of respondents reported using formula as the main milk. Interestingly, the proportion using whole cow’s milk was very low in all groups. In addition, the percentages of bottle feeding were lower in older infants and children. Half of children in group B and C were still using a bottle while the rest of them were using a cup or beaker.

Focusing on the timing of introducing complementary food and frequency of main meals, the results were mostly consistent with reported knowledge (Table 2) and consistent with the Thai National guideline. All groups reported rice porridge and mashed banana as the most common first complementary foods while food texture was significantly different among groups, with more lumpy foods fed in group B and C ( $p < 0.001$ ). Furthermore, the frequency of both main and snack meals was also higher in the older groups.

Interestingly, more than half of the respondents in group B and C replied that they introduced the first ABP after 6-7 months. Furthermore, egg yolk was emphasized as the most commonly used ABP while there was no report of using beef among the groups. Regarding food diversity, the results showed that approximately 60% of the infants in group A and B did not meet the WHO recommendation.

Although the data indicated that the complementary food was prepared by home cooking in around 90% of the sample, the use of seasoning (i.e., salt and sugar) was significantly higher in the older age group ( $p = 0.019$ ). The most common cooking methods were boiling and steaming, while frying and grilling were used more for older infants but there was no significant difference.

Figure 1 summarises the behavioural aspects of CF among the three groups. Complementary foods were mainly offered following a fixed schedule (offering the meals at nearly the same time every day), whilst few children were fed by using hunger cues (e.g., smacking lips, sucking fist, restless and crying), so-called responsive feeding. The respondents with older children tended to report independent feeding (children can eat food with partial support or without any help from caregivers) and eating as a family more than those with younger infants. However, unfavorable behaviours such as premastication (pre-chewing food) and using food as a reward were also more frequent in older children, especially in group C.

## **Discussion**

The present study demonstrated the attitudes, knowledge, and practices associated with CF in urban Thai families. The results showed that the 'others' appeared to have lower confidence and more misunderstandings than the mothers. They were also significantly less likely to value appropriate CF as a factor promoting child

growth. For feeding practices, the results showed that most respondents reported timely introduction of CF, giving milk and using feeding methods appropriate for the child's age. However, some families offered a low variety of foods and delayed the introduction of ABP. These practices may cause lower intakes of micronutrients, especially iron and zinc. **In Thailand, as zinc supplementation is not a routine practice and the coverage of iron supplementation for infants and young children is only 3.6%<sup>19</sup>, consumption of predominantly PBP may not meet the daily requirements for both nutrients and lead to deficiency.<sup>20</sup>** Furthermore, the use of seasoning and premastication were reported. While a few families offered food following the infant's hunger cues, the use of food as a reward increased in older children. **Both non-responsive feeding and using food as a reward may lead to childhood obesity.<sup>21</sup>**

To our knowledge, few studies have reported on the knowledge and attitudes of non-maternal caregivers about CF. One study reported decreased breastfeeding duration and increased juice consumption in infants and toddlers with a non-maternal care-giver.<sup>22</sup> In contrast, a qualitative study focusing on grandmothers from indigenous populations in New Zealand found that they considered breastfeeding to be a good choice and also thought that home cooking using ingredients from their own gardens without added sugar or salt was the healthiest option. However, some feeding practices were still based on their previous experiences and customary norms.<sup>23</sup>

As previously mentioned, the present study found that the 'others' group had low confidence about feeding their child, were less likely to value CF and had some misunderstandings compared with the mothers group. This suggests that the other caregivers should be targeted for nutritional education in order to improve IYCF. However, further studies are needed as the issues are likely to vary in different settings.

Focusing on practical aspects, the results showed that more than half of infants aged 6-8 months received breast milk alongside CF but the number dropped in the older groups. Similarly, a study in urban areas of Beijing, China also reported decreasing breastfeeding from 51.8% to 25.4% in infants aged 6 and 12 months, respectively.<sup>24</sup> According to a recent survey, the percentage of breastfeeding alongside complementary foods was 21.9% in northern Thailand (infants were 6-23 months old)<sup>25</sup> while this study reported a higher rate of 36.1% (26 out of 72 who currently received breast milk combined with complementary foods according to Table 3). However, the present study included both breastfeeding and the use of expressed breast milk and only included children up to 18 months of age, which could explain the higher percentage.

