

Profile of complementary food consumption during the first year of life based on Indonesia Individual Food Consumption Survey 2014

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ABSTRACT

Background: In Indonesia, though the recommendation to start complementary foods (CF) is at six months, mothers do not comply with this recommendation. **Methods:** Data from Indonesia Individual Food Consumption Survey (IFCS) 2014 of 1,514 infants aged 0-11 months was used for this study. The profiles of CF consumption during the first year of life, including frequency of consumption, types of CF, timely introduction and nutritional contents of CF were determined. Mothers were interviewed at home to determine infant intake using 24-hour dietary recall. The IFCS classified CF as home-made or manufactured. Nutrient contents were calculated using several sources. Nutrient intakes from CF for 6-11 months were compared with WHO (2001) and Dewey (2001) recommendations. **Results:** There were 19.2% early and 3.2% late introduction of CF. Homemade complementary foods were widely consumed. Frequency of consumption of CF among 82.7% of infants aged 6-8 month was 2-3 times per day. Intake of fat, iron, zinc and calcium from CF were inadequate in 75.5%, 86.6%, 72.9% and 60.3% respectively among infants aged 6-8 months. Inadequate intake of fat, protein, iron, zinc and calcium were also found among infants aged 9-11 months. Inadequate intake of vitamin D was also found in 89.5% and 88.7% of infants in each age group. Excessive sodium intake was found in 37.2% and 49.3% of infants in each age groups. **Conclusion:** While untimely complementary feeding introduction was found, greater concern was for inadequate intake of several key nutrients and excess intake of sodium among Indoensian infants. Complementary feeding education is recommended.

Keywords: Complementary food, infants, Indonesia Individual Food Consumption Survey (IFCS) 2014

INTRODUCTION

The period from birth to two years of age is a critical window for promotion of infants' optimal growth, health and behavioral development. They should get adequate nutrient intake for optimal growth and development, because inadequate or excessive nutrient intake will have an irreversible

impact on the quality of their life. The recommendations for infant and young child feeding have been clearly provided by the World Health Organization (WHO): exclusive breastfeeding for the first six months, thereafter infants should receive complementary foods (CF) due to insufficient nutrient intake from breast milk and continued

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breastfeeding for up to 2 years of age or beyond (WHO, 2001; WHO, 2003). Similarly, the government of Indonesia has also provided recommendations, which are in accordance with WHO recommendations.

Indonesia is facing a nutritional problem in infants and children. According to the Indonesia Basic Health Research 2013, 37% of children under 5 years of age in Indonesia were stunted, 12% were wasted and 19.6% were underweight (Ministry of Health, 2013a). Poor breastfeeding and complementary feeding practices, coupled with high rates of infectious diseases, are the principal proximate causes of malnutrition during the first two years of life. Complementary food is defined as nutritious food that is given to infants aged six months and above in addition to breast milk in order to achieve nutritional need of infants (WHO, 2001).

WHO recommends that complementary foods should have or provide adequate nutrients, be introduced timely and can be consumed 2-3 times per day at the age of 6-8 months and 3-4 times per day at the age of 9-11 months (WHO, 2001; WHO, 2003). Introduction of CF prior to six months of age may displace breast milk and have a negative impact on nutrient intake (Friel *et al.*, 2010). Also, early introduction to complementary feeding does not have any potential benefits in regards to improved growth velocities or food acceptance of infants. On the other hand, delayed introduction to complementary feeding is associated with negative consequences to the infants' health. As breast milk is no longer able to fulfil the nutritional requirements of an infant after six months of age, continuing to feed only breast milk beyond this period leads to nutritional deficiencies and as a consequence malnutrition, the child is susceptible to infections thus increasing morbidity (Basnet *et al.*, 2015).

The purpose of this study is to determine the consumption profile of CF during the first year of life, including frequency of consumption, types of complementary food, and to compare nutritional intake of CF against the nutritional needs of Indonesian infants aged 6-11 months based on the data collected through the IFCS 2014. This study also assessed timely introduction for age group 0-5 months old and 6-11 months old.

