

Review Article

Feeding practices among Indonesian children above six months of age: a literature review on their magnitude and quality (part 1)

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Background: In Indonesia, 37% of children under-five are stunted, 12% wasted and 12% overweight. Adequate feeding practices among children above 6 months of age are critical to tackle malnutrition. National surveys have been conducted to assess feeding practices but these aggregates hide geographic disparities. While several studies have been conducted in specific country locations to address this gap, no attempt has been made to reconcile available information. This paper aims to provide a comprehensive review of the literature on feeding practices among Indonesian children above six months of age. **Methods:** A literature search was conducted in several databases using combinations of different search terms: feeding, child, Indonesia, *MPASI*/complementary feeding, *gizi*/nutrition, factor, determinant, *praktek*/practices. All documents were reviewed using a three-step procedure to assess content appropriateness and research quality. Available information was analyzed using current recommendations on feeding practices. **Results:** Dietary diversity, consumption of iron-rich foods, active feeding and hygiene practices were among the non-optimal feeding practices. Consequently dietary intakes are not fulfilled for several micronutrients. Some feeding practices are worst in younger children. Differences between data from national and site-specific surveys are noted. Overall quality of the surveys needs to be strengthened. **Conclusions:** Generally, child feeding practices are not optimal. Indicators used to assess components of child feeding vary and make inter-survey comparisons challenging. The results also stress the need to investigate the underlying factors to optimal child feeding practices. The results may be used for advocacy of additional resource allocation for effective child feeding promotion programs.

Key Words: complementary food, feeding practices, dietary intake, literature review, Indonesia

INTRODUCTION

The critical role of feeding practices and, especially, of optimal complementary feeding practices along with continued breastfeeding among children six months and onwards to reduce young child under-nutrition and mortality is well recognized.¹⁻⁴

Indonesia is one of the 36 high burden countries known to be home to 90% of world's stunted children.² Although the country is on track to achieve the Millennium Development Goal's target on the reduction of underweight prevalence, a high stunting rate persists. National estimates indicate that 37% of children under-five (around 8 million) are stunted while wasting and overweight, affects 12% of them.^{5,6} Given the impact of malnutrition on child survival, cognitive development, work productivity as well as its health consequences in adulthood, and thus, on national financial burden and economic growth,^{1,2,6-8} global targets have been endorsed by the World Health Assembly (WHA) in 2012 (WHA Resolution 65.6) to improve maternal, infant and young child nutrition. Countries involved in the Scaling Up Nutrition (SUN) Move-

ment such as Indonesia are committed to achieve the WHA's nutrition targets.⁹ To a certain extent, in Indonesia, this pledge is reflected in the current National Development plans¹⁰⁻¹¹ which aim to decrease stunting prevalence. Up to now though, Government's efforts to improve child feeding have focused on breastfeeding promotion and limited resources have been invested on the child complementary feeding component.

In the past decades, national surveys have been conducted in Indonesia to assess feeding practices among children under-five but disparities exist between the 33

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provinces and around 500 districts and regencies constituting the country. To address this challenge, studies have investigated feeding practices among infants and young children in specific areas. However, no attempt has been made to reconcile available literature and to identify gaps in the current knowledge. The aim of this paper is to provide a comprehensive review of available literature on feeding practices among children above 6 months of age. The review results will be used to advocate at national and sub-national levels for a better alignment of current development plans with Indonesia's global commitments on nutrition and also to leverage appropriate resources, for nutrition in particular, to the implementation of effective program promoting all components of appropriate child feeding practices. The results will also provide guidance to the development of key messages for behaviour change. Another paper resulted from the review sheds light on the underlying determinants of these practices.

METHODS

Census of literature

A systematic research of the literature was conducted in the following electronic databases: www.perpustakaan.ui.ac.id from the University of Indonesia, <http://repository.usu.ac.id/> from the University of North Sumatera, <http://www.library.upnvj.ac.id/> from the University of *Pembangunan Nasional Veteran* Jakarta, GARUDA search engine (*Garba Rujukan Digital*) at <http://jurnal.dikti.go.id>, in Proquest: <http://proquest.umi.com/pqdweb> and EBSCO: <http://search.ebscohost.com> as well as in PubMed: <http://www.ncbi.nlm.nih.gov/pubmed>.

Publications from 1990 up to 2012 were identified by the search using the following key words (English and Indonesian languages) either used individually or combined: feeding, children, Indonesia, *MPASI*/complementary, *gizi*/nutrition, factor, determinant, child, *praktek*/practices. All combinations included Indonesian words. The research yielded a maximum of 37 references. In addition, 11 reports from organizations and local research institutions were included.

Analysis

Peer-review papers, reports and theses were included if they were complete and if they had data on at least one component of feeding practices among children under-five and/or underlying factors to those practices (Step 1 below).

