



Dietary Diversity and Associated Factors Among Children Aged 6–23 Months in Indonesia

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ABSTRACT

Background: Optimum feeding practice is the key to determine development and growth among infants and young children. Dietary diversity is considered an indicator to assess nutritional adequacy.

Objectives: This study aimed to determine the factors that associated with minimum dietary diversity types among children aged 6–23 months in Indonesia.

Methods: Secondary data analysis was carried out for this study using the Indonesian Demographic and Health Survey (IDHS) 2017. The study was conducted with inclusion criteria in women of childbearing age with ages ranging from 15 to 49 years, having children aged 6–23 months, and living with respondents ($n = 4861$). Data obtained using a questionnaire with cross-sectional design approach. Chi-square test, and logistic regression test were used to measure the determinants of minimum dietary diversity.

Results: The prevalence of children aged 6–23 months who received various foods was 3070 (63.15%) respondents. Age of child of 18–23 months [AOR = 5.88; 95% CI = 4.48–7.14], mother graduated from university level [AOR = 5.16; 95% CI = 2.07–12.89], access to maternal information on mass media (reading newspapers or magazines [AOR = 1.30; 95% CI = 1.10–1.55] and watching television [AOR = 1.56; 95% CI = 1.06–2.30]), and richest wealth quintile [AOR = 1.91; 95% CI = 1.32–2.75] significantly related to minimum dietary diversity in children aged 6–23 months in Indonesia.

Conclusions: The current study revealed that minimum dietary diversity among Indonesian children remain related to education, mass media and socio-economic level.

Practice implications: Pediatric nurses can play a critical role here by delivering the messages through educational outreach visits that focus on poor uneducated mother.

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Introduction

The age of 6–23 months is the golden period in the first 1000 days of life (UNICEF, 2020). This period is called the window of opportunity and an important stage to optimize the growth and development of children (Dewey & Vitta, 2013). Fulfilling the nutritional needs of infants will affect the pattern of development and growth (Gautam, Adhikari, Khatri, & Devkota, 2016; Kusumaningrum, Lestari, & Sulistyono, 2017).

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Nutrition is the important indicators within Sustainable Development Goals (SDGs), therefore, meeting the nutritional needs of every population would impact the better health and environment (Grosso et al., 2020). Providing complementary diets for children aged 6–23 months needs to comply with various types of food alloys. Inadequate feeding practices result in malnutrition and stunting problems resulting in delays in the growth and development of infants (Eshete, Kumera, Bazezew, Mihretie, & Marie, 2018). Globally, every year 3.1 million children under five die due to improper nutrition practices (UNICEF, 2018). More than 55% of under-fives experience stunting in the Asian region. Among the total of 83.6 million children with stunting in Asia, 33.3% came from South Asia while the region with the lowest stunting level is Eastern Asia, which is 5.3% (UNICEF/WHO/World Bank Group, 2018). Meanwhile, according to the Indonesian Ministry of Health, in 2018 there were as many as 150.8 million (22.2%) toddlers with stunting (Kemenkes, 2018).

From birth until the age of 6 months, the baby's nutrition has been fulfilled with exclusive breastfeeding, whereas, when the baby is more than six months old, the nutritional needs will increase so that there is need for complementary feeding (Gautam et al., 2016; Kusumaningrum et al., 2017; World Health Organization, 2020). It aims to meet the nutritional needs of infants that contain carbohydrates, proteins, fats, iron, vitamins, and other minerals needed by the baby's body (Eshete et al., 2018). An increasing number of prevalence of malnourished among children age 6–23 months is strongly related to improper feeding practice and complementary feeding (CF) (Ahmad, Madanijah, Dwiriani, & Kolopaking, 2018).

Food diversity is one indicator used to assess nutritional adequacy. This can also be used to see groups of food consumed by people in certain regions (Eshete et al., 2018). The practice of providing complementary food diversity in developing countries is based on the geographical conditions of each area and is more likely to be adapted to the social conditions of the family. Families that are classified as underprivileged will mostly consume staple foods with little to no nutritional value (Mitchodigni et al., 2017). They are unlikely to eat animal products and only eat seasonal fruits and vegetables. Families who live in urban areas will have a higher income so their food consumed will be more diverse (Iqbal, Zakar, Zakar, & Fischer, 2017).

Children aged 6–23 months recommended to receive four or more food groups. The World Health Organization (WHO) divides these into seven groups, namely staple foods, legumes, milk, meat, eggs, fruits, and vegetables (World Health Organization, 2010). The provision of diverse types of food is very influential in addressing malnutrition in children, so the practice of its implementation must follow recommendations. However, many people ignore the issue of diversity in proper feeding, thus triggering health problems to arise in children such as malnutrition, stunted growth, and being underweight. Hence, it is necessary to identify any factors that cause less optimal nutrition due to a lack of food diversity in children. This research aimed to determine the factors that associated with minimum dietary diversity types in children aged 6–23 months in Indonesia, by child's age, sex of the child, mother's age, mother's education, mother's information access to mass media, wealth quintile, and place of residence.