In 1992, Jackson et al. reported the median age of introduction of CF was only 4 weeks in Thailand.<sup>26</sup> Mashed rice and banana were the most common foods at 3 months of age. By 6 months, ABP was introduced as soft meat and rice mixtures in 45% of the infants, however the figures increased at 9 and 12 months. In the present study, some “traditional practices”, particularly the use of meat-free diets in the early phase of CF, was still reported, however this was related to the “perceptions” of the respondents rather than to affordability. Most of the respondents thought that ABP was “inappropriate for the gastrointestinal function of the infant” and “hyper-allergenic” compared with PBP. A review article concluded that caregivers in countries using rice porridge or cereal as first foods believe that rice “helps with digestion”.<sup>27</sup> On the other hand, evidence suggests that most ABP have high amino acid quality<sup>28</sup> and avoiding them cannot prevent food-protein allergy.<sup>29</sup> Furthermore, Gibson et al. found that complementary foods in developing countries including Thailand provide inadequate calcium, iron and zinc.<sup>30</sup> Similarly, a survey of micronutrients in Thai diets also reported that ABP-free diets had lower bioavailability of iron and zinc.<sup>31, 32</sup> Therefore,

avoiding the delayed introduction of ABP should be addressed in parallel with promoting the CF guideline.

Interestingly, although the percentage of home-cooking was high in this study, the use of seasoning was also common. Likewise, a study revealed over 40% of Vietnamese mothers usually added monosodium glutamate to complementary foods.<sup>33</sup> When compared to commercially infant foods, home-made foods were surprisingly found to be high in salt and low in fat.<sup>34</sup> However, these results should not discourage the use of home-based foods. Instead, families should be educated about how to prepare safe and appropriate foods.

Jackson et al. described that most first complementary foods were softened to a semi-solid consistency by pounding and mastication in Thai families.<sup>26</sup> Thirty-five percent of infants were reported to be receiving this type of food at 1 to 13 weeks of age while the older infants did not receive this practice. It can be assumed that previously, premastication was used in very young infants who had limited ability to chew solid food. In contrast, the present study found the percentage of reported premastication was higher in older groups. The most serious potential consequence of this practice is the transmission of pathogens such as Hepatitis B virus and Human Immunodeficiency Virus (HIV)<sup>35</sup>, from caregivers to infants particularly if the caregiver has gingival bleeding or periodontal disease.<sup>36</sup> There are reported cases that might indicate transmission of HIV from foods pre-chewed by HIV infected caregivers.<sup>37</sup> Although there are theoretical benefits of premastication<sup>38</sup>, pending the availability of more robust data families should be advised to avoid it, especially in countries where HIV infection is prevalent.<sup>39</sup>

This study had some limitations including the small number of respondents and the fact that some respondents were not the primary caregiver. However, a subgroup analysis including only data from respondents who were primary caregivers revealed similar findings. The recalled data especially from the respondents with older children may have affected the accuracy of some results.

In summary, the present study highlights the role of other family members as key players in CF in middle-class urban Thai families. Currently, most urban Thai families report timely introduction of complementary feeding but certain aspects and feeding practices such as the use of premastication need more attention. This study also provides some new information. Improved understanding of the reasons why caregivers do not follow advice, or adopt undesirable practices, would allow the IYCF guidelines to be adjusted in the future.

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### Appendix 1: The Thai National Guideline for Complementary feeding (In 2016)

Age (months)	Carbohydrate (per meal)	Protein (per meal)	Vegetable (per meal)	Fruit (per day)	Oil (per day)	Character of food
6 (1 meal)	Finely mashed rice 2 tbs	½ Egg yolk alternate with Meat 1 tbs	Boiled vegetable ½ tbs	Ripe fruit 1 pieces	½ tea spoon	Finely ground
7 (1 meal)	Soft cooked rice 3 tbs	½ Whole egg alternate with Meat 1 tbs	Cooked Vegetable 1 tbs	Ripe fruit 2 pieces	½ tea spoon	Roughly ground
8 (2 meals)	Soft cooked rice 4 tbs	½ Whole egg alternate with Meat 1 tbs	Cooked vegetable 1 tbs	Ripe fruit 3 pieces	½ tea spoon	Roughly ground
9-12 (3 meals)	Soft cooked rice 4 tbs	½ Whole egg alternate with Meat 1 tbs	Cooked vegetable 1½ tbs	Ripe fruit 4 pieces	½ tea spoon	Roughly ground
13-36 (3 meals)	Cooked rice 6 tbs (1 ladle)	½ Whole egg alternate with Meat 1 tbs	Raw/ cooked vegetables 4 tbs	Fresh fruit 3 portions**	3 tea spoons	Family food

