

# Nutrient Adequacy and Quality of Complementary Feeding Practices among Children 06-23 Months of Age

Nur Sakinah<sup>a</sup>, Abdul Razak Thaha<sup>b</sup>, Citrakesumasari<sup>b</sup>,  
Indra Dwinata<sup>c</sup>, Veni Hadju<sup>b</sup>, Cut Desy Ariani<sup>d</sup>

## ABSTRACT

**Background:** The quality of complementary feeding (CF) was still low especially in many low to moderate income countries. This study was intended to examine the quality of CF in children aged 6-23 months in South Batui Subdistrict. **Method:** The method was a cross-sectional conducted in ten villages in the subdistrict. Study participants were mothers who have 6-23 month children. They were interviewed for CF practices and characteristic of family, including mother's education, occupation, and parents income using questionnaire. The CF intakes of children were obtained and analyzed using Nutrisurvey, which then be compared to the Indonesia's Recommended Dietary Allowance (RDA). **Results:** In general, the mothers graduated from junior high school (56.9%), and family income was less than two million rupiah per month (76.1%). According to CF adequacy, the average macronutrient protein, fat, energy, and carbohydrate intake was 117%, 33%, 64%, and 78% of RDA, respectively. Meanwhile, the average intake of micronutrients was mostly less than 50% of RDA, including iron, zinc, vitamin A and vitamin E. The number of children who consumed a good quality CF was only 27%. There were significantly different among ages group for a good quality CF (5.7%, 35.3%, and 50.0%, respectively for children aged 6-11, 12-17 and 18-23 months,  $p < 0.05$ ). However, there were no significant differences among education, occupation, and family income with the quality of CF ( $p > 0.05$ ). **Conclusions:** Quality of CF is very low, and this is significantly different between age groups.

**Keywords:** Complementary feeding, food intake, nutrient adequacy, malnutrition

<sup>a</sup>Graduate Student, <sup>b</sup>Department of Nutrition, <sup>c</sup>Epidemiologi University of Hasanuddin, Indonesia

<sup>d</sup>Join Operating Body Pertamina Medco Tomori, Luwuk Banggai Regency, Central Sulawesi Province, Indonesia

**Corresponding Author:** Dr. Veni Hadju, Department of Nutrition, University of Hasanuddin, Indonesia

**E-Mail:** phunhas@gmail.com

**Received:** 28<sup>th</sup> December 2022

**Accepted:** 10<sup>th</sup> January 2023

**How to Cite this Article:** Sakinah N, Thaha AR, Citrakesumasari, Dwinata I, Hadju V, Ariani CD. Nutrient adequacy and quality of complementary feeding practices among children 6-23 months of age. *Int Med Sci Acad* 2023;36(1):103-106.

**Access this article online :** [www.jimsaonline.com](http://www.jimsaonline.com)



## Introduction

Based on the results of the Riskesdas (Riset Kesehatan Dasar/ Basic Health Research) data in 2018, the prevalence of infants 6-23 months of age consuming good variety of complementary food (CF) was 46.6%. There were 23 provinces where the prevalence rate of infants 6-23 months consuming good variety of complementary food below the national figure. Central and West Java provinces have shown prevalence rates above the national rate i.e. 55.0% and 55.4 % among 18 provinces that have stunting toddlers above the national rate [1].

Data from WHO showed that weight loss begins of age of 4-6 month. Inadequate food intake is partly because of low food quality and inadequate feeding practice. Low quality food can be found in the form of low-quality micronutrients, diversity of types of food consumed and limited animal food sources. Food that do not contain nutrients, and complementary foods that contain low energy lead to stunting [2].

Research conducted in Flores only 40% of children aged 6-23 months received CF with energy according to the RDA and 50% received

CF with protein in accordance with the RDA. Studies conducted in developing countries such as Ethiopia, Zambia, and India are generally not diverse; dietary variation is minimal and feeding frequency is still low. Inadequate nutrition of CF that is low in quality or quantity of baby food ultimately results in stunted and food diversity. Consumption of various types of food is also associated with stunted. The researchers wanted to assess the quality of CF for children aged 6-23 months in stunting locus area: South Batui District, Banggai Regency, Central Sulawesi Province, Indonesia.