Methods

Data

The study was conducted using secondary data from the Indonesia Demographic and Health Survey (IDHS) in 2017 for the research design, which was applied using a cross-sectional study.

Population and sample

The population in this study were households in 34 provinces in Indonesia. The survey was conducted in urban and rural areas by a multistage (two stage) probability sample drawn from the latest population census. The first stage was the selection of number of census blocks and the second stage, chosen households were taken from the listing. Details of this survey including the sample design can be found at DHS program website (DHSProgram, 2020a). This design presented reliable estimates at national and provincial level respondents in Indonesia. As many as 47,963 households were interviewed. In total 50,730 women were eligible, and 49,627 women of childbearing age (15–49 years) met the 2017 IDHS criteria to be interviewed. Subsequently, the sample was reduced again according to the inclusion criteria: the respondent was a woman aged 15–49 who had a child aged 6–23 months, and the child lived with the respondent, which obtained as many as 4861 respondents. Respondents who met these inclusion and exclusion criteria were interviewed using the questionnaire.

Variables

This study used the independent variables of the child's age (6–11 months, 12–17 months and 18–23 months), and sex of the child (male and female), mother's age (15–19 years, 20–24 years, 25–29 years, 30–34 years, 35–39 years, 40–44 years and 45–49 years), mother's education (uneducated, primary school, junior/high school, university), mother's information access to mass media (internet use, reading newspapers or magazines, watching television, and listening to the radio), wealth quintile (poorest, poorer, middle, richer and richest), and place of residence (rural and urban). The wealth index is calculated based on the selected asset of the household level such as bicycles, sanitation facilities and others. Details of wealth index construction can be found at DHS program (DHSProgram, 2020b). The dependent variable was the dietary diversity as defined as at least having received 4 out of 7 food groups. The measuring instrument was a questionnaire that asked mothers whether they fed the children with the following food groups such as legumes and nuts; grains, roots and tubers; dairy products (milk, yogurt, cheese); eggs; flesh foods (meat, fish, poultry and liver/organ meats); vitamin A rich fruits and vegetables, other fruits and vegetables (World Health Organization, 2010). Children categorized as receiving minimum dietary diversity if they fed from 4 or more food groups. The 2017 IDHS questionnaire refers to the questionnaire used in the Demographic and Health Survey (DHS) Phase 7 in 2015, which accommodated some of the latest issues (Croft, Marshall, & Allen, 2018). Ethical permission was obtained from the Ministry of Health of Indonesia and from the OCR Macro (number 45 CFR 46). All respondent identities were anonymized from the data and permission for the use of the data in this study was obtained from ICF International.

Data analysis

The results of the study were processed using STATA version 14.0. Chi-square tests and logistic regression tests were used to determine the factors that associated with dietary diversity types.

Results

The majority of respondents 1718 (35.34%) had a child aged 12–17 months. Furthermore, fewer respondents (31.37%) had a child aged 18–23 months. According to gender, there were 51.89% male respondents for children aged 6–23 months and 48.11% female respondents. The majority of respondents were aged 25–29 years (26.08%), and the fewest were in the highest age bracket of 45–49 years (0.92%). Most mothers reported to be educated to junior high/high school level (59.15%). Mothers reported access to information through the mass media on internet (47.32%), print mass media whether reading newspaper or magazine (38.31%), access to information through television (95.87%), and listening to the radio (36.68%). The wealth quintile was dominated by richer families, with 1038 people in this category or 21.35%. A total of 2473 (50.87%) respondents lived in rural areas.

It was known that the majority of respondents' (63.15%) children aged 6–23 months received a diversity of four or more food groups at meals. While as many as 1791 (36.85%) respondents' children aged 6–23 months did not get a variety of types of food or provision of food types and were eating less than four kinds of food groups the day before the 2017 IDHS survey was conducted (see Table 1).

Results obtained indicate that children between the ages of 18–23 months [AOR = 5.88; 95% CI = 4.48–7.14] were 5.88 times more likely to get a variety of foods with each meal compared to children aged 6–11 months. Of the maternal factors, highest educational level [AOR = 5.16; 95% CI = 2.07–12.89], access to mass media from reading newspapers or magazines [AOR = 1.30; 95% CI = 1.10–1.55] and watching television [AOR = 1.56; 95% CI = 1.06–2.30] were significantly related to the diversity of feeding types. At the level of education,

Table 1
Characteristics of the respondents regarding determinants of dietary diversity in child age 6–23 months in Indonesia.