MATERIALS AND METHODS

Study population

This study was carried out using the data resulted in the Individual Food Consumption Survey (IFCS) 2014 on 1,514 individuals from the age group of 0-11 months who were part of the National IFCS 2014. The National IFCS survey involved 145,360 individuals aged 0->55 years from all provinces in Indonesia. The surveyed individuals for the age group of 0-11 month were divided into the following age groups: 0-5, 6-8 and 9-11 months.

IFCS 2014 is a cross-sectional survey, which was conducted by the Ministry of Health of the Republic of Indonesia. Food consumption was collected by interviewing the mothers/householder using a questionnaire. The questionnaire was designed to obtain information on age of infants as well as the type and quantity (weight) of food consumed by infants using 24-hour dietary recall method. The 24-hour dietary recall method was conducted by asking the householder to recall all the food consumed in the past 24 hours (one day) by means of probing using the 5-Step Multiple-Pass Method.

Identification and categorisation of complementary foods

Complementary foods were categorised into two groups, namely homemade complementary food and manufactured complementary food. Homemade

complementary food includes cereals (wheat, rice, barley, oats, rye, maize, millet, sorghum and buckwheat), tubers (cassava, sweet potato, potato, arrowroot, starchy materials (sago, palm), pulses (mung bean, red bean), oil seed (soybean, ground nut, sesame), milk, fish, meat, poultry meat, fruit and vegetables; whereas manufactured complementary food is classified based on its category and brand.

Assessment of profile of complementary food consumption

- a) Identifying the timely introduction of CF is to know the early introduction for infants under the age group of 0-5 months and the late introduction for 6-11 months age group. It is called early complementary food feeding if infants aged 0-5 months have been provided with CF, while those aged 6-11 months but have not yet been given CF fall under the category of late introduction to the complementary food. The proportion of early and late introduction of CF is presented as the number and percentage of sample populations.
- b) Identifying the frequency of consumption of CF among infants under the age group of 6-8 months and the 9-11 months age group.
- c) Determination of the nutrient content of CF includes energy, protein, fat, vitamins (vitamin B1, vitamin B2, vitamin B3, vitamin B6 dan vitamin D) and minerals (iron, zinc, calcium, phosphor, sodium, potassium, iodine, and magnesium). The nutrient content of homemade complementary food was calculated using the Nutrisurvey 2007 software, whereas for foods that are not available in the Nutrisurvey 2007 software the calculation of nutrient content was based on TKPI-2009 or ACFD-2014. Nutrient content of manufactured

complementary food was calculated using nutrition information label.

Data analysis

Nutrient intakes of CF to nutritional adequacy was analysed based on WHO (2001) and Dewey (2001) recommendation on percentage amount of nutrient needed from complementary food. Analysis was conducted through the following steps:

- a) Calculating the nutrient needed from CF by multiplying the recommendation as percentage amount of nutrient needed from complementary food with Indonesia Recommended Dietary Allowance (Ministry of Health, 2013).
- b) Nutrient intake from CF was calculated by counting consumption amount of complementary food per day per individual.
- c) Nutrient intake from food is categorised as sufficient when fulfilling 80-120% of nutritional need (McCrorry & Campbell, 2011). Referring to those recommendations, nutrient intake analysis was categorised into three groups, namely <80% (less), 80-120% (sufficient) and >120% (excessive).

RESULTS

Out of 1,514 individuals surveyed, 863 (57%) were aged 0-5 months, 288 (19.0%) were 6-8 months old and 363 (23.9%) were 9-11 months of age. The proportions in the age groups of 0-5, 6-8 and 9-11 months who consumed CF were 19.2%, 96.2% and 97.3% respectively. The characteristics of individuals by age and sex are described in Table 1.

Homemade complementary foods were prepared from 342 raw materials which were divided into 15 food groups, whereas manufactured CF consisted of nine variances. Homemade CF was the

Table 1. Individual profile of 0-11 months age group

Age group (months)	Consuming complementary food			Not consuming complementary food			Total (persons)
	Boy (persons)	Girl (persons)	Total (persons)	Boy (persons)	Girl (persons)	Total (persons)	
0-5	82	84	166	367	330	697	863
6-8	137	140	277	7	4	11	288
9-11	170	183	353	4	6	10	363
Total	389	407	796	378	340	718	1514

most widely consumed among the age groups. Consumption of CF category by age group is described in Figure 1.

