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Factors Associated with Minimum Acceptable Diet in 6–11-Month-Old Indonesian Children Using the 2017 IDHS

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Abstract

BACKGROUND: Inadequate complementary feeding practices are known to contribute to children's nutritional status. A minimum acceptable diet (MAD) is one of the simple, valid, and reliable indicators to assess complementary feeding practices in 6–23-month-old children on food diversity and meal frequency. Based on the UNICEF data, the MAD of 6–11 months in Indonesia was 26.3% in 2017 and the lowest compared to other groups. Hence, this study research question is posing toward several factors associated with the low MAD among 6–11 months infant.

AIM: This study aimed to determine factors associated with MAD in 6–11-month-old children in Indonesia.

METHODS: This study was a secondary analysis using the 2017 Indonesia Demographic and Health Survey. This is a cross-sectional study involving 17,848 children in Indonesia. Final sample to be analyzed were 1,441 children of 6–11-month-old. Logistic regression model was applied to identify the significant risk factors associated with MAD.

RESULTS: The result showed that the prevalence of MAD in this study is 29%. From the multivariate logistic regression, wealth index, television ownership, and mother's occupation were significantly associated with MAD of 6–11-month-old children in Indonesia.

CONCLUSION: In conclusion, factors associated with MAD among 6–11-month-old children were wealth index, television ownership, and mother's occupation.

Introduction

Undernutrition is still a big nutritional problem in Indonesia. The latest nutritional status survey on children under five in Indonesia (Survei Status Gizi Balita Indonesia) showed that 16.29% of children were underweight, 27.67% were stunted, and 7.44% were wasted [1]. Undernutrition occurred due to the direct, underlying, and base causes. The direct causes of malnutrition were insufficient intake and disease that were caused by underlying causes including household food insecurity, unhealthy living environment, inadequate health facility, and inadequate feeding practices [2], [3], [4].

In 2008, the WHO and UNICEF created indicators to assess the infant and young child feeding (IYCF) practices [5], [6], [7]. There are eight core indicators to assess the IYCF practices that are mainly designed for use in large-scale surveys or national programs. One of the eight indicators is minimum acceptable diet (MAD). The MAD is one of the eight indicators that are simple, valid, and reliable to assess IYCF practices in the population level. This indicator consists of two other core indicators, minimum dietary diversity (MDD) and minimum meal frequency (MMF). MDD is defined as a child who ate ≥5 food groups in the previous day, whereas MMF is defined as a child who was given food that fulfills the minimum criteria [3], [4]. The criteria of MMF are different by the age and the breastfeeding status. In breastfed children aged 6–8 months, the minimum frequency is 2 times. Meanwhile, the minimum frequency of 9–23 breastfed children is 3 times and for the nonbreastfed children aged 9–23-month-old is 4 times [3], [5], [6]. The child who ate diverse food and was given food in an adequate frequency is considered to meet the MAD. Therefore, MAD is defined as a proportion of children aged 6–23 months who receive the MDD and MMF [4], [5]. The global achievement of MAD is 15.9% [6]. Meanwhile, the

South East Asia and Indonesia's achievement of MAD in 6–23-month-old children is 41% and 40.3%, respectively [8], [9], [10].

According to the UNICEF Global Database of IYCF, the latest survey to determine the MAD in Indonesia was the Indonesia Demographic and Health Survey (IDHS) held in 2017 in 34 provinces of Indonesia. From this survey, the achievement of MAD varies within the age group. The MAD prevalence in children aged 6–11 months, 12–15 months, 16–19 months, and 20–23 months is 26.3%, 46%, 45.7%, and 50.5%, respectively [10]. The prevalence in 6–11 months was the lowest among all age group. Compared to the prevalence of MAD on the IDHS that was held in 2012, an approximately 5% increment was found in most of the older age group except in the 6–11-month-old group. In 2012, the prevalence of MAD was 25.7% [10]. Within 5 years, the prevalence of MAD in children aged 6–11 months is 26.3%, thus showing that the increment is only 0.6%.