Step 1

All 48 documents were screened for inclusion using the following criteria:

- Full papers, reports, theses
- At least one component of the subject of interest was covered
- Children above 6 months up to 59 months of age were the main subject

As many as 43 publications were retained. Each publication was read thoroughly by at least two authors. Detailed information on the objectives, methodology (sampling, data collection and analysis) and main results were extracted and compiled for each publication.

Step 2

The quality of each document was then analyzed using specific criteria based on a previously used template.¹² This second screening process identified 34 papers, thesis and reports which were covering either or both, feeding practices and any of their underlying determinants. In this current paper, only publications investigating feeding practices were retained (26) as shown in Table 1.

Step 3

Available data on the different components of child feeding practices was analyzed based on the WHO current recommendations¹³ in terms of indicators and criteria as follows:

1. Minimum meal frequency: % of breastfed and non-breastfed children 6-23 months of age who received solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) with the minimum number of times or more:
 - a. Breastfed children 6-8 months who received solid, semi-solids or soft foods 2 times or more during the previous day;
 - b. Breastfed children 9-23 months who received solid, semi-solids or soft foods 3 times or more during the previous day;
 - c. Non-breastfed children 6-23 months who received solid, semi-solids or soft foods 4 times or more during the previous day.
2. Minimum dietary diversity: % of breastfed and non-breastfed children 6-23 months of age who received foods from four or more food groups (namely grains; roots and tubers; legumes and nuts; flesh foods such as meat, fish, poultry and liver/organ meats; eggs; vitamin-A rich fruits and vegetables; other fruits and vegetables).
3. Minimum acceptable diet: % of children 6-23 months of age who received a minimum acceptable diet (apart from breast milk):
 - a. % of breastfed children 6-23 months of age who had at least the minimum dietary diversity and the minimum meal frequency during the previous day;
 - b. % of non-breastfed children 6-23 months of age who received at least 2 milk feedings and had at least the minimum dietary diversity (not including milk feeds) and the minimum meal frequency during the previous day.
4. Introduction of solid, semi-solid, or soft foods: % of infants 6-8 months of age who received semi-solid or soft foods.
5. Consumption of iron-rich or iron-fortified foods: % of children 6-23 months of age who received an iron-rich or iron-fortified food (specially designed for infants and young children or fortified at home).
6. Continued breastfeeding at one year of age: % of children 12-15 months of age who are fed breast milk.
7. Continued breastfeeding at two years of age: % of children 20-23 months of age who are fed breast milk.

Data available on other components of child feeding practices such as on active/responsive feeding, feeding practices during illness and hygiene practices around child food preparation as well as on child dietary intake were also retained in the review. Based on the Care Initia-

tive document published by UNICEF¹⁴ and Demographic and Health Survey's methodology, the following indicators and criteria were used to assess the appropriateness of these practices:

- Active feeding: adequate if caregiver encourages the child to eat.
- Feeding during illness: adequate if continued or increased breastfeeding during illness is encouraged.
- Hygiene practices around child food preparation and feeding: adequate if storage of food is done at temperature that does not promote growth of pathogens (below 10°C and above 60°C), sufficient cooking or reheating of food, hand-washing with soap before preparing child's or family meal as well as before feeding the child, also availability of a place with water and soap for hand-washing.

RESULTS

In total, 26 documents were included in the review. With the exception of the 2007 and 2012 Demographic and Health Surveys (DHS) and the 2010 National Health Survey, of a total of 33 provinces constituting Indonesia, data on feeding practices among children above 6 months of age, have been collected in 12 provinces. West and Central Java, East Nusa Tenggara (NTT in Indonesian), West Nusa Tenggara Barat (NTB in Indonesian), North Sumatra and Nanggroe Aceh Darussalam (NAD) provinces were the locations of more than one survey (Table 1). Out of a total of around 500 districts/regencies, assessments have been carried out in 57 districts. This number does not include districts covered by national surveys. With the exception of NTB and NTT provinces, surveys have been conducted in a limited number of districts in each province.

The majority of studies were in English language. Most of them used a cross-sectional design and were not representative beyond the survey site. Average sample size was above 100 individuals with a response rate above 90% (Table 1).

Feeding practices

Available information from the review of feeding practices among children six months and above are featured in Table 2. Some data are presented by child's characteristic such as age, health and breastfeeding status.

Data from national and site-specific surveys show that most children 6-8 months received complementary food. Similarly, all survey data revealed that the majority of children 12-15 months and 20-23 months were still breastfed even though breastfeeding practice was declining with increasing child's age. In addition, during diarrhea episodes, majority of the mothers continued to breastfeed their child.

Data from site-specific surveys revealed that most children aged 6-23 months received three meals daily (the indicator to assess minimum meal frequency). However, national aggregates show lower figures. These assessments took into account the breastfeeding status of the child based on the WHO feeding recommendations. As such, data from the 2007 DHS indicate that 12% of non-breastfed and 67% of breastfed children benefited from

the minimum meal frequency, or in other words, received the recommended/adequate number of meals on a daily basis. Interestingly, the proportion of non-breastfed children benefited from the minimum meal frequency was much higher in the subsequent 2012 DHS (i.e. 79%). Both, the 2007 DHS and 2012 DHS, show that the adequacy of daily meal frequency was declining with increasing child's age (results not shown). For instance, the 2007 DHS data reveal that 43% of children aged 18-23 months compared with 70% and around 53% of children aged 6-8 months and 9-17 months, respectively, benefited from the minimum meal frequency. One site-specific study shows a lower adequacy of daily meal frequency among children with diarrhea compared with healthy children.

