

ORIGINAL ARTICLE

Maternal Determinants of Feeding Practices among Children Under Two Years in Sleman District, Yogyakarta, Indonesia

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ABSTRACT

Introduction: Optimum feeding practices can help children under two years old achieve a pivotal period of growth, health, behaviour and intellectual development. However, suboptimal feeding practices are still found in developing countries, and are influenced by maternal factors. We aim to investigate maternal education, employment, age, and feeding practices among children under two years old in Sleman District, Yogyakarta, Indonesia. **Methods:** The study was a cross-sectional design involving 388 mothers who had 0–24 months old children. The subjects were taken from the Sleman Health and Demographic Surveillance System, Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada in 2019. The association between maternal determinants and feeding practice was analyzed using Fisher's exact and chi-square test. **Results:** 21.1% of children were started on infant formula at 0–6 months old. The first initiation of fruits, milk enriched porridge, and soft foods was mainly in 6–9 months old infants (63.1%; 46.6%; 49.0%), once (74.7%), twice (48.8%) and three times daily (46.1%), respectively. 30.9% of children had been given solid foods in >12 months old, three times daily (66.3%). There was a significant association between maternal employment to the first initiation and the daily frequency of infant formula ($p < 0.001$ and $p = 0.008$), maternal education to the daily frequency of fruits ($p = 0.020$) and soft foods ($p = 0.013$) feeding. **Conclusion:** Maternal education and employment are associated with feeding practices among children under two years old. Education on child feeding is recommended to increase their practice.

Keywords: Feeding practices, Infant formula, Children under two, Maternal determinants

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INTRODUCTION

Malnutrition is one of the prevalent health problems in children below the age of five. In addition, it leads to stunting and wasting. Studies show that the prevalence of stunting is declining too slowly, while that of wasting is still very great. In 2018, global data reported that the number of stunted and wasted children under the age of five were 149, and 49 million, respectively (1). Furthermore, based on the latest Global Nutrition Report (2019), as of 2013, some children of the above age group in Indonesia sufferer from the above malnutrition problems. The national prevalence of wasting and stunting were 13.5% and 36.4%, respectively (2).

Adequate nutrition is needed for the growth and development of children. In addition, optimum feeding practices can help them under the age of two achieve a positive pivotal moment of growth, health, behaviour

and intellectual development (3–5). Growth faltering can result in poor physical and intellectual development that may last a lifetime. Similarly, previous research suggested that suboptimal feeding practices in children of the above age group, such as poor food quality, and micronutrient deficiencies, play a major role in their mortality (6).

Nutritional status of children under two years old is highly influenced by feeding practice. Therefore, WHO recommends the infant and young child feedings (IYCF) practices, such as the early initiation of breastfeeding within the first one hour of delivery, and exclusive breastfeeding for 6 months (3). After six months, only breastmilk will no longer be sufficient to meet the nutritional needs of an infant, therefore, complementary food is needed. Furthermore, its amount and consistency escalates with age. At six months of age, infants can eat pureed, mashed, and semi-solid foods, 2–3 times a day, while at age 9–12, and >12 months, the consistency of food increases to soft and solid, 3–4 times a day (7,8).

In developing countries, suboptimal feeding practices, including the late initiation of breastfeeding, prelacteal

feeding, inappropriate time for the introduction of complementary foods, and providing low quality, quantity and unhygienic complementary foods still occur (4,5). Previous studies found that maternal factors contribute to the inappropriate feeding practices in children under two years old. Furthermore, maternal education, occupation, age, wealth, media exposures, adequate antenatal and post-natal contacts, knowledge, and frequency of complementary feeding were some of the determinants of feeding practices (6).

Therefore, this study aims to determine if maternal determinants influences feeding practices, and if they do, find solutions that will improve this condition, therefore, better the growth and development of children.

The Sleman Health and Demographic Surveillance System (HDSS) is the second of its kind established in Indonesia, after the only HDSS in Purworejo District, Central Java. It provides the community-based demographic and health data over time in Sleman District. Therefore, using this survey body, this study also aims to investigate the effects of maternal education, employment and age on feeding practices, among children under the age of two, in Sleman District, Yogyakarta, Indonesia.

MATERIALS AND METHODS

Study design and participants

This study was conducted using a cross-sectional design. Furthermore, it utilized secondary data from the Sleman Health and Demographic Surveillance System (HDSS), that was collected in 2019. Detailed information regarding the data collection, instruments, and quality control is explained in Dewi et al (9). The population data consisted of people who lived in Sleman District, Yogyakarta. Furthermore, inclusion criteria were mothers who had children of 0-24 months old, while exclusion criteria were mothers who were not living with their children, those that had passed on, missed the demographic survey, and had no data on birth weight, and feeding practices. Meanwhile, data was collected from everyone who met the criteria.