\*Table spoon (tbs)

\*\* 1 portion of fresh fruit = 15 g of carbohydrate from fruit (for example 1 portion = 1 medium size orange, 1 apple, ½ guava, ½ Cavendish banana)

## **Title page**

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**Short title:** Complementary feeding in urban families

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**Table 1 Demographic data of respondents and their children**

Characteristic of respondent	All respondents (n = 108)	Mothers (n = 67)	Others (n = 41)	p-value*
	Number, (%)	Number, (%)	Number, (%)	
<b>1. Relationship to infant/child</b>				
Mother	67 (62.0)			
Father	34 (31.5)	NA	NA	NA
Grandparent	6 (5.6)			
Other relative (i.e., aunt, uncle)	1 (0.9)			
<b>2. Primary caregiver*</b>				
- Mother	65 (60.2)			
- Other	56 (51.8)	NA	NA	NA
<b>3. Age (years)</b>				
< 20	4 (3.7)	3 (4.5)	1 (2.4)	} < 0.01
20 – 29	31 (28.7)	23 (34.3)	8 (19.5)	
30 – 39	63 (58.3)	37 (55.2)	26 (63.4)	
40 – 49	6 (5.6)	2 (3.0)	4 (9.8)	
≥ 50	2 (1.9)	0	2 (4.9)	
Not answered	2 (1.9)	2 (3.0)	0	
<b>4. Education</b>				
Primary school	2 (1.9)	0	2 (4.9)	} 0.539
Lower secondary school	11 (10.2)	7 (10.4)	4 (9.8)	
Higher secondary school	23 (21.3)	12 (17.9)	11 (26.8)	
Bachelor degree	51 (47.2)	32 (47.8)	19 (46.3)	
Postgraduate degree	20 (18.5)	15 (22.4)	5 (12.2)	
Not answered	1 (0.9)	1 (1.5)	0	
<b>5. Occupation</b>				
Housewife	26 (24.1)	25 (37.3)	1 (2.4)	} < 0.01
Farming and agriculture	1 (0.9)	0	1 (2.4)	
Government employee	21 (19.5)	9 (13.4)	12 (29.3)	
Other (private employee, self-employment)	59 (54.6)	33 (49.3)	26 (63.4)	
Not answered	1 (0.9)	0	1 (2.4)	
6. Living in the city	51 (47.2)	28 (41.8)	23 (56.1)	0.319
7. Extended family	62 (57.4)	40 (59.7)	22 (53.7)	0.568
<b>8. Family income (monthly, Baht)</b>				
< 10,000	12 (11.1)	10 (14.9)	2 (4.9)	} 0.336
10,000 – 29,999	55 (50.9)	31 (46.3)	24 (58.5)	
30,000 – 49,999	35 (32.4)	22 (32.8)	13 (31.7)	
≥ 50,000	4 (3.7)	3 (4.5)	1 (2.4)	
Not answered	2 (1.9)	1 (1.5)	1 (2.4)	
<b>Characteristics of infant or child</b>				
1. Gender, male	54 (50.0)	36 (53.7)	18 (43.9)	0.666
<b>2. Age (months)</b>				
Less than 6	36 (33.3)	19 (28.3)	17 (41.5)	} 0.609
6 – 8	23 (21.3)	15 (22.4)	8 (19.5)	
9 – 12	24 (22.2)	16 (23.9)	6 (14.6)	
More than 12	25 (23.2)	17 (25.4)	10 (24.4)	
3. First born infant	71 (65.7)	44 (65.7)	27 (65.9)	0.110

