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Factors Associated with Minimum Dietary Diversity among Breastfed Children Aged 6-23 Months in Indonesia (Analysis of Indonesia DHS 2017)

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Abstract

Poor complementary feeding practices can lead to malnutrition in infants and young children. Minimum dietary diversity (MDD) is one of the determinants of children's nutritional status and has been found to predict stunting. This study examined factors associated with MDD achievement among breastfed children aged 6-23 months based on Indonesia's Demographic and Health Survey 2017. This study used chi-square and multiple logistic regression to analyze the data. Among 2,976 children only around 53% children met MDD recommendation. Multivariate analysis found that the diversity of diet is better among older children than younger children. Children aged 18-23 months have possibility of 5.7 times higher to achieve MDD than children aged 6-11 months and 1.3 times higher than children aged 12-17 months. Children of wealthier family (3rd quintile and above), those delivered by trained health personnel, children of higher mothers' education, working mothers, fathers' involve in child care, ANC visit >= 4 times, and parents reside in urban areas have possibility of having higher MDD achievement significantly than the other groups. The low MDD achievement among children aged 6-11 months warrant the importance of prioritizing effort on this age group because this is a period where a child grows rapidly and potentially expose to infection as a result of un-hygienic food preparation, and will affect the child's growth later on.

Keywords: Children aged 6-23 months, complementary feeding, minimum dietary diversity, Indonesia DHS 2017

Abstrak

Praktik MP-ASI yang buruk dapat menyebabkan kekurangan gizi pada anak-anak.a Ragam Asupan Minimal (MDD) merupakan salah satu penentu status gizi anak dan dapat memprediksi terjadinya stunting. Penelitian ini membahas mengenai faktor-faktor yang berhubungan dengan capaian MDD pada anak yang diberi ASI usia 6-23 bulan berdasarkan data SDKI tahun 2017. Penelitian ini menggunakan uji Chi-square dan uji regresi logistik ganda untuk menganalisis data. Dari 2,976 anak usia 6-23 bulan yang diberi ASI di Indonesia tahun 2017, hanya sekitar 53% anak yang telah mencapai MDD. Hasil analisis multivariat menunjukkan bahwa capaian MDD lebih baik pada anak yang berusia lebih tua. Anak umur 18-23 bulan mempunyai kemungkinan sebesar 5.7 kalinya untuk mencapai MDD dan anak umur 12-17 bulan sebesar 1.3 kalinya, dibandingkan dengan bayi umur 6-11 bulan. Anak yang berasal dari keluarga lebih mampu (kuintil 3 atau lebih), yg lahir ditolong tenaga kesehatan terlatih, anak dari ibu yang berpendidikan lebih tinggi, ibu yang bekerja, ayah yang berperan dalam mengurus anak, ibu yang melakukan kunjungan ANC ≥ 4 kali dan orang tua tinggal di perkotaan, mempunyai kemungkinan lebih besar secara bermakna untuk mencapai MDD sesuai anjuran. Rendanhya capaian MDD pada bayi 6-11 bulan menunjukkan pentingnya memberikan perhatian pada kelopmpok ini karena merupakan kelompok yang masih tumbuh dengan cepat dan mulai terpapar dengan kemungkinan terjadiya infeksi akibat penyiapan makanan yang tidak hygienis, dan akan berpengaruh terhadap pertumbuhan selanjutnya.

Kata Kumci: Anak usia 6-23 bulan, minimum dietary diversity (MDD), *MP-ASI, SDKI 2017.*

Introduction

Among children under five years old, children aged 6-23 months have a higher risk for malnutrition (1). In 2018, 149 and 49 million of children under five in the world are stunting and wasting (2). In the same year, nearly 3 of 10 children in Indonesia under 5 years of age are stunting and 1 in 10 children are wasting (3). More than two-thirds deaths of children related to malnutrition are associated with inappropriate feeding practice for the first two years of life (4). Ages 6-23 months are part of the critical windows of opportunity and period of children in need over a lot of energy and nutrients dense food to grow and to thrive (4). Lack of nutrients intake during this period of time can cause a serious negative impacts include impaired cognitive development, growth retardation, and consequences of lower attainment of education (5).