## Methods

This research was conducted during September-October 2021 in Banggai Regency, in the stunting locus area in Batui Selatan District, which consists of ten villages, namely Bone Balantak village, Sinorang village, Gori-Gori village, Sukamaju village, Sukamaju 1 village, Ombolu village, Masungkang village, Maleojaya village and Paisubuloli village. There were three villages that were included as stunting locus areas, namely Maleojaya village, Paisubuloli village and Masungkang village.

Study used cross-sectional survey with the subject of two years old children. Overall, the total subjects were 140 children: 53 of children aged 6-11 months, 51 of children aged 12-17 months, and 36 of children aged 18-23 months. The variables measured in this study were age, gender, mother's education, occupation, family income, availability of home garden, and the quality of complementary feeding.

The measurement method was carried out according to the types of variables. The subject characteristics was assessed by interview method using Kobo Collect application at android-based smartphone. Then the data that has been collected were downloaded from the Kobotoolbox server. Afterwards the data were processed and analyzed using the SPSS for windows program. The nutrisurvey program was used to process the results of 24-hour recall interviews. The adequacy of the nutritional intake of each respondent was calculated using the 2019 Nutrient Adequacy Rate table. Bivariate test was conducted to determine relationship between two variable and chi square test was used and multivariate test used was logistic regression, with significant p value <0.05.

## Results

### Child Characteristics

There were 140 children which divided into three age groups, namely 6-11 months (n=53 children), 12-27 months (n=51 children) and 18-23 months (n=36 children). The children were also evenly distributed by gender, namely 50% male and 50% female. Mother's education was generally quite high; 73% were graduated from high school or above, but family income was generally low; 76.7% had income < IDR 2 million. 75% of mothers did not work and 52% of them grow plants in their home. The number of children who consumed more than 4 types of foods were only 27%.

**Table 1: Characteristics of Subjects.**

Variables	n (140)	%
<b>Age group</b>		
6-11 months	53	37.5
12-17 months	51	36.1
18-23 months	36	26.2
<b>Child gender</b>		
Boy	70	50
Girl	70	50
<b>Mother's Education</b>		
Low (junior high school and below)	67	47.5
Height (high school and above)	73	52
<b>Family Income</b>		
Low (< IDR 2 million)	108	76.7
High (> IDR 2 million)	32	22.6
<b>Working Mother</b>		
Yes	33	23.4
No	107	75.8
<b>Planting plants in the yard</b>		
Yes	74	52.4
No	66	46.8
<b>CF quality</b>		
1 food group	36	25.5
2-3 food groups	65	46
≥ 4 food groups	39	27

### Types of Complementary Foods

The types of food that mothers gave to their babies can be seen in Table 2. After rice porridge, fish was mostly given to children aged 6-11 months. 20% of children aged 6-11 months were given formula milk. As many as 26% of children received instant CF and 15%

children received eggs. In children aged 12-17 months and 18-23 months, after rice, most mothers gave fish (57% and 62% respectively); while eggs were 27% and 44%, respectively.

**Table 2: Types of Complementary Foods.**

Age	Food Type	n	%
6-11 months	Rice porridge	29	54.72
	Fish	18	33.96
	Spinach	14	26.42
	Sun	14	26.42
	White rice	13	24.53
	Formula milk	11	20.75
	Egg	11	20.75
	Spinach	8	15.09
	Biscuits	7	13.21
	Banana	6	11.32
	12-17 months	White rice	37
Fish		28	57.1
Spinach		18	36.73
Egg		13	26.53
Formula milk		12	24.49
Banana		10	20.41
Tempe		9	18.37
Rice porridge		6	12.24
Pawpaw		4	8.16
Spinach		4	8.16
White rice		37	75.51
18-23 months	Fish	28	57.1
	White rice	36	92.31
	Fish	24	61.54
	Spinach	18	46.15
	Egg	17	44
	Banana	10	25.6
	Tempe	8	20.51
	Spinach	4	10.26
	Porridge	4	10.26
	Pawpaw	4	10.26

### Nutrient Intake

In general, children aged 6-11 months and 12-23 months consumed energy 63% and 34% compared to their RDA. The children aged 6-11 months and 12-23 months intake of protein, fat, and carbohydrates were 78% and 35%, 111% and 91% and 32% and 33% of their RDA, respectively. The micronutrient adequacy rate of vitamins and minerals was low. Adequate intake of vitamin A, vitamin E, iron and zinc among children aged 6-11 months and 12-23 months were 58% and 63%, 33% and 32%, 30% and 35, 81% and 29%, respectively.