NA = Not analysis; \* Fisher's exact test

**Table 2 Knowledge and attitudes related to complementary feeding**

Topics	All respondents (n = 108)	Mother (n = 67)	Other respondent (n = 41)	p-value <sup>¶</sup>
<b>1. Timing of introducing complementary foods, number (%)</b>				
< 4 months old	0	0	0	} 0.625*
4 – less than 6 months old	12 (11.1)	5 (7.5)	7 (17.1)	
6 months old	65 (60.2)	41 (61.2)	24 (58.5)	
> 6 months old	30 (27.8)	20 (29.8)	10 (24.4)	
Not answered	1 (0.9)	1 (1.5)	0	
<b>2. Age at starting other main meals (months), median (range)</b>				
Second meal	8 (5-12)	8 (5-10)	6 (6-12)	<b>0.040</b> #
Third meal	12 (8-12)	12 (8-12)	12 (8-12)	0.873#
<b>3. Is the animal-based protein different from plant-based protein? number (%)</b>				
Yes	88 (81.5)	56 (83.6)	32 (78.0)	} 0.284*
No	17 (15.7)	8 (11.9)	9 (22.0)	
Not answered	3 (2.8)	3 (4.5)	0	
<b>4. What is/ are the difference(s) between animal-based proteins compared to plant-based proteins? (Can choose more than one), number (%)</b>				
More difficult to digest	57 (52.8)	36 (53.7)	21(51.2)	0.679§
Higher allergenicity	27 (25.0)	18 (26.9)	9 (21.9)	0.512§
Higher cost	3 (2.8)	1 (1.5)	2 (4.9)	0.309§
A better supply of essential amino acids	14 (13.0)	9 (13.4)	5 (12.2)	0.814§
A good source of iron and zinc	18 (16.7)	15 (22.4)	3 (7.3)	<b>0.034</b> §
<b>5. The most reliable source of information about infant and young children feeding is, number (%)</b>				
Healthcare professionals	55 (50.9)	35 (52.2)	20 (48.8)	0.643*
Maternal and child handbook	10 (9.3)	5 (7.5)	5 (12.2)	0.516*
Official website of the Ministry of public health	5 (4.6)	5 (7.5)	0	0.122*
Maternal-child magazine	0	0	0	0.288*
Other online information	5 (4.6)	4 (5.9)	1 (2.4)	0.180*
Advice from seniors	3 (2.8)	1 (1.5)	2 (4.9)	0.491*
Advice from peers	1 (0.9)	0	1 (2.4)	0.364*
Not answered	29 (26.9)	17 (25.4)	12 (29.3)	0.288*
<b>6. How confident you are to feed your child properly? (1= least, 6 = most), number (%)</b>				
1	3 (2.8)	0	3 (7.3)	} 0.075*
2	4 (3.7)	2 (3.0)	2 (4.9)	
3	13 (12.0)	4 (6.0)	9 (22.0)	
4	48 (44.4)	36 (53.7)	12 (29.3)	
5	19 (17.6)	13 (19.4)	6 (14.6)	
6	6 (5.6)	3 (4.5)	3 (7.3)	
Not answered	15 (13.9)	9 (13.4)	6 (14.6)	
<b>8. What is/are the important factors that affect growth and development of children? (Can choose more than one), number (%)</b>				
Exclusive breastfeeding until 6 months of age	89 (82.4)	57 (85.1)	32 (78.0)	0.211*
Appropriate complementary feeding	74 (68.5)	51 (76.1)	23 (56.1)	<b>0.017</b> *
Supplementation of vitamins and minerals	20 (18.5)	16 (23.9)	4 (9.8)	0.066*
Intake of high quality infant formula	10 (9.3)	6 (8.9)	4 (9.8)	0.566*
Other (i.e., nurture)	1 (0.9)	0	1 (2.4)	0.378*

<sup>¶</sup> p-value was calculated by comparison between mother and other respondent groups.