One of WHO and UNICEF recommendations for optimal child feeding as stated in the Global Strategy is complementary feeding that is nutrients adequate and safe starting from 6 months of age with continued breastfeeding until 2 years of age or more (1). Indicators of infant and young child feeding (IYCF) practices can be used to monitor the effectiveness of various breastfeeding and complementary feeding interventions (2). The core indicators are early initiation of breastfeeding, exclusive breastfeeding, continued breastfeeding for 1 year, the introduction of solid, semi-solid or soft foods, minimum dietary diversity, minimum meal frequency, minimum acceptable diet, and consumption of iron-rich or iron-fortified foods (3).

In many countries, only less than a quarter of children aged 6-23 months had met the criteria for appropriate MDD for their age (6). In 2013 and 2018 Riskesdas data, the achievement of the MDD of children aged 6-23 months in the world only reached 29% (3). Inappropriate complementary feeding increases the risk of malnutrition, illness, and even death in children under two years of age (4). Children without diverse diet after 6 months of age have a risk of becoming stunted, though breastfeeding is optimal (7). Although more than 50% of children in Indonesia had breastfed and received complementary feeding, among 1,000 live birth, 25 infants died before reaching 5 years of age (3). In Indonesia, there are only 54% of children aged 6-23 months achieved MDD (3).

MDD is a useful indicator for assessing nutritional adequacy (8). In addition, MDD is a significant predictor of stunting which allows interventions aimed at increasing MDD to play an important role in reducing the long-term burden of stunting among children (9). Studies have shown that MDD was positively associated with children's age (10–13), mother's education (8,14,15), wealth index (7,8), mother's access to media (7,8,16). Reports also found that fathers' education was positively associated with MDD (8). Other factors such as antenatal visits (13) and residence (7,15,17) also found to be positively associated with children's MDD.

Generally, MDD achievement in childre n who are breastfed are lower (18). Without adequate diversity in their food, children can have nutrients deficiency, especially micronutrients, to appropriately grow and develop, which can affect the body and brain. In order not to risk *stunting* and its irreversible impact, this study discusses

factors associated with MDD among breastfed children aged 6-23 months in Indonesia in 2017.

Methods

This study used data from the Indonesian Demographic Health Surveys in 2017. This study is a secondary analysis that used a cross-sectional design study. The population of this study includes all women aged 15-49 years with children under-five in kids' recode data set. This study analysed factors associated with MDD among breastfed children aged 6-23 months who were alive, lived with their currently married mother and lived with their father. This study excluded children with missing food intake data. Based on the two-proportion hypothesis equation, the sample size of 1,488 has a test power of more than 80%. The number of samples was then multiplied by two. The number of samples of this study is 2,976 samples.

The data was obtained from the DHS website (dhsprogram.com) with an email verification. The 2017 IDHS data set consists of seven data sets. This study was using data from kids recode data set. Analysis of the data in this study was carried out by using SPSS version 25. Frequencies and cross-tabulation were used to summarize descriptive statistics of the data. Chi-square analysis was used to identify associations between the dependent (MDD) and independent variables (predisposing factors: children's age, children's gender, mother's age, mother's education, mother's working status, mother's access to media, wealth index, father's education; reinforcing factor: father's role, and enabling factors: ANC visits, delivery assistants, place of delivery, and residence). A multiple logistic regression analysis was used to identify factors affecting MDD. MDD was defined as the number of foods consumed within 24 hours before survey from a total of seven food groups. These included (i) breast milk; (ii) grains, roots, and tubers; (iii) legumes and nuts; (iv) dairy products; (v) flesh foods; (vi) eggs; (vii) vitamin-A rich fruits and vegetables; and (viii) other fruits and vegetables (19). The MDD score was coded as '0' for those who had consumed five of more foods and '1' for less than five food groups during the previous day (19). P-value <0.25 were included in the initial multivariable regression models. Final models were derived using elimination of variables with only variables with P-value <0.05 remained with a 95% confidence interval.

Results

There were 2,976 breastfed children aged 6-23 months in the samples, 36.9% aged 18-23 months, 37.0% aged 12-17 months and 26.1% aged 6-11 months.

There were 1,571 (52.8%) breastfed children who met MDD recommendation (Table 1). Grain, roots, and tubers were the most consumed food groups in 24 hours preceding the survey. It is consumed by 2,767 (93%) of the children, followed by vitamin-A rich fruits and vegetables (75%). In contrast, consumption of other fruits and vegetables were only 25%, followed by legumes and nuts (26%), and dairy products (35%) (Fig.1).