Proportions of children who received foods daily from at least four food groups (criteria of adequacy in terms of dietary diversity) were lower than those benefited from the minimum meal frequency (Table 2). The 2012 DHS reveals a situation which was worst among younger age groups as only 23% of children aged 6-8 months compared with 54%, 65% and 75% of 9-11, 12-17 and 18-23 months old, respectively, received foods from at least four groups daily. The 2007 DHS revealed a similar pattern (results not shown). Studies investigating dietary diversity showed consistent data. It is however noteworthy that a lower proportion of stunted children consumed animal source foods compared with that of non-stunted children.

Consumption of individual iron-rich foods varied from 3% to 88%, and it appeared lower among stunted children. Site-specific surveys report a wider range than that of national surveys. National level estimates were higher than data issued from site-specific surveys. Vitamin A rich foods were generally consumed by a majority of children below three years of age. As for iron-rich food, their consumption increased (results now shown) with increasing child's age.¹⁵⁻¹⁶ Overall, data from the two sets of DHS indicated that approximately 4 out of 10 children received the minimum acceptable diet. Yet, non DHS figures from provincial-representative surveys carried out in NTB and NTT provinces showed that 1 out of 10 children benefited from the minimum acceptable diet. Differences were also noted according to the breastfeeding status of children. As such, the 2007 DHS revealed that 53% of breastfed and 8% of non-breastfed children were fed following the WHO recommendations, which were found to be 34% and 43% respectively in the 2012 DHS. Data from the 2012 DHS also showed a higher proportion of older children receiving the minimum acceptable diet: 18% (6-8 months), 34% (9-11 months), 41% (12-17 months) and 45% (18-23 months). With the exception of the study carried out in Gorontalo province,¹⁷ available data show that active feeding was practiced by around 30% of caregivers in most areas and it was somewhat lower among anaemic children compared with their non-anaemic counterparts.

As revealed in the 2007 DHS (results not shown), data from the 2012 DHS also indicated differences between proportions of children benefiting from a minimum acceptable diet according to mother's education and house

Table 1. Procedure for validity assessment: design and methodological characteristics of all included documents

Characteristics	Reference No
References included in the review and their related number [†]	
Authors	
Astari et al (2006)	1
Nutrisiani (2010)	2
Mustamin et al (2008)	3
Sulastris (2004)	4
Inayati et al (2012a)	5
Gryboski (1996)	6
Padang (2008)	7
Fransisca (2005)	8
SEAMEO TROPED RCCN (2010)	9
Ministry of Health and The Manoff Group (1991)	10
Action Against Hunger (2010)	11
Ministry of Health (2010)	12
Statistic Indonesia/Macro International (2008)	13
Statistic Indonesia/BKKBN/Kemenkes/ ICF International (2013)	14
University of Indonesia (UI) and UNICEF (2012)	15
SEAMEO TROPED RCCN and UNICEF (2012)	16
Rospita (2009)	17
SEAMEO TROPED RCCN / FAO/UNICEF/WFP (2010)	18
Februhartanty et al (2005)	19
UI/Ministry of Health/GTZ (2009)	20
SEAMEO TROPED RCCN/WFP/EU (2005)	21
SEAMEO TROPED RCCN/WFP (2008)	22
SEAMEO TROPED RCCN (2007)	23
Utomo et al (2000)	24
Lestari et al (2005)	25
Anwar et al (2010)	26
Location (provinces)	
All provinces	12,13, 14
West Java	1, 17, 24, 26
Central Java	2, 6, 16, 25
East Java	10
North Sumatra	4, 5, 7, 23
West Sumatra	23
Jakarta DKI	19
South Sulawesi	3
NTT	8, 11, 16, 18, 21
NTB	10, 20, 21
Gorontalo	9
NAD	15, 22
West Papua	16
Design	
Longitudinal	6
Cross-sectional	1, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26
Others	2, 3
Aim clearly stated	
Yes	1, 2, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 18, 19, 20, 23, 24, 25, 26
No	3, 11, 17, 21, 22
Theoretical basis	
Explicitly theory based	2, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 23, 24, 25, 26
Partially	1, 7, 17
No theory or unclear	3, 21, 22
Sample size	
Not reported	None
<30	None
30-49	3
50-100	1, 2, 4, 6
>100	5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26

[†]For practical purpose, reference numbers are used in Tables 1 and 2.

Table 1. Procedure for validity assessment: design and methodological characteristics of all included documents (cont.)