\*Fisher's exact test; # Mann-Whitney U test; §Chi-square test

**Table 3 Infant and young child feeding (IYCF) practices among different age groups**

Feeding practices	(group A) 6 – 8 months old (n = 23)	(group B) 9 – 12 months old (n = 24)	(group C) 13 – 18 months old (n = 25)	p-value
<b>1. Feeding practices related to milk intake</b>				
<b>- Current milk intake, number (%)</b>				
Breast milk (breastfeeding & expressed breast milk)	12 (52.2)	7 (29.2)	7 (28.0)	} 0.572*
Combined breast milk and formula	3 (13.0)	6 (25.0)	5 (20.0)	
Infant or Follow-on formula	8 (34.8)	7 (29.2)	10 (40.0)	
Cow's milk	0	3 (12.5)	2 (8.0)	
Not answered	0	1 (4.2)	1 (4.0)	
<b>- Continue using breast milk along with complementary feeding, number (%)</b>	15 (65.2)	13 (54.2)	12 (48.0)	0.718*
<b>- Bottle feeding (expressed breast milk &amp; formula), number (%)</b>	19 (82.6)	13 (54.2)	16 (64.0)	0.320*
<b>2. Complementary feeding practices</b>				
<b>- Timing of introducing complementary feeding, median age (range)</b>	6 months old (5 – 6)	6 months old (3 – 7)	6 months old (4 – 6)	0.610 <sup>#</sup>
<b>- Frequency of main meal, number (%)</b>				
1	18 (78.3)	0	0	} < 0.001*
2	3 (13.0)	6 (25.0)	5 (20.0)	
3	1 (4.3)	18 (75.0)	19 (76.0)	
≥ 4	0	0	1 (4.0)	
Not answered	1 (4.3)	0	0	
<b>- Type of first complementary foods introduced (more than one could be chosen), number (%)</b>				
Rice porridge	13 (56.5)	15 (62.5)	16 (64.0)	} 0.288*
Mashed banana	11 (47.8)	6 (25.0)	12 (48.0)	
Commercial infant food	4 (17.4)	4 (16.7)	0	
Fruit juice	1 (4.3)	0	0	
Other (i.e., pumpkin)	1 (4.3)	1(4.2)	0	
<b>- Texture of current complementary foods, (choose more than one), number (%)</b>				
Soup	0	2 (8.3)	0	} < 0.001*
Mashed food/ purée	19 (82.6)	6 (25.0)	3 (12.0)	
Chopped food	3 (13.0)	11 (45.8)	6 (24.0)	
Family food	0	5 (20.8)	16 (64.0)	
<b>- Timing of first introduction of animal-based protein, number (%)</b>				
6-7 months old	16 (69.6)	12 (50.0)	12 (48.0)	} 0.177*
8-9 months old	2 (8.7)	10 (41.7)	10 (40.0)	
10-12 months old	NA	1 (4.2)	2 (8.0)	
> 12 months old	NA	1 (4.2)	0	
Not answered	1 (4.3)	0	1 (4.0)	

\*Fisher's exact test; <sup>#</sup> Kruskal-Wallis test; NA = Not analysed (range of age in group A did not reach these ages)

Feeding practices	(group A) 6 – 8 months old (n = 23)	(group B) 9 – 12 months old (n = 24)	(group C) 13 – 18 months old (n = 25)	<i>p</i> -value
<b>- Type of first animal-based protein introduced,</b> (Can choose more than one), number (%)				
Egg yolk	16 (69.6)	19 (79.2)	17 (68.0)	} 0.303*
Fish	6 (26.1)	6 (25.0)	7 (28.0)	
Liver	4 (17.4)	4 (16.7)	5 (20.0)	
Pork	4 (17.4)	6 (25.0)	1 (4.0)	
Whole eggs	3 (13.0)	2 (8.3)	5 (20.0)	
Chicken	2 (8.7)	3 (12.5)	1 (4.0)	
Beef	0	0	0	
<b>- Current food diversity, number (%)</b>				
Less than 4 food groups	14 (60.9)	8 (33.3)	10 (40.0)	} 0.196*
≥ 4 food groups	8 (34.8)	14 (58.4)	15 (60.0)	
Not answered	1 (4.3)	2 (8.3)	0	
<b>- Frequency of snacks each day, number (%)</b>				
None	18 (78.3)	8 (33.3)	8 (32.0)	} 0.008*
1	4 (17.3)	12 (50.0)	12 (48.0)	
2	0	1 (4.2)	1 (4.0)	
≥ 3	0	0	0	
Not answered	1 (4.3)	3 (12.5)	4 (16.0)	
<b>- Daily intake of fruit juices, number (%)</b>				
None	16 (69.6)	14 (58.3)	10 (40.0)	} 0.239*
1-2 Oz	6 (26.1)	4 (16.7)	3 (12.0)	
3-4 Oz	0	1 (4.2)	5 (20.0)	
≥ 4 Oz	0	0	0	
Not answered	1 (4.3)	5 (20.8)	7 (28.0)	
<b>- Home cooking, number (%)</b>				
Yes	21 (91.3)	22 (91.7)	20 (80.0)	} 0.242*
No	1 (4.3)	1 (4.2)	5 (20.0)	
Not answered	1 (4.3)	1 (4.2)	0	
<b>- Cooking method,</b> (Can choose more than one), number (%)				
Boiling	19 (82.6)	22 (91.7)	23 (92.0)	} 0.124*
Steaming	15 (65.2)	17 (70.8)	23 (92.0)	
Frying	1 (4.3)	5 (20.8)	8 (32.0)	
Grilling	0	1 (4.2)	8 (32.0)	
Baking	0	0	1 (4.0)	
<b>- Use of seasoning/ addition of oil, number (%)</b>				
Use of seasoning	3 (13.0)	6 (25.0)	12 (48.0)	} 0.019*
Adding oil to complementary foods	0	4 (16.7)	3 (12.0)	
No	19 (82.6)	17 (70.8)	13 (52.0)	
Not answered	1 (4.3)	1 (4.2)	0	
<b>- Receiving any vitamins or minerals supplementation, number (%)</b>				
Yes	1 (4.3)	6 (25.0)	10 (40.0)	} 0.297*
No	20 (87.0)	16 (66.7)	14 (56.0)	
Not answered	2 (8.7)	2 (8.3)	1 (4.0)	