The basic causes of undernutrition are social, economic, and political aspects that also could affect the feeding practices [2]. One of the indicators used to determine the economic status of household is wealth index. Studies in Indonesia and different countries showed that wealth index is one of the factors that are associated with MAD [11], [12], [13], [14]. Furthermore, social, economic, and political aspects could affect the household's access to several resources including education, income, employment, technologies, and land [2]. Other studies also showed that a correlation was found between parent's education and MAD [14], [15], [16]. Mothers who have higher educational level will have a better practice of complementary feeding due to the ability to understand the benefit of MAD [17], [18]. The household access to information also affects the MAD due to the exposure of information including television, radio, and newspaper, which will increase mother's knowledge on child's feeding practices [19]. The household that has frequent exposure to media is also associated with MAD achievement [19], [20], [21]. The parental employment status was also associated with MAD in previous studies [11], [22]. Working parents will contribute to the household's income but will also affect the parent's involvement in child feeding [11].

The previous studies on the MAD in Indonesia had been conducted before using the population of 6–23-month-old children in one of the 34 provinces in Indonesia, whereas the present study is representative of the national survey scale data [20], [21]. Based on these findings, this study aimed to determine factors associated with MAD in 6–11-month-old children in Indonesia. Better understanding on the determinants of the low prevalence in children aged 6–11 months is needed to increase the MAD prevalence.

Materials and Methods

Study settings

The IDHS was conducted on July 24–September 30, 2017, in the 33 provinces in Indonesia. The 2017 IDHS was implemented by Statistics Indonesia in collaboration with the National Population and Family Planning Board and the Ministry of Health (MoH) [22].

Study design and population of interest

A cross-sectional study design was used in this study. This study used secondary data that were obtained from the 2017 IDHS that was accessed from the demographic and health survey public domain. The study population in this study included all families in Indonesia who had 6–11-month-old children. According to Statistics Indonesia, the number of 1–11 months children in Indonesia on 2017 were 4,746,438 [23].

Sample

The 2017 IDHS samples were obtained from 1.970 census blocks spread in rural and urban areas. Two stages of stratified sampling have been identified. The first stage was to select the census block. The census blocks were selected using a system that is proportional to size and is classified based on the urban or rural area and wealth index. The second stage was for household selection. From each census block, 25 households were selected using systematic sampling. After that, eight households were selected from the previously selected households using systematic sampling to obtain samples of married men [23]. The number of samples was calculated by considering the relative standard error (RSE) values of selected basic variables in the 2017 IDHS. The minimum number of sampled households was calculated using an average RSE of 3.5%. The sample size was corrected using the compromise allocation method approach and was adjusted with nonresponse response of 5%. The expected sample was 49,250 households, with 25,300 and 23,950 households from urban and rural areas, respectively. The 25 household samples were expected to obtain 59,100 15–49-year-old women [24].

The number of eligible women aged 15–49 years who were interviewed was 49,627 [23]. The data of interviewed women who had children were recorded on the children's record (IDKR71FL) dataset (n = 17,848) that contains information related to the child's pregnancy and postnatal care, immunization, and health. A number of 1,691 eligible women aged 15–49 years interviewed with their last-born child aged 6–11 months were obtained. Cases with missing values and did not meet the inclusion criteria were

deleted from the dataset. The final subpopulation in this study is 1,441. Figure 1 will explain the sampling procedure.

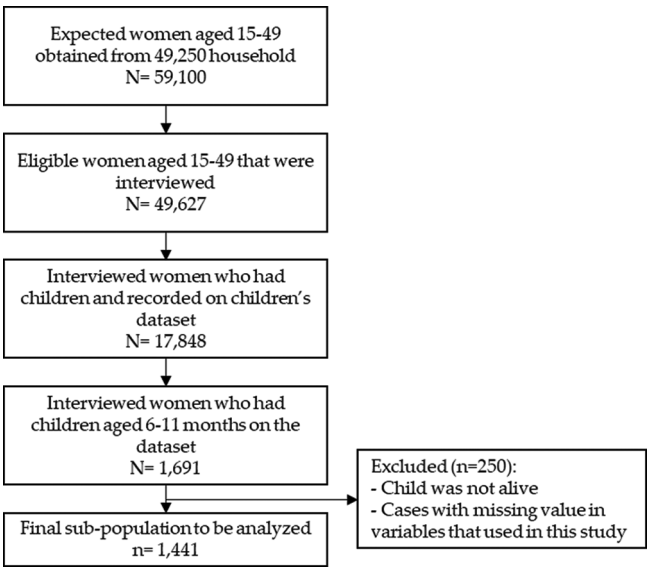

Figure 1: Sampling procedure flow diagram

Inclusion and exclusion criteria

The inclusion criteria of this study included still alive children aged 6–11 months and who have complete data in variables that are related to dietary diversity, meal frequency, parent's educational level, access to information, parent's occupation, sanitation, child care practices, and access to health facilities. All cases that did not meet the inclusion criteria were excluded from the study.