Characteristics	Reference No
Response rate	
Not reported	1, 3, 8, 10, 19, 21, 23
<50	None
50-90	None
>90	2, 4, 5, 6, 7, 9, 11, 12, 13, 14, 15, 16, 17, 18, 20, 22, 24, 25, 26
Representative sample	
Information not available	None
Not representative beyond study population	1, 2, 3, 5, 6, 9, 11, 15, 16, 17, 19, 21, 22, 23, 24, 25
Representative for restrictive area	4, 7, 8, 10, 18, 26
Representative for state/nation	12, 13, 14, 20
Indicators and criteria description	
All well defined	4, 5, 6, 7, 8, 9, 10, 13, 14, 15, 16, 18, 19, 20, 21, 24, 25
Some items well defined	1, 11, 12, 17, 22, 23, 26
Items not covered/missing	2, 3
Instrument for assessing feeding practices	
Food-frequency questionnaire	9, 21, 24
24-hour recall	1, 6, 8, 9, 10, 12, 13, 14, 15, 16, 18, 19, 20, 22, 23, 25, 26
Notes from direct observations	6, 10, 25
Semi-structured questionnaires	5, 13, 14, 16, 17, 20, 21
Others	18, 22
Not mentioned	2, 3, 4, 7, 11
Validity of applied measurements	
No information	1, 2, 3, 4, 7, 8, 9, 11, 17, 19, 22, 23, 25, 26
Only reference to former publications	None
Validity assessed for all or some items/scales within the applied study population	5, 6, 10, 12, 13, 14, 15, 16, 18, 20, 21, 24
Analysis	
Univariate	1, 2, 4, 10, 21, 22, 26
Multivariate	2, 16, 19, 25
Descriptive	3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 20, 21, 22, 23, 24
Not specified	None
Language	
English	5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26
Indonesian	1, 2, 3, 4, 7

†For practical purpose, reference numbers are used in Tables 1 and 2.

hold socio-economic level. As such, only 10% of 6-23 months old children with a non-educated mother benefited from the minimum acceptable diet compared with 50% of children with a mother having more than a secondary level of education. Two-times more children living in the richest households (i.e. 52%) received an appropriate diet compared with those living in the poorest families (i.e. 23%). Differences between areas were also noted: a higher proportion of children living in urban area benefited from the minimum acceptable diet than children in rural setting (43 vs 31%).¹⁶ Less than a quarter of children aged 6-23 months living in Papua and Maluku provinces were fed based on the recommendations while in Sulawesi the proportions varied from 16-36%. In Bali, Kalimantan, Java and Sumatera provinces, between 30-50% of children were fed adequately. In NTT and NTB provinces, the 2012 DHS data showed an average proportion of 30% which is three times higher than the percentage reported in a survey conducted in 2009.¹⁸

Hygiene practices

Less than 50% of caregivers used appropriate hygiene practices based on the nationwide recommendations. Around 50% of caregivers washed their hands with soap before preparing a meal and one-third of them washed their hands with soap before feeding the child in spite of the fact that most households reported to have a facility with soap and water for hand-washing. Moreover, the majority of caregivers stored food at room temperature and did not reheat the food before eating. Around 20% of caregivers did not cook foods thoroughly before offering them to children.

Dietary intake

Available data on dietary intake from a site-specific survey showed that quantities of food consumed by children aged 6-24 months, with and without diarrhea, were not in line with the Indonesian recommendations issued by the Ministry of Health as only 18% of children with diarrhea and 28% without diarrhea were fed accordingly (i.e. 6 months: 6 spoons; 7 months: 7 spoons; and so on).¹⁹

Table 2. Child feeding practices: results from the review for selective indicators and criteria[†]

Indicator	Proportion (%)	Reference No [‡]
<i>Introduction of solid, semi-solid or soft foods</i>		
% of children whom foods were introduced:		
before 6 months (mos)	79 (6-59 mos [§])	5
	81 (6-24 mos)	3
at/after 6 mos	92 (6-24 mos)	7
	70 (0-24 mos)	2
% of children 6-8 mos of age with mixed breastfeeding: breastmilk + soft/solid foods and/or other milks	80	24
% of children 6-8 mos of age who received solid, semi-solid or soft foods	90 (0-24 mos, breastfed)	14
	97 (0-24 mos, non-breastfed)	14
	84 (0-35 mos, breastfed)	13
	85 (0-35 mos, non-breastfed)	13
Mean age of introduction (mos)	4.4	21
<i>Continued breastfeeding</i>		
% of children 20-23 mos still breastfed		
	59 to 100	15
	60	16
	50	13
	55	14
% of children 18-24 mos still breastfed	62	24
% of children 24 mos still breastfed	74 to 80	20
% of children 12-23 mos still breastfed	43 (mildly wasted)	5
% of children 12-15 mos still breastfed	88	16
	80	13
	77	14
<i>Minimum meal frequency</i>		
% of children receiving daily:		
1-2 meals (4-6 mos), 3-4 meals (6-12 mos), 4-6 meals (12-24 mos)	58 (all)	4
2 meals	27 (<36 mos)	1
≥ 3 meals	66 (<36 mos)	11
	94 (6-8 mos)	8
	97 (9-11 mos)	8
	99 (12-23 mos)	8
	78 (6-24 mos, healthy children)	2
	50 (6-24 mos, with diarrhea)	2
	80 (12-59 mos)	22
	86 (12-59 mos)	18
Breastfed children		
6-8 mos: % who received solid, semi-solids/soft foods ≥ 2 times	92	15
	80	13
	73	14
9-23 mos: % who received solid/ semi-solids/soft foods ≥ 3 times	52	15
6-23 mos: % who received solid/ semi-solids/soft foods either 2 or 3 times	78	16
	61	14
	67	13
Non-breastfed children		
6-23 mos: % who received solid/ semi-solids/soft foods ≥ 4 times	3	15
	53	16
	79	14
	12	13
<i>Minimum dietary diversity</i>		
% of children 6-23 mos of age who received foods from ≥ 4 food groups		
	49	16
	56	15
	58	14
	76 [¶]	13