2). Manufactured CF, cereal-based homemade CF and fruit-based CF were the most widely consumed by infants

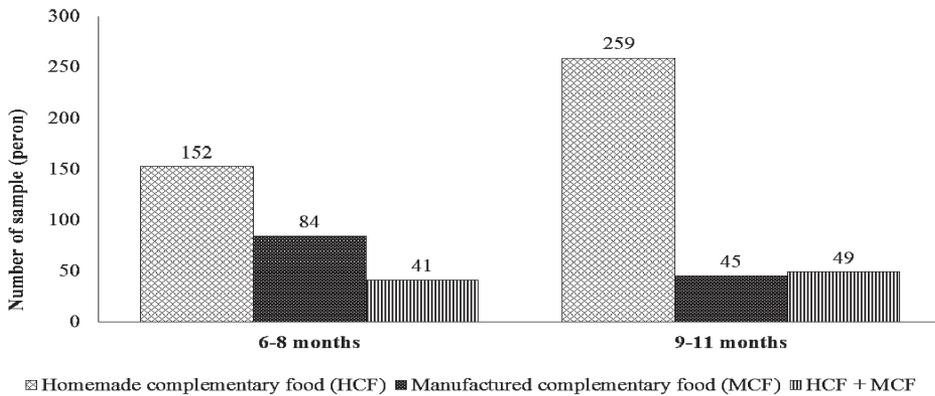


Figure 1. Complementary food consumption by category

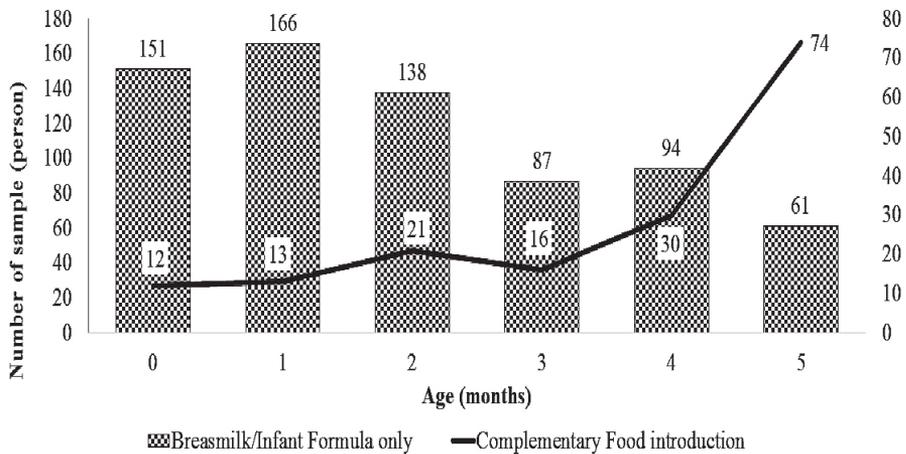


Figure 2. Early introduction profile of complementary food

Timely introduction of complementary food

Out of 863 infants aged 0-5 months, 19.2% were introduced early CF (Figure

aged 0-5 months. In contrast, 3.2% of 651 infants aged 6-11 months had not been introduced with complementary food at the time of the survey.

As for frequency of CF consumption, 82.7% of 6-8 months consumed 2-3 times per day, and 59.5% aged 9-11 months 3-4 times per day.

Nutrient intake of complementary food

Nutrient intake of CF for infants of the 6-8 months age group is described in Figure 3a, Figure 3b and Figure 3c.