### Analysis

Table 4 shows that age has a significant effect on the quality of CF with p value = 0.000. Meanwhile, the variables of gender, mother's education, family income, mothers' occupation, and having home garden did not have a significant effect on the quality of CF (p<0.05).

### Discussion

Complementary food has an impact on stunted for children aged 0-23 month. Complementary feeding was often given in insufficient quantities and lower quality than breast milk [2]. The specific interventions to reduce the prevalence of stunting in relation to the CF program have not been maximized, which is marked by the low prevalence of consumption of food diversity for children aged 6-23 months. Children under the age of five in this study were evenly distributed between boys and girls. A similar study in Ethiopia showed that mother who had boy were three time more likely to start CF on time than mothers with girls [3]. Children in this study generally came from families with low levels of education and

**Table 3: Children's Nutrient Intake by Age Group.**

No	Variable	Age 6-11 (n=52)			Age 12-23 (n=93)		
		Average	SD	% RDA	Average	SD	% RDA
1	Energy	509.05	406.13	63.63	526.30	313.26	38.99
2	Protein	17.66	16.19	117.70	18.36	12.00	91.79
3	Fat	11.39	13.42	32.55	14.86	14.17	33.03
4	Carbohydrates	82.65	67.18	78.71	76.92	41.49	35.78
5	Vitamin A (RE)	232.34	320.70	58.08	253.71	256.29	63.43
6	Vitamin E (mcg)	1.69	2.34	33.75	1.94	1.67	32.40
7	Vitamin B1 (mg)	0.23	0.29	76.86	0.20	0.17	39.27
8	Vitamin B2 (mg)	0.43	0.43	107.07	0.27	0.20	53.42
9	Vitamin B6 (mg)	0.28	0.24	94.62	0.34	0.21	67.76
10	Folate (mcg)	33.68	29.18	42.10	48.17	39.51	30.10
11	Vitamin C (mg)	16.13	23.62	32.27	12.27	12.44	30.68
12	Sodium (mg)	181.12	188.56	48.95	95.01	93.86	11.88
13	Potassium (mg)	604.87	638.09	86.41	451.88	308.74	17.38
14	Calcium (mg)	376.68	468.85	139.51	127.30	147.90	19.58
15	Magnesium (mg)	68.68	71.91	124.88	65.11	37.48	100.16
16	Phosphorus (mg)	409.94	434.67	149.07	295.30	217.99	64.20
17	Fe (mg)	3.35	5.03	30.41	2.49	1.94	35.51
18	Zinc (mg)	2.44	2.54	81.36	1.89	1.19	62.92

**Table 4: Results of Bivariate Analysis.**

Variable	CF quality				p-value
	Inadequate (< 4 types)		Adequate (≥ 4 types)		
	n	%	n	%	
<b>Age</b>					
6-11 months.	50	94.3	3	5.7	0.000
12-17 months.	33	64.7	18	35.3	
18-23 months.	18	50.0	18	50.0	
<b>Child gender</b>					
Man	52	74.3	18	25.7	0.572
Woman	49	70.0	21	30.0	
<b>Mother's Education</b>					
Low (junior high school and below)	49	73.1	18	26.9	0.802
Height (high school and above)	52	71.2	21	28.8	
<b>Family income</b>					
Low (< IDR 2m)	80	74.1	28	25.9	0.343
High (≥IDR 2m)	21	65.6	11	34.3	
<b>Working Mother</b>					
No	78	72.9	29	27.1	0.720
Yes	23	69.7	10	30.3	
<b>Planting plants in the yard</b>					
No	50	67.6	24	32.4	0.201
Yes	51	77.3	15	22.7	

income, namely 47% and 76.7%, and most mothers do not a permanent job.

There are 27% children consumed foods with e"4 food groups, which was classified as low. The low food diversity was associated with the poor practice of giving complementary foods after six months or when children were familiar with CF. This research showed at the end of 6-11 months only 5.7% of children consumed more than 4 types of food. This finding is in line with the finding by a study conducted in Kamba District in Ethiopia 23.3% also in Amhara region 17% [4] and the city of Haramaya in the Oromia region 25.2% [5] while in Rwanda Province most of the children (62%) have low dietary diversity [6].