Variables	n	%
Diversity of food types (4 types of food)		
Yes	3070	63.15
No	1791	36.85
Child's age		
6–11 months	1618	33.29
12–17 months	1718	35.34
18–23 months	1525	31.37
Sex of the child		
Male	2522	51.89
Female	2339	48.11
Mother's age		
15–19 years	176	3.62
20–24 years	940	19.36
25–29 years	1268	26.08
30–34 years	1262	25.96
35–39 years	881	18.12
40–44 years	289	5.95
45–49 years	45	0.92
Mother's education		
Uneducated	42	0.86
Primary school	1110	22.83
Junior/high school	2875	59.15
University	834	17.16
Accessibility information to the internet		
Never	2560	52.68
Ever	2301	47.32
Accessibility information to newspaper or magazine		
Never	2999	61.69
Ever	1862	38.31
Accessibility information to television		
Never	200	4.13
Ever	4661	95.87
Accessibility information to radio		
Never	3078	63.32
Ever	1783	36.68
Wealth quintile		
Poorest	945	19.44
Poorer	968	19.92
Middle	952	19.59
Richer	1038	21.35
Richest	958	19.70
Place of residence		
Rural	2473	50.87
Urban	2388	49.13

mothers who had graduated from university level were 5.16 times more likely to offer a diversified diet to their children compared to mothers who did not attend school. Mothers with access to mass media information from reading newspapers or magazines were as much as 1.30 times more likely to provide diverse types of food to their children at every meal than mothers who have never read a newspaper or magazine. Mothers with access to mass media information from watching television were 1.56 times more likely to provide a variety of foods to their children at every meal than mothers who have never watched television. Of socio-economic factors, richest wealth quintile [AOR = 1.91; 95% CI = 1.32–2.75] was significantly related to the diversity of feeding types. Respondents in the highest wealth quintile were 1.91 times more likely to provide their child with a variety of foods at every meal compared to the lowest wealth quintile (see Table 2).

Discussion

The results identified several factors that were associated with the minimum dietary diversity in children aged 6–23 months and the results obtained a positive association. The increasing age of the child was linked to receiving a more diverse diet: children aged 18–23 months

Table 2
Logistic regression analysis of determinants on dietary diversity in child age 6–23 months in Indonesia.*

Variables	AOR	95% CI	
		Lower	Upper
Child's age			
6–11 months	Ref		
12–17 months	4.18***	3.45	5.07
18–23 months	5.88***	4.84	7.14
Sex of the child			
Male	Ref		
Female	1.15	0.99	1.34
Mother's education			
Uneducated	Ref		
Primary school	3.32**	1.37	8.04
Junior/high school	4.33**	1.78	10.53
University	5.16***	2.07	12.89
Accessibility information to the internet			
Never	Ref		
Ever	1.15	0.95	1.38
Accessibility information to newspaper or magazine			
Never	Ref		
Ever	1.30**	1.10	1.55
Accessibility information to radio			
Never	Ref		
Ever	1.09	0.91	1.31
Accessibility information to television			
Never	Ref		
Ever	1.56**	1.06	2.30
Wealth quintile			
Poorest	Ref		
Poorer	1.19	0.94	1.51
Middle	1.53**	1.18	1.98
Richer	1.47**	1.12	1.91
Richest	1.91**	1.32	2.75
Place of residence			
Rural	Ref		
Urban	0.92	0.76	1.11

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

were more likely to receive a variety of foods with each meal than younger children. This finding is consistent with the studies conducted in Ethiopia (Dafursa & Gebremedhin, 2019). The variation in diet given to younger children is lower than the older and tends only to improve dietary diversity score (DDS) with the increasing age (Dafursa & Gebremedhin, 2019). It is related to the mother's perception of Infant and Young Child Feeding (IYCF) practices (Baek & Chitekwe, 2019). Many mothers thought children aged less than one year did not need a variety of foods and should avoid animal-sourced food because of their gut conditions (Adhikari, 2010; Dafursa & Gebremedhin, 2019; Locks et al., 2015). Khanal, Sauer, and Zhao (2013) also found that most types of food, especially vegetables, fruits, and meat, were consumed more at the minimum age of 12 months. Based on this finding, health workers need to promote the benefits of a variety of foods targeting mothers with younger children.

The factor of maternal education level was significantly related to the variety of feeding types for children aged 6–23 months in Indonesia. Mothers who received tertiary education were 5.16 times more likely to provide diverse types of food to their children at every meal than mothers who did not attend school. The mother's education was strongly related to the consumption of staple foods and all food groups consumed by children (Agrawal et al., 2019). A higher educational level allows mothers to have better nutrition knowledge for all family members, especially for the children (Codjoe, Okutu, & Abu, 2016). Mother's knowledge of IYCF can be related to the quality of the diet food offered to children (Dafursa & Gebremedhin, 2019). Another argument is that educated mothers have better employment and higher income, giving more opportunities to purchase diverse foods (Agrawal

et al., 2019; Codjoe et al., 2016). Therefore, the government should make policies to cover uneducated mothers, such as establishing mother and baby classes by forming cadres in each village supervised by healthcare professionals.