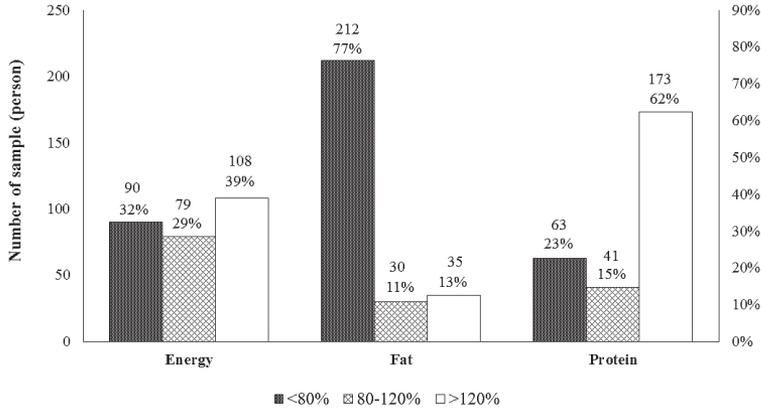


Figure 3a. Macronutrients intake of complementary food for 6-8 months age group

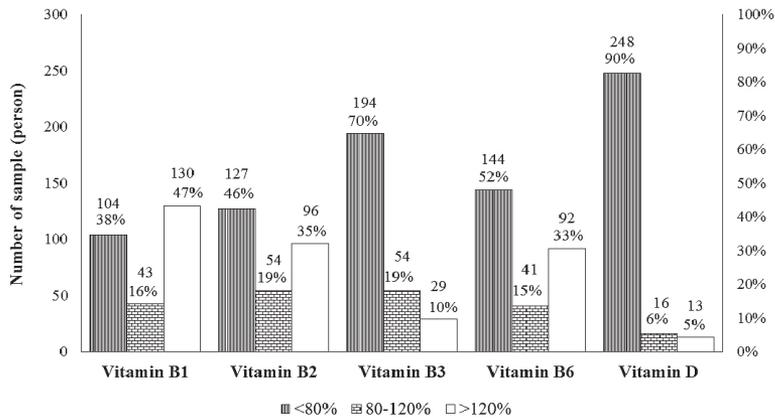


Figure 3b. Vitamins intake of complementary food for 6-8 months age group

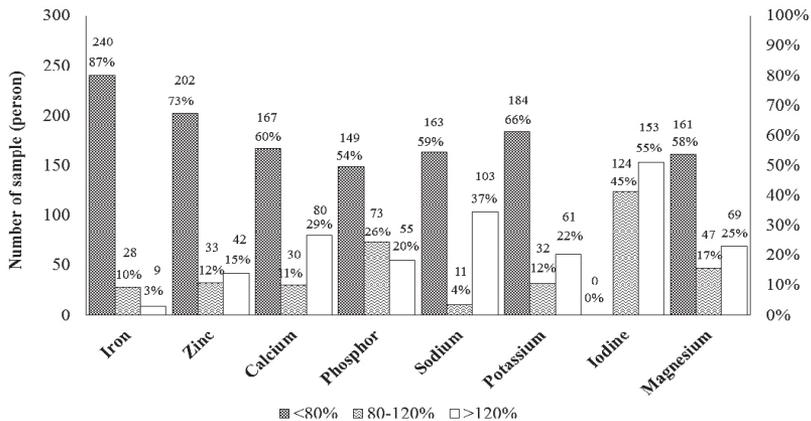


Figure 3c. Minerals intake of complementary food for 6-8 months age group

There were 76.5% who had less intake of fat and 62.5% excessive protein intake. Almost all vitamin intakes were less than recommendations with vitamin D being the worse-off with 89.5% not meeting requirements. As for mineral intake, iron, zinc, potassium, calcium and sodium intake showed 86.6%, 72.9%, 66.4%, 60.3% and 58.8% not meeting respective requirements. In contrast, intake of sodium and iodine exceeded recommendations was found in 55.2% and 37.2% respectively of the

infants. The main source of iodine was manufactured CF.

Intake of energy, fat and protein were below recommendations among aged 9-11 months involving 69.1%, 90.4% dan 47.0% individuals respectively (Figure 4a). Almost all vitamin and mineral intakes were below requirements with vitamin D as the lowest involving 88.7% of the infants (Figure 4b and Figure 4c). Also for this age group, sodium and iodine intake exceeded recommendations in 49.3% and 11.0% respectively of the infants.