\*Fisher's exact test

**Supplementary table: Knowledge and attitudes related to complementary feeding between primary and non-primary caregivers**

Topics	All respondents (n = 108)	Primary caregivers (n = 65)	Non-primary caregivers (n = 43)	p-value <sup>¶</sup>
<b>1. Timing of introducing complementary foods, number (%)</b>				
< 4 months old	0	0	0	} 0.358*
4 – less than 6 months old	12 (11.1)	5 (7.7)	7 (16.3)	
6 months old	65 (60.2)	39 (60.0)	26 (60.5)	
> 6 months old	30 (27.8)	20 (30.8)	10 (23.3)	
Not answered	1 (0.9)	1 (1.5)	0	
<b>2. Age at starting other main meals (months), median (range)</b>				
Second meal	8 (5-12)	8 (6-12)	7 (5-12)	<b>0.543<sup>#</sup></b>
Third meal	12 (8-12)	12 (8-12)	12 (8-12)	0.166 <sup>#</sup>
<b>3. Is the animal-based protein different from plant-based protein? number (%)</b>				
Yes	88 (81.5)	54 (83.1)	34 (79.1)	} 0.117*
No	17 (15.7)	8 (12.3)	9 (20.9)	
Not answered	3 (2.8)	3 (4.6)	0	
<b>4. What is/ are the difference(s) between animal-based proteins compared to plant-based proteins? (Can choose more than one), number (%)</b>				
More difficult to digest	57 (52.8)	36 (55.4)	21(48.8)	0.626 <sup>§</sup>
Higher allergenicity	27 (25.0)	13 (20.0)	14 (32.5)	0.528 <sup>§</sup>
Higher cost	3 (2.8)	0	3 (7.0)	0.500 <sup>§</sup>
A better supply of essential amino acids	14 (13.0)	10 (15.4)	4 (9.3)	0.481 <sup>§</sup>
A good source of iron and zinc	18 (16.7)	15 (23.1)	3 (7.0)	<b>0.043<sup>§</sup></b>
<b>5. The most reliable source of information about infant and young children feeding is, number (%)</b>				
Healthcare professionals	55 (50.9)	33 (50.8)	22 (51.2)	0.750*
Maternal and child handbook	10 (9.3)	6 (9.2)	4 (9.3)	0.762*
Official website of the Ministry of public health	5 (4.6)	5 (7.7)	0	0.073*
Maternal-child magazine	0	0	0	0.288*
Other online information	5 (4.6)	4 (6.2)	1 (2.3)	0.809*
Advice from seniors	3 (2.8)	1 (1.5)	2 (4.7)	0.606*
Advice from peers	1 (0.9)	1(1.5)	0	0.594*
Not answered	29 (26.9)	15 (23.1)	14 (32.6)	0.519*
<b>6. How confident you are to feed your child properly? (1= least, 6 = most), number (%)</b>				
1	3 (2.8)	1 (1.5)	2 (4.7)	} 0.570*
2	4 (3.7)	2 (3.1)	2 (4.7)	
3	13 (12.0)	6 (9.3)	7 (16.2)	
4	48 (44.4)	32 (49.2)	16 (37.2)	
5	19 (17.6)	11 (16.9)	8 (18.6)	
6	6 (5.6)	5 (7.7)	1 (2.3)	
Not answered	15 (13.9)	8 (12.3)	7 (16.3)	
<b>8. What is/are the important factors that affect growth and development of children? (Can choose more than one), number (%)</b>				
Exclusive breastfeeding until 6 months of age	89 (82.4)	57 (87.7)	32 (74.4)	0.051*
Appropriate complementary feeding	74 (68.5)	46 (70.8)	28 (65.1)	<b>0.785*</b>
Supplementation of vitamins and minerals	20 (18.5)	12 (18.5)	8 (18.6)	1.000*
Intake of high quality infant formula	10 (9.3)	5 (7.7)	5 (11.6)	0.789*
Other (i.e., nurture)	1 (0.9)	0	1 (2.3)	0.395*

<sup>¶</sup> p-value was calculated by comparison between mother and other respondent groups.

\*Fisher's exact test; # Mann-Whitney U test; §Chi-square test