[†]Underlined items refer to the WHO recommendations in terms of indicator. [‡]The reader shall refer to Table 1 for authors' names. [§]Age group under assessment. [¶]Consists of at least 3 or 4 food groups. ^{††}Vitamin A rich foods include meat, fish, poultry, eggs, yellow squash, carrots, yellow or orange sweet potatoes, dark green leafy vegetables, mangoes, papayas, jackfruit, *cempedak*, persimmon, yellow melon and other locally grown fruits and vegetables that are rich in vitamin A. ^{†††}Consumption of specific iron-rich foods (meat, fish, poultry, liver, eggs, infant formulas) was assessed. Values presented are ranges of proportions of children consuming different and specific iron-rich foods. ^{§§}Iron-rich foods: meat, poultry and fish. ^{¶¶}Animal-protein foods: eggs, chicken, fish, meat. ^{††††}Meat (including organ meat). ^{†††††}Meat (including organ meat), fish, poultry and eggs. ^{§§§§}Animal source foods (lamb, beef, pork, fish, seafood, poultry, organs/offal, milk), processed foods containing animal foods and iron-fortified foods i.e. foods with addition of micronutrient powders, fortified foods and beverages (milk).

Table 2. Child feeding practices: results from the review for selective indicators and criteria[†] (cont.)

Indicator	Proportion (%)	Reference No [‡]
<i>Minimum dietary diversity</i>		
% of children 6-12 mos consuming different food groups		
Animal proteins	13 (stunted children) 47 (normal children)	1
Vegetables	46 (stunted children) 73 (normal children)	1
Fruits	21 (stunted children) 61 (normal children)	1
Milk	6 (stunted children) 31 (normal children)	1
Mean number of food groups	1-2 (<36 mos)	11
<i>Consumption of vitamin A and iron-rich, iron-fortified foods</i>		
% of children consuming vitamin A rich foods	87 (6-35 mos) 83 (6-23 mos) 40 (6-59 mos, include oranges)	13 ^{††} 14 ^{††} 21 ^{††}
% of children 6-23 mos consuming specific iron rich foods in the last 24 hours	49 to 60 (fish/shell fish + eggs) <13 (red meat) <22 (poultry)	15 15 15
% of children 6-24 mos consuming specific iron rich foods in the last month ^{†††}	3-21 (6-8 mos) 3-53 (9-11 mos) 10-76 (12-17 mos) 6-88 (18-24 mos)	24 24 24 24
% of children consuming iron-rich foods	31 (North Sumatra), 45 (West Sumatra) (6-59 mos) ^{§§} 13 (stunted, 6-12 mos) ^{¶¶} 47 (not stunted) 70 (6-35 mos) ^{††††} 68 (6-23 mos) ^{††††} 75 (6-23 mos) ^{§§§§}	23 1 1 13 14 16
% of children consuming of iron-rich and iron-fortified foods		
<i>Minimum acceptable diet</i>		
% of children 6-23 months of age who received a minimum acceptable diet	39 41 37 9 (NTT), 13 (NTB)	16 13 14 20
<i>Active feeding</i>		
% of mothers encouraging the child to finish the meal	28 (6-8 mos) 17 (9-11 mos) 31 (12-23 mos)	8 8 8
% of mothers encouraging/persuading the child to eat	68 (6-23 mos) 30 (anaemic, 6-59 mos) 40 (non-anaemic, 6-59 mos)	9 21 21
<i>Feeding during illness</i>		
% of mothers who reduced non-breast milk calories	25 (3-25 mos)	6
% of mothers who continued breastfeeding + give ORT and/or increased fluids during diarrhea	61 (0-59 mos) 54 (0-59 mos)	14 13
<i>Hygiene practices around child food preparation and feeding</i>		
% of caregivers with practices in line with all Indonesia Ministry of Health recommendations		
Washing hands before feeding the child, before cooking, washing cooking utensils, give foods according to child's age, don't keep left-over foods	45 (0-24 mos, healthy) 20 (with diarrhea)	2 2
% of caregiver washing hand with soap before preparing a meal	34-64 57 (North Sumatra), 48 (West Sumatra), 26 (NTB), 33 (NTT) 17-55	15 23 20 19