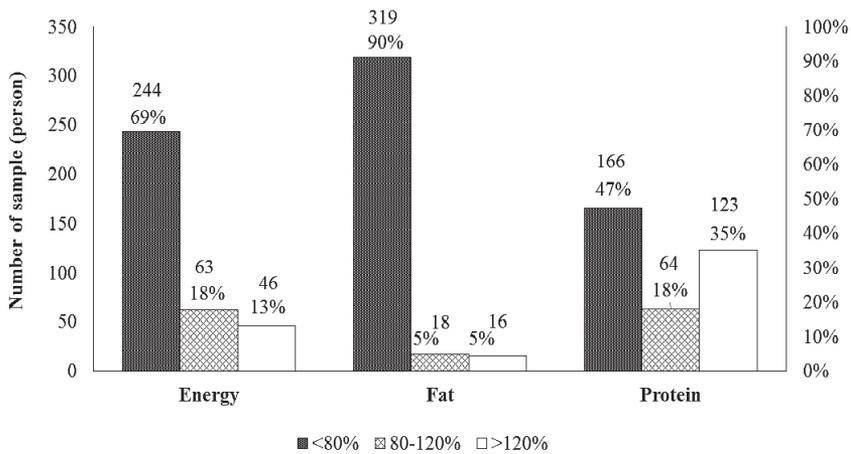


Figure 4a. Macronutrients intake of complementary food for 9-11 months age group

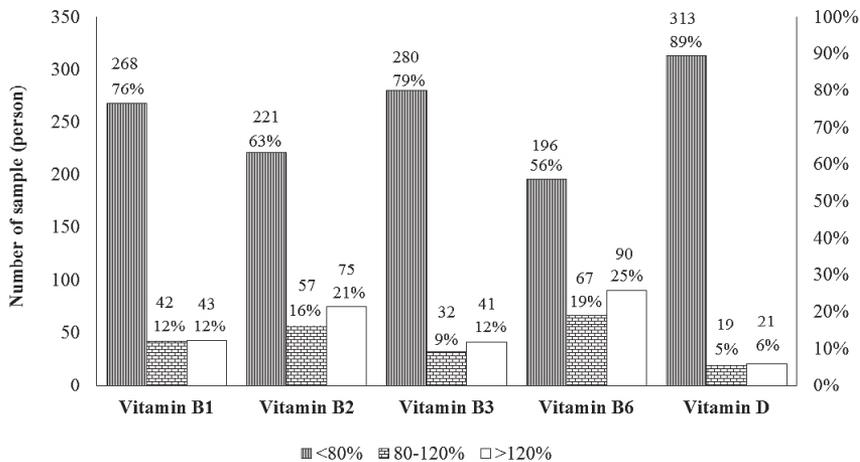


Figure 4b. Vitamins intake of complementary food for 9-11 months age group

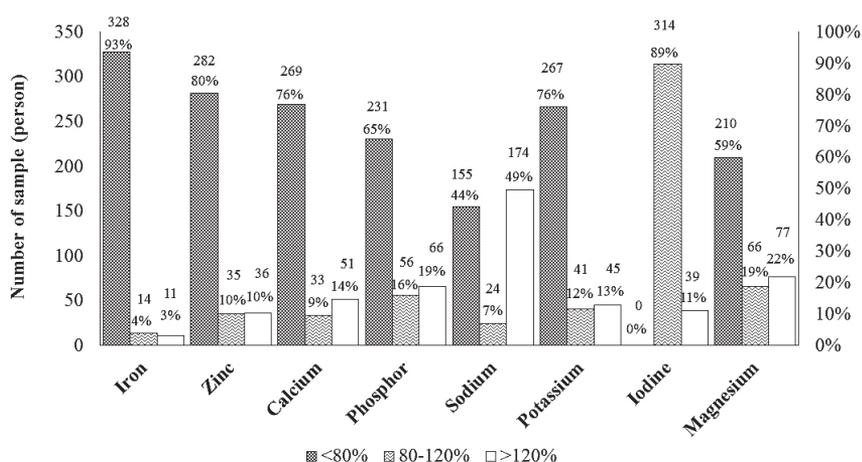


Figure 4c. Minerals intake of complementary food for 9-11 months age group

DISCUSSION

In many developing countries, manufactured CF is difficult to obtain due to very limited availability. As a result, homemade complementary foods are frequently used for child feeding (Abeshu, Lelisa & Geleta, 2016). As a developing country, in Indonesia, homemade CF is also the most widely consumed among infants aged 6-11 months. According to WHO recommendations, the purpose of feeding practice is to get used to eating family food (Indonesian Pediatrician Association, 2015). The cases of early and late introduction of CF were found in Indonesia, however, the late introduction case is less than the early introduction. It is important to educate the members of the community about the impact of early introduction. An argument by Saleem *et al.* (2014) suggests that mother's education have a positive impact on the timely and appropriate complementary food feeding. The untimely introduction was also found in other countries. A study of 562 mothers with children aged 6-23 months in Ethiopia, showed that 59.6% of them were introduced CF before the age of six months (Agedew *et al.*, 2014). A study in northeast Italy involving 400 infants reported that

7.0% were given CF at three months, 32.0% at four months, and 47.0% at five months (Carletti *et al.*, 2017). Basnet *et al.* (2015) and Mrosková, Schlosserová, & Magurová (2016) reported various reasons given by the mothers for early introduction of CF, including insufficient breast milk, infants were old enough to be given CF, needed to return to work, infants were able to take CF, and infants were often hungry on breast milk only.

Frequency of CF consumption among the Indonesian infants was in line with WHO recommendations for breastfed infants. This study however, did not analyse the difference of consumption frequency between breastfed and non-breastfed infants or combination of both. WHO has provided different recommendations for the breastfed and non-breastfed infants.

Infants belonging to the 6-8 month age group received excessive protein, compared to those aged 9-11 months. Breastmilk is deemed adequate as the main source of protein, and only 21% of the recommended dietary allowance for protein is needed from CF for infants 6-8 months (WHO, 2001; Dewey, 2001). As for ages 9-11 months, 42% of their required protein has to be from CF, owing to decreasing protein from breastmilk.