Optimal food diversity for children 6-23 month in locus is classified as low [7] in this study. Table 1 shows that children aged 6-11 months was given rice porridge, and fish for 20% and of eggs for 15%. In children aged 12- 23 month, most mothers gave fish (57%

and 62%). Eggs have also been given to children at this age as many as 27% and 44%, respectively. According to type by foods consumed by children in study, 27% who consumed more than 4 types of food and also none of them consumed meat. Children who eat meat have a higher prevalence of iron deficiency than those who do not eat meat [8]. Insufficient type of food consumed can be seen at children aged 6-9 month (5.7%). The lower the type of food intake, the higher chance of being underweight [9].

The results of research reported, [10] Children aged 6-23 months who ate foods from six or more foods group were less likely to be stunted than those with fewer or no diverse food groups. Furthermore, consumption of animal's source food (egg, meat, dairy product) will reduce a likelihood of stunting by 1.436 compared to those who did not consume animal source foods.

The intake of macronutrients in this study were on average lower than needed; i.e., for energy it was only 63% and 34% of the RDA

children aged 6-11 and 12-23 months. Carbohydrates and Fats intake were still low. However, protein intake was quite high in all age groups. Protein was important for optimizing growth and preventing stunted than several studies have shown that a high intake may increase the risk of obesity [11]. Several studies have shown high protein intake during the first 2 years of life is more be at risk for obesity later in life [12].

The intake of micronutrients namely Vitamin A, Vitamin E, Iron and Zinc is low compared to the recommended % RDA. This is indicated by the low diversity or type of food consumed. Lack of micronutrients such as zinc and vitamin A have an impact on the growth. Vitamin A plays a role in the process by protein synthesis, thus affecting cell growth. In children who are deficient in vitamin A, growth failure occurs [13]. Household food insecurity, lack of protein, vitamin A and zinc intake are the most risk factors for increasing the incidence of stunting in children aged 6-24 months [14]. The iron consumption is an good predictor for children growth [15].

The factor that is closely same to the nutritional status of children under five is the practice of child feeding, both during complementary feeding period in the first two-years and during the full feeding period afterwards. The result of this study is in line with the results of Riskesdas that provision by CF was very low quality among children under one year of age. In fact, the children who are able to consume family food, such as children aged 12-23 months, are still below 50% who consumed at least four types of food. For this reason, more efforts must continue to be made, especially assistance to mothers to take make use of local food sources or food that is easily accessible for their children [16].

The results of the analysis of this study were variables of gender, mother's education, family income and growing crops in the yard were not significant with the quality of CF ( $p > 0.05$ ). The similar result also reported in Nigeria, maternal education level, knowledge level by complementary feeding and family income were not show relationship to food quality [17].

In this study, families could afford to buy groceries and various types of food were ready by the local market, but the lack awareness of mothers about the nutritional value of variety types by food was an important factor for their children. Then the variables in the age group of 7-10, 12-17 and 18-23 months had a significant effect on the quality of CF with  $p$  value = 0.000. Children aged 18-23 months were more likely to be given more variety of food (50%) or more than 4 types of food compared to children aged 6-11 months (5.7%). In Ethiopia, the most significant factor with food diversity is the age of the child. Children aged 12-23 month consumed more variety by food than children 7-10 months [18]. This shows the relationship between the type of food and the age group, the type of food consumed increases along with the age of the child. This is because most mothers assume that children aged 6-11 months were still susceptible to stomach infection to receive food, as a result most of the children in this study were late in receiving CF to breast milk.

## Conclusion

The average intake of energy, carbohydrates and fat is still relatively low, while the average intake of micronutrients is mostly less than 50% of the Recommended Dietary Allowances including vitamin A, E iron and zinc. The number of infants consuming more than four type of food or good quality only 27%. There was a significant relationship between age groups for good quality complementary foods  $p < 0,01$ . There is no significant relationship among mother's education, occupation and family income with food quality. There is a need for mentoring or nutrition education for mothers in the provision or introduction by complementary foods for breast milk.

## What is known about the subject?

Complementary food has an impact on stunted for children aged 0-23 month. Complementary feeding was often given in insufficient

quantities and lower quality than breast milk

## What does the study performed add to the literature?

In this study, families could afford to buy groceries and various types of food were ready by the local market, but the lack awareness of mothers about the nutritional value of variety types by food affects low quality of CF.