Data collection

The 2017 IDHS was a national scale survey. The primary data of the 2017 IDHS were collected on July 24–September 30, 2017. The data were collected using four questionnaires, which included the household questionnaire, woman's questionnaire, man's questionnaire, and unmarried man's questionnaire. The household and women questionnaires were based on the standard DHS phase 7 questionnaires but were adapted for use in Indonesia. The questionnaire was pretested in several places in Indonesia. To collect the data, 145 interviewing teams had been trained [24].

The dataset was obtained from the demographic and health survey public domain (https://dhsprogram.com/). The data were requested on November 9, 2020 using project title "MAD in Indonesia" and requesting access for Indonesia data. The request was accepted on November 10, 2020. After the permission was granted by DHS, the dataset that was used in this study was IDKR71FL or children's record file. This dataset contains the information related to the child's pregnancy and postnatal care, immunization, and health.

Dependent variables of the study

The dependent variable in this study was the MAD. MAD refers to the proportion of children who had at least the MDD and MMF during the previous day for breastfed children and received at least two milk feedings and had at least the MDD and MMF during the previous day for nonbreastfed children [7].

MDD refers to children who were fed with 5 out of 8 groups in the previous day. The food groups included (1) grains, roots, and tubers, (2) legumes and nuts, (3) dairy products (milk, yogurt, cheese), (4) flesh foods (meat, fish, poultry, and liver/organ meats), (5) eggs, (6) vitamin A-rich fruits and vegetables, (7) other fruits and vegetables, and (8) breast milk [25]. MMF refers to children who received solid, semisolid, or soft foods that fulfill the minimum criteria [8]. The minimum criteria for MMF were divided based on age and breastfeeding status. For children who were breastfed and aged 6–8 months, the mini-mum requirement is 2 times/day. The minimum requirement for children aged 9–23 months and who were breastfed is 3 times/day. Meanwhile, the requirement for children aged 6–23 months who are not breastfed is 4 times a day [7], [8].

Independent variables of the study

The independent variables in this study were parent's educational level, parent's occupation, sanitation, access to information, wealth index, and access to health facilities.

Data entry and analysis

To construct the MAD variable, constructing the MDD and MMF variables first is important by computing variables that were related to MDD and MMF that can be seen in Table 1. After the MDD and MMF variables were constructed, the MAD variable could be constructed. The MAD variable was classified as met and not met. Children were classified as met MAD variable if they met the MAD and MMF. For nonbreastfed children, the additional requirement to meet the MAD was that the children received minimum 2 times of milk feeding.

A descriptive analysis was performed to see the sample characteristic and the prevalence of MAD. Subsequently, bivariate analyses were conducted to determine the associations between the independent and dependent variables (MAD). The bivariate analyses for the independent variables were performed at $p < 0.05$ using bivariate logistic regression. Multivariate logistic regression analyses were performed to determine the association between the independent variables and MAD to see the effects of other relevant factors and covariates. The independent variables found to be significantly associated with the dependent variable in the bivariate analyses were used in the multivariate

Table 1: Variables used to construct the MAD

Indicators	Food group	Variables in IDKR71FL dataset	
		Variables	Labels
MDD	Breastmilk	M4	Duration of breastfeeding
	Grains, roots, and tubers	V12A	Gave child fortified baby food
		V414E	Gave child bread, noodles, other made from grains
		V414F	Gave child potatoes, cassava, or other tubers
	Legumes and nuts	V414O	Gave child food made from beans, peas, lentils, nuts
	Dairy products (milk, yogurt, cheese)	V411	Gave child tinned, powdered, or fresh milk
		V411A	Gave child baby formula
		V414V	Gave child yogurt
		V414P	Gave child cheese, yogurt, other milk products
	Flesh foods (meat, fish, poultry, and liver/organ meats)	V414H	Gave child meat (beef, pork, lamb, chicken, etc.)
		V414M	Gave child liver, heart, other organs
		V414N	Gave child fish or shellfish
	Eggs	V414G	Gave child eggs
	Vitamin A-rich fruits and vegetables	V414I	Gave child pumpkin, carrots, squash (yellow or orange inside)
		V414J	Gave child any dark green leafy vegetables
		V414K	Gave child mangoes, papayas, other vitamin A-rich fruits
	Other fruits and vegetables	V414L	Gave child any other fruits
MMF		M39	Number of times ate solid, semisolid, or soft food yesterday
		V469E	Times gave child powdered/tinned/ fresh milk
		V469F	Times gave child infant formula
		V469X	Times gave child yogurt

MAD: Minimum acceptable diet, MDD: Minimum dietary diversity, MMF: Minimum meal frequency.

logistic regression modeling at $p < 0.05$. Odds ratios and 95% confidence intervals (CI) were reported at $p < 0.05$ level of significance. In the analysis process, the parent's occupation variables were reduced into three sub-variables. The sub-variables are not working, working in agricultural section, and working in nonagricultural section.