Based on the results of the research on maternal access to newspapers or magazines (print) this was found to be significantly related to minimum dietary diversity in children aged 6–23 months. Mothers who read newspapers or magazines were 1.30 times more likely to offer different types of food to their child at each meal than mothers who never read newspapers or magazines. This study is similar to a survey conducted in Africa and Austria, which found that newspapers and magazines are probably the more interesting media for nutrition-related topics (Freisling, Haas, & Elmadfa, 2010; Kang et al., 2019). There have not been any further studies explaining this issue: it may be related to the fact that newspapers and magazines are still the primary information media frequently used by people in Indonesia. This is associated with the price of newspapers and magazines, which are cheap and affordable. Furthermore, magazines and newspapers also provide exciting pictures that make it easy for people to understand.

The results of the research on access to information through television found that access is significantly related to the diversity of feeding types because health promotion by mass media can improve feeding practices as recommended. This finding is supported by previous studies that indicated that access to information via the television is associated with better infant and child nutrition (Blackstone & Sanghvi, 2018; Temesgen, Yeneabat, & Teshome, 2018). The availability of information media in the household can help mothers obtain information about varied food options for children (Tessema, Belachew, & Ersino, 2013). This indicates that mass media can be used as an effective means of promoting the practice of feeding infants and young children (Temesgen, Negesse, Woyraw, & Mekonnen, 2018). Television media currently promote and show the practice of IYCF. The IYCF include breastfeeding, a healthy diet, and good nutrition for children (World Health Organization, 2018). Having frequent access to mass media can increase food variations in children aged 6–23 months (Beyene, Worku, & Wassie, 2015; Victor, Baines, Agho, & Dibley, 2014). It is not a surprising issue that mass media is a trustworthy source of information and can influence behavior (Dafursa & Gebremedhin, 2019). In particular, this finding indicates that television may be currently more frequent and widespread in promoting IYCF in Indonesia.

The results of the study of family factors with diversity in the provision of food based on wealth quintile found a significant relationship. Richest wealth quintile was more likely to obtain a variety of foods than those in the poorest wealth quintile. Lower wealth quintile was related to unmet minimum dietary diversity (Dafursa & Gebremedhin, 2019; Victor et al., 2014). Improvement of wealth has a significant effect on appropriate child feeding. Wealth quintile is closely related to household income, and financial constraints can be limiting factors for the mother to serve adequate nutritious food to their children daily (Codjoe et al., 2016; Joshi, Agho, Dibley, Senarath, & Tiwari, 2012; Ng, Dibley, & Agho, 2012; Patel et al., 2012; Senarath, Godakandage, Jayawickrama, Siriwardena, & Dibley, 2012). Therefore, government support must be enhanced in all wealth quintiles to ensure that each child receives a variety of foods to meet their nutritional requirements.

However, this study has several limitations related to the study design. This survey used a cross-sectional design so a cause-and-effect relationship cannot be considered. In addition, the current survey results cannot be extrapolated and generalized to other populations, which exclude non-household populations such as those living on the street or in institutions. Despite the previous limitations, this study can highlight important factors that contribute to minimum dietary diversity among children aged 6–23 months in Indonesia. The results of this study can be implemented in pediatric nursing practice to plan nutritional education programs to improve complementary food provision and meet minimal dietary diversity to reach optimum nutritional status. Finally, a future study can use another study method to identify the causality

of the other factors related to the minimum dietary diversity of children in Indonesia.

Conclusions

Dietary diversity was determined by several factors, including the age of the child, maternal education level, access to maternal mass media information (reading newspapers or magazines, and watching television), and wealth quintile. The findings indicate the need to target mothers, especially those who have younger children, of low education and lower wealth status, through formal health education programs, advocacy, and awareness-raising campaigns of the benefits of diverse diets to ensure optimal child growth. The government and healthcare workers especially pediatric nurses need to commit to improving the promotion of the types of complementary food that will ensure children's nutritional requirements are met.

Authorship statement

All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated sufficiently in the work to take public responsibility for the content, including participation in the concept, design, analysis, writing, or revision of the manuscript. Furthermore, each author certifies that this material or similar material has not been and will not be submitted to or published in any other publication before its appearance in the *Journal of Pediatrics Nursing*.

Authorship contributions

Study design: R.S, D.E.S, R.F, F.E., E.A.

Data analysis: R.S, D.E.S, R.F, F.E., W.M.A, I.A.S, E.A.

Manuscript writing and revisions for important intellectual.

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