The sample size was calculated, with its significance level at 95%, power 80%, and percent of exposed, with the outcome at 14% (10,11). 52 participants were excluded from the study, bringing the total number of surveyed participants to 388 subjects.

Ethical approval and permission

Ethical approval (with the number KE/FK/0434/EC/2018) was obtained from the ethics committee of the Faculty of Medicine, Public Health, and Nursing Universitas Gadjah Mada.

Measurements

The data was gathered from the Sleman HDSS Wave five release 9-1-0 (2019), using a questionnaire about

demographic, birth weight, and feeding practices (early initiation of breastfeeding, exclusive breastfeeding, breastfeeding practice, the first initiation and daily frequency of infant formula, fruits, milk enriched porridge, soft foods and solid foods). Sleman HDSS uses a validated questionnaire, which is based on Riset Kesehatan Dasar (National Baseline Health Research), a national level of public health indicators survey.

Statistical analysis

The characteristics and feeding practices of subjects were analyzed using a descriptive analysis, to show the frequency distribution. Furthermore, the significant association between feeding practices, and maternal determinants was statistically tested with fisher's exact and chi-square ($p < 0.05$), using SPSS Statistics 23 Software.

RESULTS

Participants were 388 mothers, with children under the age of two, and their characteristics are shown in table I. 23.2% of children used were 0 – 6 months old, 26.0%, 6 – 12 months old, and 50.8%, 12 – 24 months old. Furthermore, most (91.8%) weighed ≥ 2500 grams at birth. The characteristics of mothers were mainly those who graduated from a junior or senior secondary school (67.3%), housewife/unemployed (57.5%) and those of ages ≤ 35 years (72.9%). Furthermore, the mean age of the mothers and children were 31.38 ± 6.653 years and 11.78 ± 6.791 months, respectively.

Feeding practices among participants are shown in table II. 334 children (86.1%) of age ≤ 1 year (58.7%) were currently been breastfed, and, the prevalence of exclusive breastfeeding was 34.8%. Furthermore, it was discovered that 21.1% of children received their first infant formula when they were 0 – 6 months old, while 4.9%, received this formula about once a day (32.4%) since birth. Most of the children who were fed once a day, and those who have not been fed with

Table I: Characteristics of Participants

Variables	n	%
Age of child		
0 – 6 months	90	23.2
6 – 12 months	101	26.0
1 – 2 years	197	50.8
Birth weight		
<2500g	32	8.2
≥ 2500 g	356	91.8
Maternal education		
Primary school or below	19	4.9
Secondary education	261	67.3
Higher education	108	27.8
Maternal occupation		
Housewife/unemployed	223	57.5
Working	165	42.5
Maternal age		
≤ 35 years	283	72.9
> 35 years	105	27.1

Table II: Feeding Practices of Children Under Two Years

Variables	n	%
Currently breastfed		
≤1 year	196	58.7
>1 year	138	41.3
Exclusive breastfeeding		
Yes	135	34.8
No	253	65.2
First initiation of infant formula feeding		
Since born	19	4.9
0-6 months	82	21.1
>6 months	103	26.5
Have not been given	182	46.9
Unknown	2	0.5
Daily frequency of infant formula feeding		
1 time	66	32.4
2 times	42	20.6
3 times	30	14.7
>3 times	61	29.9
Unknown	5	2.5
First initiation of fruits feeding		
<6 months	24	6.2
6-9 months	245	63.1
9-12 months	11	2.8
>12 months	8	2.1
Have not been given	100	25.8
Daily frequency of fruits feeding		
1 time	215	74.7
2 times	60	20.8
3 times	10	3.5
>3 times	2	0.7
Unknown	1	0.3
First initiation of MEP feeding		
<6 months	22	5.7
6-9 months	181	46.6
9-12 months	5	1.3
>12 months	3	0.8
Have not been given	173	44.6
Unknown	4	1.0
Daily frequency of MEP feeding		
1 time	45	21.3
2 times	103	48.8
3 times	60	28.4
>3 times	3	1.4
First initiation of soft foods feeding		
<6 months	4	1.0
6-9 months	190	49.0
9-12 months	61	15.7
>12 months	12	3.1
Have not been given	121	31.2
Daily frequency of soft foods feeding		
1 time	27	10.1
2 times	112	41.9
3 times	123	46.1
>3 times	4	1.5
Unknown	1	0.4
First initiation of solid foods feeding		
6-9 months	15	3.9
9-12 months	61	15.7
>12 months	120	30.9
Have not been given	192	49.5
Daily frequency of solid foods feeding		
1 time	10	5.1
2 times	51	26.0
3 times	130	66.3
>3 times	5	2.6