Results

Characteristics of the study population

This study included 1,441 cases. The child's mean age in this study was (±SD) 8.51 ± 1.69 months. Most of the children in this study lived in Java Island (31.5%), Indonesia, which is the most populated island. A number of children (5.8%) were born with low birth weight, whereas 1,357 children (94.2%) were born weighing ≥2,500 g. Most of the children (81.8%) did not experience diarrhea in the past 2 months (Table 1). Most of the children lived in households that have television (82.1%) and watch television at least once a week (80.8%). Most households in this study owned a mobile telephone (580.4%). Over half of the cases were not using the internet in the last month (51.3%), but 35.2% used it almost every day. Most of the households were in the poorest (23%) category of the wealth index (Table 2). The father's occupation in this study was mostly agricultural or self-employed (24.1%). Meanwhile, half of the mothers in this study were not working (53.6%). Fathers and mothers' highest

Table 2: Characteristics of the children

Characteristics	Frequency (n = 1,441)	Percentages
Age in months*		
6	232	16.1
7	206	14.3
8	241	16.7
9	267	18.5
10	244	16.9
11	251	17.4
Child's sex		
Male	787	54.6
Female	654	45.4
Location		
Sumatra	387	26.9
Java	454	31.5
Bali, East Nusa Tenggara, West Nusa Tenggara	130	9.0
Borneo	134	9.3
Sulawesi	219	15.2
Papua and Maluku	117	8.1
Currently breastfed		
Yes	1,198	83.1
No	243	16.9
History of diarrhea		
No	1,179	81.8
Yes, last 2 weeks	262	18.2
Birth weight		
<2,500 g	84	5.8
≥2,500 g	1,357	94.2

*Mean child age was 8.51 ± 1.69 months.

educational level was mostly graduated from senior high school, respectively, 38.4% and 35.7%. Over 70% of households in this study had private toilet facilities with septic tanks, and 81.8% of the children did not have diarrhea in the last 2 weeks (Tables 3 and 4).

Table 3: Characteristics of the household

Characteristics	Frequency (n = 1,441)	Percentages
Household has television		
No	198	13.7
Yes	1,183	82.1
Not a dejure resident	60	4.2
Frequency of watching television		
Not at all	77	5.3
Less than once a week	199	13.8
At least once a week	1,165	80.8
Owns a mobile telephone		
No	282	19.6
Yes	1,159	80.4
Frequency of using internet last month		
Not at all	739	51.3
Less than once a week	57	4
At least once a week	138	9.6
Almost every day	507	35.2
Wealth index		
Poorest	332	23
Poor	303	21
Middle	263	18.3
Richer	267	18.5
Richest	276	19.2
Had problem with getting money needed for treatment in health facility		
Big problem	231	16
Not a big problem	1,210	84
Had problem with distance to health facility		
Big problem	198	13.7
Not a big problem	1,243	86.3
Type of toilet facility		
Private: with septic tank	1,009	70
Private: with no septic tank	135	9.4
Shared/public	134	9.3
River/stream/creek	77	5.3
Beach	11	0.8
Pool/ponds	5	0.3
Pit	35	2.4
Yard/bush/forest	35	2.4

MAD

A child is considered to meet the MAD if the child met the criteria in MDD and MMF. In this study, children who met the MMF were higher than children who met the MDD, respectively, 75.9% and 35.7%.