Three-quarters of the mothers aged ≥ 25 years, around two-thirds are non-working mothers, mostly have access to media at least once a week, two thirds of the fathers involved in the child care, almost all mothers have ANC visits of ≥ 4 times, and three-quarters of mothers delivered in health facility (Table 1).

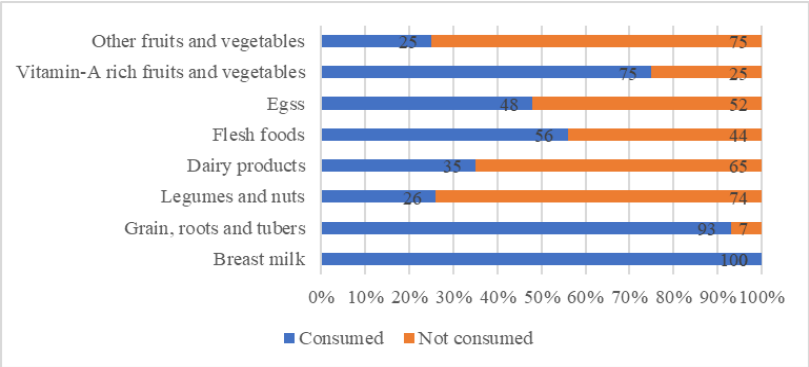

Figure 1. Percentage of food groups consumption

Table 1. Characteristics of respondents

Variables	Percentage (n=2.769)
MDD	
Yes	52.8
No	47.2
Children's age	
18 – 23 months	36.9
12 – 17 months	37.0
6 – 11 months	26.1
Children's gender	
Female	48.5
Male	51.5
Mother's age	
≥25 years old	78.8
<25 years old	21.2
Mother's education	
High (high school graduate/ equivalent or higher)	47.6
Low (junior high school graduate/ equivalent or lower)	52.4
Mother's working status	
Working mother	38.5
Non-working mother	61.5
Mother's access to media	
Accessing regularly (at least once a week)	87.5
Not accessing regularly (less than once a week)	12.5
Wealth Index	
High (3rd quintile and above)	52.4
Low (2nd quintile and below)	47.6
Father's education	
High (high school graduate/ equivalent or higher)	48.3
Low (junior high school graduate/ equivalent or lower)	51.7
Father's role	
Involved	76.6
Not involved	23.4
ANC visits	
Often (≥4 times)	90.0
Rarely (<4 times)	10.0
Delivery assistants	
Trained health personnel	91.1
Others	8.9
Place of delivery	
Health facility	77.7
Home	22.3
Residence	
Urban	47.6
Rural	52.4

Table 2. Factors associated with MDD achievement

Variables	MDD					OR (95% CI)	*P-value*
	Yes		No		Total		
	n	%	n	%	n		
Children's age							
18 – 23	537	69	241	31	778	(1) 1.322	<0.001*
12 - 17	691	62	410	37.2	1101	(2) 4.898	
6 - 11	343	31.3	754	68.7	1097		
Children's gender							
Female	782	54.2	661	45.8	1443	1.116 (0.966 – 1.288)	0.147
Male	789	51.5	744	48.5	1533		
Mother's age							
≥25 years old	1242	53.0	1103	47.0	2345	1.034 (0.867- 1.233)	0.746
<25 years old	329	52.1	302	47.9	631		
Mother's education							
High	842	59.5	574	40.5	1416	1.672 (1.446 – 1.934)	<0.001*
Low	729	46.7	831	53.3	1560		
Mother's working status							
Working mother	651	56.8	496	43.2	1147	1.297 (1.118 – 1.504)	0.001*
Non-working mother	920	50.3	909	49.7	1829		
Mother's access to media							
Accessing regularly	1424	54.9	1169	45.1	2593	1.978 (1.582 – 2.474)	<0.001*
Not accessing regularly	141	38.1	229	61.9	370		
Wealth Index							
High	953	61.1	606	38.9	1559	2.033 (1.757 – 2.353)	<0.001*
Low	618	43.6	799	56.4	1417		
Father's education							
High	848	59.1	586	40.9	1434	1.634 (1.413 – 1.889)	<0.001*
Low	721	47.0	814	53.0	1535		
Father's role							
Involved	1248	56.2	972	43.8	2220	1.647 (1.385 – 1.959)	<0.001*
Not involved	297	43.8	381	56.2	678		
ANC Visits							
Often (≥4 times)	1452	54.4	1217	45.6	2669	1.872 (1.465 – 2.392)	<0.001*
Rarely (<4 times)	116	38.9	182	61.1	298		
Delivery assistants							
Trained health personnel	1486	54.8	1226	45.2	2712	2.552 (1.950 – 3.340)	<0.001*
Others	85	32.2	179	67.8	264		
Place of delivery							
Health facility	1292	55.9	1020	44.1	2312	1.754 (1.473 – 2.089)	<0.001*
Home	278	41.9	385	58.1	663		
Residence							
Urban	841	59.4	575	40.6	1416	1.663 (1.438 – 1.923)	<0.001*
Rural	730	46.8	830	53.2	1560		