[†]Underlined items refer to the WHO recommendations in terms of indicator. [‡]The reader shall refer to Table 1 for authors' names. [§]Age group under assessment. [¶]Consists of at least 3 or 4 food groups. ^{††}Vitamin A rich foods include meat, fish, poultry, eggs, yellow squash, carrots, yellow or orange sweet potatoes, dark green leafy vegetables, mangoes, papayas, jackfruit, *cempedak*, persimmon, yellow melon and other locally grown fruits and vegetables that are rich in vitamin A. ^{†††}Consumption of specific iron-rich foods (meat, fish, poultry, liver, eggs, infant formulas) was assessed. Values presented are ranges of proportions of children consuming different and specific iron-rich foods. ^{§§}Iron-rich foods: meat, poultry and fish. ^{¶¶}Animal-protein foods: eggs, chicken, fish, meat. ^{††††}Meat (including organ meat). ^{††††}Meat (including organ meat), fish, poultry and eggs. ^{§§§§}Animal source foods (lamb, beef, pork, fish, seafood, poultry, organs/offal, milk), processed foods containing animal foods and iron-fortified foods i.e. foods with addition of micronutrient powders, fortified foods and beverages (milk).

Table 2. Child feeding practices: results from the review for selective indicators and criteria[†] (cont.)

Indicator	Proportion (%)	Reference No [‡]
<i>Hygiene practices around child food preparation and feeding</i>		
% of women who washed their hands before preparing a meal (no mention if with/without soap)	97	13
% of caregivers washing hands before feeding the child	60 (no mention if with/without soap) 20 (with soap) 31 (North Sumatra), 10 (West Sumatra) (no mention if with/without soap) 30 (NTB), 28 (NTT) (with soap)	11 22 23 20
% of caregivers		
Storing foods at room temperature	80	17
No reheating foods before eating	70	17
Not cooking food thoroughly	19	17
Putting fingers test child food temperature	30	17
% of households with children having a facility with soap and water for hand-washing		
	57	16
	92	14

[†]Underlined items refer to the WHO recommendations in terms of indicator. [‡]The reader shall refer to Table 1 for authors' names. [§]Age group under assessment. [¶]Consists of at least 3 or 4 food groups. ^{**}Vitamin A rich foods include meat, fish, poultry, eggs, yellow squash, carrots, yellow or orange sweet potatoes, dark green leafy vegetables, mangoes, papayas, jackfruit, *cempedak*, persimmon, yellow melon and other locally grown fruits and vegetables that are rich in vitamin A. ^{***}Consumption of specific iron-rich foods (meat, fish, poultry, liver, eggs, infant formulas) was assessed. Values presented are ranges of proportions of children consuming different and specific iron-rich foods. ^{§§}Iron-rich foods: meat, poultry and fish. ^{¶¶}Animal-protein foods: eggs, chicken, fish, meat. ^{***}Meat (including organ meat). ^{***}Meat (including organ meat), fish, poultry and eggs. ^{§§§}Animal source foods (lamb, beef, pork, fish, seafood, poultry, organs/offal, milk), processed foods containing animal foods and iron-fortified foods i.e. foods with addition of micronutrient powders, fortified foods and beverages (milk).

In Bogor district²⁰ compared with the Indonesian Recommended Dietary Allowances (RDAs), the contribution of complementary foods to the satisfaction of nutritional requirements was generally two-times lower among stunted (15% to 58%) than that among non-stunted children (50% to 100%). Moreover, in NTB and East Java provinces, available data showed that healthy children aged 5-18 months met around 50% of their energy and protein requirements²¹ as opposed to Cianjur district (West Java) where on average energy intake fulfilled 80% of young children requirements but protein intake was well above the RDAs.²²

In Jakarta area, between 50% and 100% of children aged 6-24 months met two-thirds of their nutritional requirements for a range of macro- and micronutrients when compared to Indonesian RDAs. Nutrient requirements were better satisfied among older children (6-11 months: 50-100% vs 12-23 months: 73-100%).²³ In Alor district (located in NTT province), the satisfaction of nutrient requirements was also generally low among children aged 6-23 months and, in particular, among the youngest group when compared with Indonesian RDAs. Overall, 33%, 23%, and 53% of children aged 6-8, 9-11, and 12-23 months, respectively, had mean adequacy ratio for all nutrients combined of ≥ 0.67 (the selected cut-off for adequacy). In each age group, less than half of the children had nutrient intake of equal or above two-thirds of their requirements for fat, riboflavin, iron, zinc, and calcium.²⁴ Lestari et al²⁵ pointed out that nutrient intake of 12-23 months old breastfed children living in Purworejo district (Central Java) were below the Indonesian RDAs for energy (724 vs 1,250 kcal/day), protein (16 vs 23 g/day) and zinc (2 vs 10 mg/day). Lastly, the results of the 2010 National Indonesian Health Survey showed that 24% of children 2-4 years old had energy intakes below 70% of the Indonesian RDAs.²⁶