Table 4: Characteristics of parents

Characteristics	Frequency (n = 1,441)	Percentages
Father's occupation		
Did not work	10	0.7
Professional/technical/managerial	143	9.9
Clerical	121	8.4
Sales	224	15.5
Agricultural self-employed	348	24.1
Industrial worker	333	23.1
Services	250	17.3
Other	8	0.6
Don't know	4	0.3
Mother's occupation		
Did not work	773	53.6
Professional/technical/managerial	134	9.3
Clerical	75	5.2
Sales	203	14.1
Agricultual self-employed	105	7.3
Industrial worker	66	4.6
Services	84	5.8
Don't know	1	0.1
Father's education		
Primary	334	23.2
Junior high	290	20.1
Senior high	554	38.4
Academy	50	3.5
University	211	14.6
Don't know	2	0.1
Mother's education		
No education	16	1.1
Primary	288	20
Junior high	317	22
Senior high	515	35.7
Academy	88	6.1
University	217	15.1

Meanwhile, the percentage of children who met the MAD in this study was 29% (Tables 2 and 5).

Table 5: Prevalence of MDD, MMF, and MAD in 6–11-month-old children

Indicators	n	Percentages
Minimum dietary diversity		
Met	515	35.7
Not-met	926	64.3
Minimum meal frequency		
Met	1,093	75.9
Not-met	348	24.1
Minimum acceptable diet		
Met	418	29
Not-met	1,023	71

MAD: Minimum acceptable diet, MDD: Minimum dietary diversity, MMF: Minimum meal frequency.

Bivariate association between parent's education and MAD

The mother's highest educational level was found to be significant with MAD of 6–11-month-old infant (p = 0.032). Compared with mothers who did not get education, mothers with higher educational levels were 9.335 times more likely to feed the child with MAD (Table 2). The father's highest educational level was also found to be significant with MAD especially those fathers who graduated from secondary (p = 0.019) and higher (<0.001) educational level. The odds ratio of fathers who graduated from the secondary and higher to meet the MAD was 1.465 and 2.605, respectively (Table 3).

Bivariate association between parent's occupation and MAD

No significant association was found between father's occupation and meeting MAD. Nonetheless, a significant association was observed between mother's occupation and meeting MAD. Table 3 shows that mothers who were working in nonagricultural area were 1.742 times more likely to feed the child according to the MAD than mothers who were not working.

Bivariate association between access to information and MAD

The ownership of television was also significant with MAD. Households that own television were 3.1 times higher in meeting MAD than households that did not have television. Not only television, but the ownership of mobile phone was also significant with MAD (p < 0.001; OR = 1.786). Households that watch television less than once a week and at least once a week were also significantly related with MAD. Compared with households that did not watch television at all, households who watched television less than once and at least once a week were, respectively, 3.419 and 3.205 times higher in meeting MAD. The frequency of using the internet was also related to MAD. Households who used the internet almost every day were 2.496 times more likely to meet MAD (Table 3).

Bivariate association between wealth index and MAD

The richest, richer, and middle wealth index categories were significantly related to the MAD of 6–11-month-old infants with a p < 0.001. Compared to households in the poorest wealth index category, the odds ratios of those who were in the middle, richer, and richest categories were 1.678, 2.161, and 4.242, respectively (Table 6).

Bivariate association between access to health facility and MAD

Households who did not have any problem with getting money for treatment to health facilities were also significantly related to the MAD of 6–11-month-old infants (p = 0.018; OR = 1.493). However, no significant relationship was observed between households who had no problem with distance to the health facility with MAD of 6–11-month-old infants (Table 6).

Bivariate association between sanitation and MAD

No signification association was observed between type of toilet facility and history of diarrhea and MAD.

Multivariate associations between the factors and MAD

Factors that are associated with MAD after multivariate analysis were household ownership of