**P-value* < 0.05

Chi-square analysis showed that children's age, mother's education, mother's working status, mother's access to media, wealth index, father's education, father's role, ANC visit, delivery assistants, place of delivery, and residence were found to have a significant association with MDD (Table 2). However, only children's age, mother's education, mother's working status, wealth index, father's role, delivery assistants, and area of residence qualified for the final multivariate modeling. Multivariate analysis found that the diversity of diet is better among older children than younger children. Children aged 18-23 months have possibility of 5.7 times higher to have higher MDD score than children aged 6-11 months and 1.3 times higher than children aged 12-17 months. Children of wealthier family (3rd quintile and above) and those delivered by trained health personnel have possibilities of having MDD score around 1.5 and 1.7 times higher than the children of poor family and children delivered by non- trained health personnel. Children of higher mothers' education, working mothers, fathers' involvement, ANC visit >= 4 times, and parents reside in urban areas have possibility of having higher MDD score between 1.2-1.3 times than the other groups (Table 4).

Table 4. Effect of child's characteristics, use of maternal care services and family factors on MDD achievement

Independent Variables	*P-value*	OR	95% CI	
Children's age				
Children's age (1) (18-23 mos compares to 12 -17 mos)	0.015*	1.294	1.052	- 1.592
Children's age (2) (18-23 mos compares to 6 - 11 mos)	<0.001*	5.739	4.637	- 7.102
Children's gender (female)	0.430	1.067	0.908	- 1.254
Mother's education (high)	0.007*	1.310	1.075	- 1.596
Mother's working status (working mother)	0.019*	1.222	1.034	- 1.444
Mother's access to media (at least once a week)	0.257	1.167	0.894	- 1.525
Wealth index (3rd quintile and above)	<0.001*	1.477	1.215	- 1.796
Father's education (High)	0.189	1.141	0.936	- 1.389
Father's role (Involved)	0.024*	1.266	1.031	- 1.555
ANC visits (≥4 times)	0.138	1.263	0.928	- 1.719
Delivery assistants (Trained health personnel)	0.007*	1.677	1.153	- 2.439
Place of delivery (Health facility)	0.761	1.039	0.812	- 1.329
Residence (urban)	0.006*	1.287	1.074	- 1.543

*$P\text{-value} < 0.05$

Discussion

Optimising IYCF practice has an important role in improving nutrients intake, health, and children's development (1) and during their lifetime (15). WHO has established IYCF indicators to assess the quality and quantity of children's food, one of which is MDD. Dietary diversity does not only look at the variety of foods consumed but also shows the relative distribution and adherence of parents to recommended dietary patterns (17).

In this study, 52.8% of breastfed children aged 6-23 months in Indonesia in 2017 had fed on five or more food groups meeting the MDD. The results of this study showed a lower prevalence when compared to UNICEF data for 2017, with 53.9% of breastfed children had fed with

MDD (20). However, it is higher when compared to the previous 2017 IDHS study, which was 39.3% of children had fed with MDD (10). This is possible due to differences in sample size, as well as the criteria for inclusion and exclusion.

Globally, children aged 18-23 months are more likely to be fed with MDD. Whereas children aged 6-11 months were less likely to be fed with MDD based on the standard 4 out of 7 food groups (21). In this study, the odds among children aged 18-23 months were 5.8 times higher to consumed five or more food groups than children aged 6-11 months. It can also be concluded that, as the child gets older, the more likely the child is to be fed with MDD compared to younger children. The significant association between children's age and MDD found in this study is consistent with two studies done in Ethiopia (16,22), a study in Pakistan (17), and Uganda (23). This study also found that most breastfed children aged 6-11 months only consumed grains, roots, and tubers. In the case of Indonesia, the main staple food is rice.