Indicators and criteria to assess feeding practices

Indicators and criteria as well as age groups to assess feeding practices varied from one study to another. In some studies, introduction of foods was assessed based on whether or not foods were introduced before or after a certain age, while another study calculated the mean age of food introduction. Such assessment as well as continued breastfeeding was carried out among different age groups of children. To assess the minimum meal frequency, the majority of site-specific surveys have considered three meals as the criteria to indicate whether or not the child benefited from the minimum meal frequency. This component was also assessed in different age groups of children, i.e 6-8 months, 9-11 months, 6-24 months or 12 months and above, without considering the breastfeeding status of children. National surveys have collected data among children aged 6-8 months, and 9 months and above. In these surveys, the consumption of either two, three or four meals daily was used to assess the proportion of children from different age groups receiving the minimum meal frequency. The breastfeeding status of children was also considered in the assessment. Most studies used four groups as the criteria to assess whether or not the child was benefiting of the minimum dietary diversity. However, over the years, standardized studies such as DHS have modified their criterion to evaluate dietary diversity from three to four food groups. To assess diet diversity, other site-specific studies have investigated the consumption of food groups separately or have calculated the average number of food groups daily consumed.

Consumption of both iron-rich foods and a range of iron-fortified foods was reported solely in one study.²⁷ Another study included data on consumption of iron-fortified infant formulas in addition to iron-rich foods.²⁸ Other site-specific surveys investigated the consumption of certain iron-rich foods while national surveys reported

on consumption of a set of iron-rich foods. As for the consumption of vitamin-A rich foods, it was assessed in different age groups and one study included oranges.

Indicators to assess active feeding were quite similar from one study to another and this component was investigated in different age groups. Yet when assessing breastfeeding practices in the presence of child's illnesses, continued breastfeeding in presence of diarrhea was generally the indicator used in national surveys. Nevertheless, Gryboski²⁹ expanded the scope of illnesses to consider more symptoms such as runny nose and fever. Main hygiene practices reported by site-specific and national surveys were around hand-washing, in particular before preparing a meal or feeding the child. In these regards, the use of soap was not always part of the indicator when hand-washing practices were assessed. One site-specific study investigated hygiene practices around food preparation and storage while another one looked at a set of hygiene practices based on the national recommendations.

With regards to child's dietary intake, most studies included in the current review have used the Indonesian RDAs as a reference to evaluate their adequacy. Indonesian RDAs are different from the current international WHO/FAO/UNU recommendations in terms of energy, protein, vitamin and mineral requirements.³⁰⁻³² For instance, current recommendations on energy intake for children 12-24 months are 850 kcal/day and 950 kcal/day for girls and boys respectively, while the Indonesian RDA are at 1,250 kcal/day for children aged 1-3 years (as defined in the 1993 national workshop on food and nutrition, *Widyakarya Pangan dan Gizi*). No differentiations by bioavailability level of zinc (5 mg and 10 mg/day for children aged 7-12 months and 1-3 years respectively) and iron (5 mg and 9 mg/day) in the diet are part of the Indonesian recommendations. International recommendations set by WHO/FAO in 2004 range from 0.8 up to 8.4 mg and 3.9 to 18.6 mg for zinc and iron requirements, respectively, for children 7-36 months old based on the level of mineral bioavailability in the diet. In addition, for children aged 7-36 months, safe levels of vitamin A and vitamin C are set up at 400 µg RE/day and 30 mg/day respectively by international bodies compared with 350 µg RE/day and 35-45 mg/day in the Indonesian recommendations.

DISCUSSION

Overall, feeding practices were not optimal among Indonesian children from six months of age and upwards and varied between locations, socioeconomic level and age groups. Although socio-demographic factors such as socio-economic status and age influenced practices, they cannot be changed easily and directly by health promotion programs.³³ As expected, data from site-specific and national surveys are not always in agreement.

Poor feeding practices constitute an impediment to stunting reduction. It is also a barrier to the reduction and prevention of other forms of malnutrition such as child wasting and overweight. A few children benefited from the minimum acceptable diet as recommended by WHO. The situation appears worst among younger and sick or undernourished children, thus, highlighting the importance of some child's attributes as potential limitations

for optimal feeding practices.³⁴ Although several good practices are in place, some critical ones are not fully implemented. They are related to dietary diversity, active feeding and hygiene practices. Poor feeding practices impact dietary intake which is not optimal. The available data suggest that children do not eat enough and that consumption of micronutrient rich foods is limited. During illnesses, although breastfeeding is pursued, quantity of food seems to be reduced. Furthermore, consumption of tea and coffee – which can limit absorption of calcium and iron – has been noted among 29% and 56% of children in some areas.³⁵