## What are the implications of the results obtained?

An educational intervention to the mother of the baby needs should be carried out intensely at the time of Posyandu and to be prioritizing during the age 6-11 mo of age.

<b>Conflict of Interest:</b>	All authors declare no COI
<b>Ethics:</b>	There is no ethical violation as it is based on voluntary anonymous interviews
<b>Funding:</b>	The authors(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: the study was funded by LITAPDIMAS the Ministry of Religion, Republic Indonesia.
<b>Guarantor:</b>	Dr. Veni Hadju will act as guarantor of this article on behalf of all co-authors.

## References

1. Riskesdas. Primary Results of Basic Health Research (Riskesdas) 2018. 2018;61.
2. WHO. *changing infant and child feeding*. 2013.
3. Semahegn A, Tesfaye G, Bogale, Alemayehu, Semahegn A, et al. Complementary feeding practice of mothers and associated factors in Hiwot Fana specialized hospital, eastern Ethiopia. *Pan Afr Med J*. 2014;18:1-11.
4. Gatahun EA, Demissie M, Abyu, Direselign Misker Gatahun EA, et al. Dietary Diversity Feeding Practice and Determinants among Children Aged 6-23 Months in Kemba Woreda , Southern Ethiopia Implication for Public Health Intervention. 2015;
5. Town H. Dietary Diversity Practice and Associated Factors Among Infants and Young Dietary Diversity Practice and Associated Factors Among Infants and Young Children in Haramaya Town , Ethiopia. 2017;(September):243-50.
6. Uwiringiyimana V, Ocké MC, Amer S, et al. Predictors of stunting with particular focus on complementary feeding practices: A cross-sectional study in the northern province of Rwanda. *Nutrition*. 2019;60:11-8.
7. Benti Tefera T, Tegegne M, Bedada S, et al. Optimal Dietary Diversity and its Associated Factors among Children Aged 6-23 Months in Bale Zone, Southeast Ethiopia: aCommunity Based Cross-Sectional Study. *J Nutr Heal Food Sci*. 2020;8(1):1-8.
8. Donkor WES, Adu-Afarwah S, Wegmüller R, et al. Complementary feeding indicators in relation to micronutrient status of ghanaiian children aged 6-23 months: Results from a national survey. *Life*. 2021;11(9).
9. Udoh EE, Amodu OK. Complementary feeding practices among mothers and nutritional status of infants in Akpabuyo Area, Cross River State Nigeria. *Springerplus*. 2016;5(1).
10. Kraviec J, An X, Kumapley R, et al. Diet quality and risk of stunting among infants and young children in low- and middle-income countries. *Matern Child Nutr*. 2017;13(November 2016):1-11.
11. Michaelsen KF, Grummer-Strawn L, Bégin, France. Michaelsen KF, et al. Emerging issues in complementary feeding: Global aspects. *Matern Child Nutr*. 2017;13(October 2016):1-7.
12. Michaelsen KF, Greer FR. Protein needs early in life and long-term health. *Am J Clin Nutr*. 2014;99(3):718-22.
13. Fitri W. Faktor risiko stunting pada anak umur 12-24 bulan. 2016;5(1):55-61.
14. Aritonang A. Analisis Pengeluaran Pangan, Ketahanan Pangan dan Asupan Zat Gizi Anak Bawah Dua Tahun (BADUTA) Sebagai Faktor Resiko Stunting. *J Nutr Coll*. 2020;9.
15. Briaux J, Savy M, Fortin S, et al. Dissimilarities across age groups in the associations between complementary feeding practices and child growth: Evidence from rural Togo. 2019;(May):1-17.
16. Hendriyani H, Sudargo T, Lusmilasari L, et al. Complementary feeding self-efficacy: A concept analysis. *Open Access Maced J Med Sci*. 2020;8(F):11-22.
17. Olatona FA, Adenihun JO, Aderibigbe SA, et al. Complementary Feeding Knowledge, Practices, and Dietary Diversity among Mothers of Under-Five Children in an Urban Community in Lagos State, Nigeria. *Int J Matern Child Heal AIDS*. 2017;6(1):46-59.
18. Beyene M, Worku AG, Wassie, Molla MeseleBeyene M, et al. Dietary diversity, meal frequency and associated factors among infant and young children in Northwest Ethiopia: A cross-sectional study. *BMC Public Health*. 2015;15(1):1-9.