The significant association between children's age and MDD could be due to the delayed introduction of complementary feeding (24). Another possibility is that mothers may perceive that younger children have a poor intestinal ability to digest solid, semi-solid, and soft foods (25). In addition, mothers may assume that providing large amounts of food will cause children to develop infections (24). The majority of mothers with children age 6-11 months usually still focused on breastfeeding. It is possible that mothers did not realise the importance of adequate dietary diversity in meeting children's nutritional needs, and consider that breastmilk after the baby aged over 6 months still has sufficient nutrients. Although breastmilk can make a large contribution to the total nutritional intake of children aged 6-24 months, breast milk is not an adequate source of several types of micronutrients such as iron, zinc, and vitamin A, as children get older (4).

In this study, the odds among children of mothers with higher education were 1.3 times higher to consumed five or more food groups than children of mothers with low education. Mothers with university education are more likely to provide a variety of foods for their children compared to mothers with primary school education and not entered formal school. This could be possible due to mother's ability to understand information and to know the diversity of food. This finding is consistent with a previous study done in Nepal (11), India (26), and Ethiopia (22).

This study showed that children of working mothers had a better chance to consume five or more food groups (OR 95% CI: 1.23 1.04-1.45) than children of non-working mothers. It was also found that there was a significant association between wealth index and mother's education with mother's working status. This founding was in line with a previous study in India (27) which states that the association between mother's working status and MDD could be due to wealth index and higher education. It was possible that working mothers had more opportunities to buy and choose a variety of foods. The significant association between mother's working status and MDD found in this study is consistent with a study done in East Africa (28) and Ethiopia (14).

This study showed that children of mothers with high wealth index were more likely to consume five or more food groups by 1.5 times higher than children of mothers with low wealth index. This could be due to the ability to purchase a wider variety of foods. This finding was consistent with a study done in India (26), Nepal (11), and Ethiopia (8).

Father's role was significantly associated with MDD in this study. It was also found that there was a significant association between ANC visits and father's role. This could be possible due to father's role through the implementation of the information obtained during the ANC visit on child feeding, especially the provision of various foods. The significant association between father's role and MDD found in this study is consistent with studies done in Ethiopia (16,29).

This study showed that delivery assistants had a significant association with MDD outcomes, especially obstetricians, nurses, and midwives. This could be due to the competency of these trained health personnel to monitor mothers during pregnancy and provide further counsel regarding complementary feeding, especially the provision of various foods (30). In contrast, this study also found a significant association with traditional birth attendants / *paraji* as a delivery assistant, who are not classified as trained health personnel, with MDD outcomes. Further analysis needs to be done regarding this finding. The significant association between delivery assistants and MDD outcomes found in this study is consistent with a study done in Nepal (31) and Ethiopia (30).

In addition, children living in urban areas had the odds to consume five or more food groups 1.3 times higher than children living in rural areas. This founding is consistent with a study done in Ethiopia (24). This could be due to the fact urban areas provide more access to public facilities such as markets/shops, schools, and hospitals (32). In conclusion, it could be possible for mothers who lived in urban areas to had easier access to bough various foods and got information about various foods.

Conclusions

MDD achievements are still a problem in Indonesia. The proportion of breastfed children aged 6-23 months in Indonesia in 2017 who were fed with MDD was 52.8%, lower than the overall prevalence based on the 2017 Indonesia DHS data (54%). The results of the multivariate analysis showed that the children's age, mother's education, mother's working status, wealth index, father's role, delivery assistants, and residence were significantly associated with MDD. Children age 6-11 months was the dominant factor affecting the MDD among breastfed children aged 6-23 months in Indonesia 2017.

Recommendation

This study suggested that the Indonesian government needs to strengthen the current programs regarding IYCF to improve IYCF practices in order to increases dietary diversity at the national level, seeing that it is an effective measure for reducing childhood malnutrition and improving the nutritional status of children. The low MDD achievement among children aged 6-11 months warrant the importance of prioritizing effort on this age group because this is a period where a child grows rapidly and potentially expose to infection. Massive campaigns on the IYCF practice are needed, including campaign about consumption of balanced diet. Future interventions are also needed to target the optimisation of dietary diversity in Indonesia, primarily targeting mothers with infants and young children, through awareness-raising programs and campaigns to encourage children's growth by providing a more diverse diet since aged of 6 months. In addition, nutrition education as well as proper parenting in IYCF practice are needed for pregnant women and mothers with children under five at health facilities

such as *posyandu* and classes for pregnant women. More studies are needed to find the answers of why MDD achievement in children age 6-11 months is low.

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