Table 6: Bivariate analysis between the factors and minimum acceptable diet

Variables	MAD		p-value	OR (unadjusted)	95% CI	
	Not-met	Met			Lower	Upper
Household has television						
No	173	25				
Yes	817	366	<0.001	3.100*	2.002	4.800
Frequency of watching television						
Not at all	68	9				
Less than once a week	137	62	<0.001	3.419*	1.604	7.291
At least once a week	818	347	<0.001	3.205*	1.581	6.496
Owns a mobile telephone						
No	225	57				
Yes	798	361	<0.001	1.786*	1.302	2.450
Uses of internet						
Never	547	147				
Yes, last 12 months	453	264	<0.001	2.169*	1.711	2.749
Yes, before last 12 months	23	7	0.778	1.133	0.477	2.691
Frequency of using internet last month						
Not at all	582	157				
Less than once a week	37	20	0.017	2.004*	1.131	3.550
At least once a week	101	37	0.149	1.358	0.896	2.058
Almost every day	303	204	<0.001	2.496*	1.943	3.205
Wealth index						
Poorest	273	59				
Poorer	231	72	0.063	1.442	0.980	2.122
Middle	193	70	0.010	1.678*	1.134	2.485
Richer	182	85	<0.001	2.161*	1.476	3.165
Richest	144	132	<0.001	4.242*	2/937	6.124
Had problem with getting money needed for treatment in health facility						
Big problem	179	52				
Not a big problem	844	366	0.018	1.493*	1.071	2.081
Had problem with distance to health facility						
Big problem	149	49				
Not a big problem	874	368	0.156	1.284	0.909	1.813
Mother's occupation						
Not working	584	189				
Agricultural	79	26	0.944	1.017	0.634	1.631
Nonagricultural	360	203	<0.001	1.742*	1.374	2.210
Father's occupation						
Not working	9	1				
Agricultural	277	71	0.431	2.307	0.288	18.509
Nonagricultural	737	346	0.172	4.225	0.533	33.482
Type of toilet facility						
Private			0.186	1.286	0.886	1.866
Share			0.76	0.597	0.338	1.056
Nature						
Mother's highest educational level						
No education	15	1				
Primary	235	53	0.243	3.383	0.437	26.175
Middle	238	79	0.123	4.979	0.647	38.298
Secondary	347	168	0.056	7.262	0.951	55.440
Higher	188	117	0.032	9.335*	1.217	71.603
Father's highest educational level						
Primary	261	73				
Middle	216	74	0.283	1.225	0.846	1.774
Secondary	393	161	0.019	1.465	1.066	2.013
Higher	151	110	<0.001	2.605*	1.822	3.723
Don't know	2	0				
History of diarrhea						
Yes, past 2 weeks	194	68				
No	829	350	0.229	1.204	0.890	1.631

*Significant at $p < 0.05$. Bivariate analysis using binary logistic regression.

television, wealth index, and mother's occupation. The household that had a television in their house was 2 times more likely to meet the MAD (p = 0.011; AOR: 2.048; 95% CI = 1.175–3.570). Household in the richest category was also associated with meeting MAD (p = 0.003; AOR = 2.205; 95% CI = 1.317–3.693). Mothers who were working in the agricultural sector were also significantly related to MAD and 1.6 times more likely to meet the MAD (p = 0.047; AOR = 1.683; 95% CI = 1.008–2.812) (Table 7).

Discussion

Based on the result of this study, we found that factors associated with MAD were wealth index, ownership of television, and mother's occupation. The coverage of MAD among 6–11-month-old children in Indonesia was 29%. A significant difference was observed between the MAD prevalence of 6–11-month-old children in the UNICEF Global Database and this study. Based on the UNICEF Global Database, the prevalence of MAD in 6–11-month-old children was 26.3% using the 2017 IDHS data [10]. This occurred due to the difference in the sample size because of the elimination of missing value from variables that were used in this study. There were >70% of 6–11-month-old children in Indonesia who did not receive MAD. Other studies in different countries showed that the prevalence of MAD was low due to the high prevalence of MMF but low in MDD [26], [27]. The study in Tanzania showed that the prevalence of MAD was significantly lower in 6–11-month-old age group than the older age group and increased with age [27]. Rather than the frequency of food given, the low prevalence of MAD in Indonesia ensued because most of the 6–11-month-old children

Table 7: Multivariate analysis between factors and minimum acceptable diet

Variables	p-value	AOR	95% CI	
			Lower	Upper
Household has television				
No				
Yes	0.011	2.048*	1.175	3.570
Frequency of watching television				
Not at all				
Less than once a week	0.086	2.051	0.904	4.657
At least once a week	0.340	1.476	0.663	3.286
Owns a mobile telephone				
No				
Yes	0.816	0.957	0.659	1.389
Use of internet				
Yes, past 12 months	0.958	0.965	0.259	3.602
Yes, before the past 12 months	0.903	0.947	0.390	2.299
No				
Frequency of using internet past month				
Not at all				
Less than once a week	0.459	1.709	0.414	7.066
At least once a week	0.980	1.018	0.260	3.984
Almost every day	0.542	1.514	0.400	5.733
Wealth index				
Poorest				
Poorer	0.827	1.052	0.670	1.650
Middle	0.587	1.144	0.704	1.858
Richer	0.223	1.354	0.831	2.207
Richest	0.003	2.205	1.317	3.693
Had problem with getting money needed for treatment in the health facility				
Big problem	0.868	1.031	0.721	1.474
Not a big problem				
Mother's occupation				
Not working				
Agricultural	0.047	1.683*	1.008	2.812
Nonagricultural	0.055	1.307	0.994	1.718
Mother's highest educational level				
No education				
Primary	0.390	2.518	0.307	20.675
Middle	0.276	3.236	0.391	26.807
Secondary	0.210	3.876	0.465	32.292
Higher	0.340	2.839	0.333	24.241
Father's highest educational level				
Primary				
Middle	0.613	0.901	0.601	1.351
Secondary	0.241	0.793	0.539	1.168
Higher	0.653	1.121	0.681	1.845