There are several limitations to the current review. First, even though in a large number of studies, sample size exceeded 100 individuals, representativeness was generally limited to the population under investigation. Sample size calculation was not always clearly described in some documents. Although a few large surveys have been conducted, their representativeness was limited to provincial level. In addition, they did not represent the situation among young children as the general household (with or without children) was the sampling unit. Discrepancy has been noted between the 2007 DHS and 2012 DHS in regards to the adequacy of meal frequency among non-breastfed children although the same criterion was used for both assessments. A cross-sectional design also provided a picture of the situation at the time of the survey and did not take into account variations that may occur throughout a year due to different circumstances (e.g. season, conditions of employment). Information on the accuracy and validity of measurements were not always provided. Using retrospective method to collect data such as on age of introduction of foods may have induced a bias.

Data analyses were mostly descriptive. In several cases, data on child feeding practices including dietary intake needed to be treated with caution since the assessment was conducted using a single 24-hour recall. As such, Astari et al²⁰ have highlighted large intra- and inter-individual variations of intakes in their study. Moreover, Indonesian RDAs were the recommendations generally used to assess adequacy of nutrient intakes. Current Indonesian recommendations are different from the international ones and do not consider whether the child is breastfed or not when assessing appropriateness of complementary feeding.

In addition to limitations related to quality of surveys, although key components of child feeding practices have been assessed, indicators and criteria diverged between studies and have changed over the years. For example, the criteria to assess adequacy of meal frequency was not always alike, also on appropriateness of hand washing. Comparisons between studies in regards to the consumption of iron- or vitamin A rich foods remain challenging given that studies have used different methods, including indicators to assess their consumption. For example, in one study, oranges were considered as a vitamin A rich food. Indicators to assess consumption of iron-rich foods varied and only a few have included fortified foods. Current studies included in this review have not specifically investigated hygiene practice around child food preparation although available data on hand-washing before pre-

paring family foods is likely a proxy – though subjective – of practices around child food preparation.

Improving feeding practices is crucial to tackle malnutrition among Indonesian young children. The results of the present review highlight that feeding practices are not optimal among children aged six months and upwards. Disparities exist between socio-demographic characteristics.

Relevant and quality research is required to get a complete and accurate picture of child feeding practices. In the future, it is essential to standardize the methods across studies to enable comparisons and to measure progress. Discussions should be held on whether or not WHO and/or Indonesian recommendations should be used to collect data on child feeding practices. Selected recommendations shall be based on evidence and adequately justified.

In addition, given the diversity and disparities of the Indonesian population and, although it is important to have national surveys, it is also essential to conduct specific – locations studies especially in the most vulnerable groups.

In spite of the aforementioned limitations, results from the current review can be used for advocacy on increased resources for programs promoting appropriate child feeding practices. The components on child complementary feeding clearly require further attention. Our review also provides a few directions on ways to improve nutrition messages for programs aiming at behaviour changes, as well as on populations to be prioritized. Improving quality of infant and young child feeding (IYCF) programs through capacity building and communication campaign is essential. Moreover, to enhance efficacy of child feeding promotion programs, a better understanding of the underlying factors to appropriate practices is needed to address barriers and identify opportunities to optimal practices.

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AUTHOR DISCLOSURES

None of the authors have a conflict of interest to disclose.

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Review Article

Feeding practices among Indonesian children above six months of age: a literature review on their magnitude and quality (part 1)

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印度尼西亚六个月以上儿童的喂养方式：规模和质量 的文献综述（第一部分）

背景：在印度尼西亚，五岁以下儿童发育迟缓占 37%，虚弱和超重分别为 12%。六个月以上儿童适当的喂养方式是解决营养不良的关键。全国性的调查已对喂养方式进行了评估，但这种集合数据隐含着地域差异。为了解决这一差异，虽然在特定的农村进行了一些研究，但没有尝试对现有信息的校正。本研究旨在为印度尼西亚六个月以上儿童喂养方式提供一个全面的文献综述。**方法：**使用不同的搜索词组合在多个数据库中进行文献检索，搜索词有：喂养、儿童、印度尼西亚、MPASI/辅食、gizi/营养、因子、决定因素和 praktek/方式。用三个步骤来审查所有文献内容的适当性和研究质量。使用目前推荐的喂养方式分析了现有的信息。**结果：**膳食多样性、富含铁食物的消费、积极的喂养和卫生习惯并非最优的喂养方式之一，因此膳食摄入不能满足多种微量营养素。幼儿中存在一些最差的喂养方式。说明来自国家和特定地区的普查之间存在差别，普查的整体质量有待加强。**结论：**概括来说，儿童的喂养方式不是最优的。用于评价儿童喂养成分的指标的不一致使得不同普查之间的比较具有挑战性。结果还强调有必要调查最优儿童喂养方式的潜在因素。该结果可用于有效幼儿喂养推广计划额外的资源分配的宣传。

关键词：辅食、喂养方式、膳食摄入、文献综述、印度尼西亚