MEP: milk enriched porridge

infant formula were currently been breast fed (40.0% and 53.0%, respectively). Likewise, children who were fed with infant formula >3 times a day, were mainly no longer been fed breastmilk (67.3%). Furthermore, both set of children (those fed infant formula, and those who were not), also received other foods, such as fruits, MEP, soft foods and solid foods. The first initiation of fruits, MEP, and soft foods mainly occurred when children were within the ages of 6 – 9 months (63.1%; 46.6%; 49.0%), with mostly given once (74.7%), twice (48.8%) and 3 times a day (46.1%), respectively. Furthermore, most of the children had not been given solid foods (49.5%), followed by those who were first fed this type of food after the age of 12 months (30.9%), and those fed 3 times daily (66.3%).

The association between feeding practices, and maternal determinants is shown in table III. Infant formula feeding in the children aged 0 – 6 months was higher in the working mother group (35.8%), compare to the unemployed (10.3%). therefore, it was concluded that working mothers were more likely to give infant formula to children. Furthermore, Children who have not been given infant formula were higher in the unemployed group (55.2%) compare to the working group (35.8%). Therefore, there was a significant association between maternal employment and the first initiation of infant formula feeding ($p<0.001$). The number of working mothers who feed infant formula >3 times a day (35.8%) were higher than those unemployed (23.5%). Furthermore, infant formula feeding once a day was higher in the unemployed (42.9%), compare to the working group (22.6%). Therefore, the daily frequency of infant formula feeding ($p=0.008$) was associated with maternal employment. Mothers who had higher education were more likely to feed fruits and MEP in a day. Furthermore, fruit feeding twice and three times a day were higher in the higher education group (28.0% and 4.9%), compare to the junior and senior school graduates (16.6% and 3.1%). It was also discovered that there was a significant association between maternal education and the daily frequency of fruits ($p=0.020$).

Soft feeding three times a day, was higher in the higher education group (50.0%), compared to the junior and senior school (44.7%), and the primary school or below (41.7%). Furthermore, the administration of this type of food, once a day was higher in the primary school or below group (16.7%), followed by the junior and senior school (10.6%) and then the higher education group (7.9%). Therefore, there was a significant association between maternal education and the daily frequency of soft foods ($p=0.013$). Lastly, there was no significant association between the first initiation and daily frequency of solid food to maternal determinants.