*Significant at p<0.05. Multivariate analysis using multinomial logistic regression`.

did not receive diverse diet that could be seen on the low prevalence of MDD and higher prevalence of MMF (Table 5). This also occurred in the previous national survey, 2012 IDHS, that the low prevalence of MAD of 6–11-month-old children ensued from the low level of MDD and high level of MMF [10].

According to the UNICEF's conceptual framework of determinants of child undernutrition, one of the basic causes of undernutrition is economic factor. Financial inadequacy or any financial issue could affect the household's access to adequate resources as regards quality and quantity including education, income, technology, land, and employment [2]. In this study, wealth index was used as the proxy to represent the household financial condition due to limited available data. Wealth index is a measurement of the household's wealth level without using neither income nor outcome data but instead using the household's asset availability and house characteristic data that can be used to portray long-term economic status [28], [29], [30], [31]. The findings about wealth index as a significant factor related to MAD were consistent with similar studies in India and other countries [20], [21], [26]. A study in India showed that household in the poorest quintile had the greatest risk of not meeting the MAD compared to the other quintile that could occur due to food insecurity and traditional barrier [20]. Another study in Indonesia also showed that wealth index and urban-rural location are also associated with MAD, and the study result implied that wealth and living in urban areas determine access to resources that will meet the child's adequate feeding practices [11]. Results from this study showed that wealth index was found to be associated with MAD. Children from richer household were more likely to achieve MAD due to the ease of access and increased ability and purchasing power of variety foods and frequency of food given to the child. Household with richer wealth index could have wider option of food that could be chosen and consumed especially in animal protein that is considered as an expensive food. In our study, 6–11-month-old children in the poorest category who consumed animal protein including meat and eggs were 31.4% and 27.7%, respectively, whereas the percentage of children in the richest category who were given meat and eggs were 49.3% and 32.6%, respectively.

In this study, the final models showed that mothers who were working in the agricultural sector were significantly related to MAD and had higher risk of achieving MAD. Studies from different countries were found to be consistent with this study showing that a significant association was observed between working mothers and MAD [32], [33]. A study in Pakistan also showed that mothers who worked in the agricultural sector have 11.39 times more diverse diet than mothers who were not working [29]. The agricultural workers mostly lived near the area of the land where they are working. This suggests that mothers who work in the agricultural sector will have more time to get involved in the child feeding practices. However, achieving MAD in children with agricultural working mothers varies by the household wealth wherein the household that had more assets could reduce their work time and work load in agricultural activities [30], [31]. The result of bivariate and multivariate regression in this study showed that mothers who were working were significantly related to MAD and had higher risk of achieving MAD than nonworking mothers. This finding was not consistent with the previous study conducted in Indonesia that found no significant association between MAD and mother's working status that also implied that working mothers had heavier workload that could reduce mother's involvement in child feeding [11]. Mothers who were working could support the household's income so the children might be given diverse and frequent food.

To represent the access to information, the ownership of television was used as the proxy. The final model of this study showed that the household that owned television was significantly associated with achieving MAD. A previous study reported that infant mothers who watched television at least once a week or every day had higher dietary diversity, meal frequency, and acceptable diet than infant mothers who did not [21]. Studies in South Asian countries

showed that limited exposure to media was significantly related to poor practice of complementary feeding [34]. Having a television suggested that the mother will be more exposed to the information. Mass media including television played a crucial role in educating mothers and caregiver on appropriate child feeding practices [35]. The Indonesian government under the MoH had published the public service advertisement about complementary feeding that also had been aired on television stations in Indonesia. The duration of the advertisement was 30 s that consists of several topics including the definition of complementary feeding, types of food in complementary feeding (staple food, animal-based protein, plant-based protein, vegetables, and fruit), time to give the child complementary feeding, and the consistency of complementary feeding in different age categories [36]. However, the public service advertisement was created in 2018 and had been limited in promoting the frequency of food that should be given to the child. Therefore, to promote the achievement of MAD in 6–11-month-old children in Indonesia, the MoH should consider on renewing the advertisement and creating another public service advertisement that served as a holistic message on how the complementary food is served.