Fish, cereal, and poultry and game meat are the major sources of protein.

Vitamin intake in the CF was low by the majority of the infants. Inadequate intake of vitamins could lead to metabolic disorders, which in turn will have a negative impact on growth. Intake of zinc, calcium, iron was also below recommendations. Campos *et al.* (2010) reported nutrient intake from CF of 64 infants aged 6-12 months in Guatemala were near recommendation levels except for calcium, iron and zinc, identified as “problem nutrients”. Fortifying CF with iron was reported effective in reducing iron deficiency (Qasim & Friel, 2015); Wang *et al.*, 2009). According to Dewey (2001), the content of these three minerals in breast milk decrease significantly and should be supplied by CF. Iron, zinc and calcium intake of Indonesian infants were mainly from manufactured CF, but the amount of manufactured CF consumption was very small compared to homemade CF that are largely vegetable based.

This study found iodine intake to be generally sufficient. Iodine’s content in breast milk is sufficient for infants and not necessary to be supplied by CF (Dewey, 2001). It is recommended to reduce salt in CF as this analysis found excessive sodium intake in the CF consumed. WHO (2003) recommended reduced sodium intake as there is a correlation between high sodium intake with the risk of hypertension.

CONCLUSION

There are cases of early and late introductions of complementary feeding to Indonesian infants. Frequency of complementary food consumption for 6-8 months age group was 2-3 times per day and 3-4 times per day for the 9-11 months age group. Intake of fat, iron, zinc and calcium was found to be insufficient.

There was excessive iodine and sodium intake in some individuals. Almost all vitamin intakes were inadequate with vitamin D being the lowest. To improve this, government policies on complementary feeding education and homemade complementary food supplementations are thus required.

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Authors’ contributions

Yusra E contributed to study concept and design, data acquisition, analysis, and interpretation, and manuscript writing; Nurheni SP and Endang P contributed to study concept and design, analysis, and critical revision of the manuscript and approved the final draft.

Conflict of interest

The authors declare that they have no competing financial interests and that their freedom to design, conduct, interpret, and publish research is not compromised by any controlling sponsor.

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