The low MAD in 6–11-month-old children in Indonesia ensued because most of the children had low diet diversity. Therefore, promoting diet diversity especially in children aged 6–11 months should be improved by the Indonesian government. In spite of the fact that the ability to consume several foods in 6–11-month-old children was limited, giving a diverse diet is still recommended rather than only giving one food group diet including only giving child porridge and chicken stock to fulfill the nutritional needs [36]. The 6–11 months age group is still included in the first 1,000 days of life; thus, fulfilling the nutritional needs by giving food that meet the MAD will support the child's growth and development. Furthermore, intervention based on community-based promotion and strong advocacy by local and national stakeholders that aim in improvement of dietary diversity and MAD should be addressed.

Based on this study, factors that are associated with MAD were wealth index, ownership of television, and mother's occupation. Wealth index was used as the proxy of household's economic status and one of the main factors that are associated with MAD. The government could improve and support the economic status of the public by empowering small and medium enterprises in Indonesia and conducting training events to improve skills. Ownership of television used as the proxy of access to information was also associated with MAD rather than the ownership or the use of internet. Therefore, strong commitment from the Indonesia Broadcasting Commission should ensure the television show that has been broadcasted has a certain quality and delivers the right information. The Directory of Health Promotion and Community Empowerment in Indonesia also could create an interesting and holistic advertisement on complementary feeding in Indonesia. Partnership from the government with the television station to share health promotion message in their programs that aim to improve children feeding practices could be conducted. Mother's occupation was also associated with MAD in Indonesia. Therefore, protections of women's right in the workplace should be addressed to ensure that women's workplace is safe. Giving breast milk is recommended until children reach 2-years-old and is counted as a food group in MDD. Hence, the workplace should provide lactating rooms for mothers so they could provide breast milk for their children. Support from the workplace, husband, relatives, and community toward working mothers to involve and provide good child feeding practices is needed to ensure that children receive the MAD.

Data from the national scale level survey, IDHS, were used in this study. The sample size was large and representative enough for 6–11-month-old children in Indonesia. To our knowledge, this is the first study to search the determinants of MAD using the 6–11 months age group. Based on how the primary data were obtained, several limitations exist including not giving a clear minimum amount of consumed food/drink that will be counted as consuming because the questionnaire was not doing the 24-h recall but only asking "Did your child eat/drink … yesterday?" There could be an overestimation because no matter how much the amount of food that was consumed, it will be counted as consuming. Therefore, the MAD indicator should not be portrayed as children's nutritional intake. Since the data only consist of a 1-day food report, this could not be portrayed as the child's eating habit. This survey was also not excluding samples based on the child's health condition that could affect the child's appetite and food intake that will be associated with achieving MAD. The sub-variables that are used to represent the independent variables from this study might be limited due to the availability of data. A study using the other age group and using the new standard in counting the MDD that uses a minimum of 10 g consumption to be counted as consuming food should be conducted in the future research to find more comprehensive MAD achievement [4].

Conclusions

In conclusion, factors that are associated with MAD in 6–11-month-old children in Indonesia include wealth index, ownership of television, and mother's occupation. The prevalence of MAD, MDD, and MMF in 6–11-month-old children is 29%, 35.7%, and 75.9%. To improve the MAD, program intervention to empower

mothers or workforce might increase the wealth index of the household. Furthermore, with the high percentage of TV ownership (82%), a multisectoral and holistic intervention to increase the complementary feeding practices in Indonesia, the government should consider channeling the information through it.

Author Contributions

Conceptualization, E.Z. and T.M.; investigation, E.Z.; methodology, E.Z., T.M., and D.R.; validation, T.M.; formal analysis, E.Z.; resources, E.Z.; writing—original draft preparation, E.Z.; writing—review and editing, E.Z., T.M., D.R., M.D., S.H., and C.T.Y.; and supervision, T.M., D.R., M.D., S.H., and C.T.Y. All authors have read and agreed to the published version of the manuscript.

Institutional Review Board Statement

This study was approved by the Ethics Committee from the Faculty of Medicine Universitas Airlangga (KEPK FKUA on June 4, 2021, number 104/EC/KEPK/FKUA/2021).

Data Availability Statement

Publicly available 2017 Indonesia Demographic and Health Survey datasets were analyzed in this study. This data can be found here: [http://dhsprogram.com/.]

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