Table III: Association between Feeding Practices to Maternal Determinants

Variable	Maternal education						p	Maternal employment status				p	Maternal age				p
	Primary or below		Junior and senior		Higher education			Housewife/unemployed		Working			≤35 years		>35 years		
	n	%	n	%	n	%		n	%	n	%		n	%	n	%	
First initiation of infant formula feeding																	
Since born	2	10.5	11	4.2	6	5.6	0.834 ^a	15	6.7	4	2.4	<0.001 ^a	14	4.9	5	4.8	0.426 ^a
0-6 months	4	21.1	55	21.1	23	21.3		23	10.3	59	35.8		54	19.1	28	26.7	
>6 months	5	26.3	66	25.3	32	29.6		60	26.9	43	26.1		77	27.2	26	24.8	
Have not been given	8	42.1	127	48.7	47	43.5		123	55.2	59	35.8		137	48.4	45	42.9	
Unknown	0	0.0	2	0.8	0	0.0		2	0.9	0	0.0		1	0.4	1	1.0	
Daily frequency of infant formula feeding																	
1 time	6	54.4	46	34.8	14	23.0	0.133 ^a	42	42.9	24	22.6	0.008 ^a	53	36.6	13	22.0	0.056 ^a
2 times	1	9.1	31	23.5	10	16.4		21	21.4	21	19.8		28	19.3	14	23.7	
3 times	1	9.1	18	13.6	11	18.0		9	9.2	21	19.8		24	16.6	6	10.2	
>3 times	2	18.2	34	25.8	25	41.0		23	23.5	38	35.8		38	26.2	23	39.0	
Unknown	1	9.1	3	2.3	1	1.6		3	3.1	2	1.9		2	1.4	3	5.1	
First initiation of fruits feeding																	
<6 months	0	0.0	15	5.7	9	8.3	0.153 ^a	12	5.4	12	7.3	0.655 ^a	20	7.1	4	3.8	0.648 ^a
6-9 months	10	52.6	168	64.4	67	62.0		147	65.9	98	59.4		179	63.3	66	62.9	
9-12 months	2	10.5	4	1.5	5	4.6		7	3.1	4	2.4		7	2.5	4	3.8	
>12 months	1	5.3	6	2.3	1	0.9		4	1.8	4	2.4		5	1.8	3	2.9	
Have not been given	6	31.6	68	26.1	26	24.1		53	23.8	47	28.5		72	25.4	28	26.7	
Daily frequency of fruits feeding																	
1 time	7	53.8	153	79.3	55	67.1	0.020 ^a	128	75.3	87	73.7	0.871 ^a	156	73.9	59	76.6	0.547 ^a
2 times	5	38.5	32	16.6	23	28.0		33	19.4	27	22.9		45	21.3	15	19.5	
3 times	0	0.0	6	3.1	4	4.9		7	4.1	3	2.5		8	3.8	2	2.6	
>3 times	0	0.0	2	1.0	0	0.0		1	0.6	1	0.8		2	0.9	0	0.0	
Unknown	1	7.7	0	0.0	0	0.0		1	0.6	0	0.0		0	0.0	1	1.3	
First initiation of MEP feeding																	
<6 months	0	0.0	19	7.3	3	2.8	0.204 ^a	8	3.6	14	8.5	0.211 ^a	16	5.7	6	5.7	0.991 ^a
6-9 months	8	42.1	127	48.7	46	42.6		101	45.3	80	48.5		134	47.3	47	44.8	
9-12 months	0	0.0	2	0.8	3	2.8		2	0.9	3	1.8		4	1.4	1	1.0	
>12 months	0	0.0	2	0.8	1	0.9		2	0.9	1	0.6		2	0.7	1	1.0	
Have not been given	11	57.9	110	42.1	52	48.1		107	48.0	66	40.0		124	43.8	49	46.7	
Unknown	0	0.0	1	0.4	3	2.8		3	1.3	1	0.6		3	1.1	1	1.0	
Daily frequency of MEP feeding																	
1 time	4	50.0	30	20.0	11	20.8	0.365 ^a	24	21.2	21	21.4	0.116 ^a	37	23.7	8	14.5	0.176 ^a
2 times	4	50.0	74	49.3	25	47.2		61	54.0	42	42.9		76	48.7	27	49.1	
3 times	0	0.0	44	29.3	16	30.2		28	24.8	32	32.7		42	26.9	18	32.7	
>3 times	0	0.0	2	1.3	1	1.9		0	0.0	3	3.1		1	0.6	2	3.6	
First initiation of soft foods feeding																	
<6 months	0	0.0	4	1.5	0	0.0	0.796 ^a	2	0.9	2	1.2	0.120 ^a	4	1.4	0	0.0	0.744 ^a
6-9 months	10	52.6	127	48.7	53	49.1		120	53.8	70	42.4		139	49.1	51	48.6	
9-12 months	1	5.3	40	15.3	20	18.5		34	15.2	27	16.4		42	14.8	19	18.1	
>12 months	1	5.3	8	3.1	3	2.8		4	1.8	8	4.8		8	2.8	4	3.8	
Have not been given	7	36.8	82	31.4	32	29.6		63	28.3	58	35.2		90	31.8	31	29.5	
Daily frequency of soft foods feeding																	
1 time	2	16.7	19	10.6	6	7.9	0.013 ^a	14	8.8	13	12.1	0.722 ^a	21	10.9	6	8.1	0.607 ^a
2 times	4	33.3	80	44.7	28	36.8		71	44.4	41	38.3		81	42.0	31	41.9	
3 times	5	41.7	80	44.7	38	50.0		72	45.0	51	47.7		88	45.6	35	47.3	
>3 times	0	0.0	0	0.0	4	5.3		2	1.3	2	1.9		3	1.6	1	1.4	
Unknown	1	8.3	0	0.0	0	0.0		1	0.6	0	0.0		0	0.0	1	1.4	
First initiation of solid foods feeding																	
6-9 months	0	0.0	11	4.2	4	3.7	0.953 ^a	8	3.6	7	4.2	0.409 ^b	11	3.9	4	3.8	0.197 ^a
9-12 months	3	15.8	42	16.1	16	14.8		41	18.4	20	12.1		48	17.0	13	12.4	
>12 months	8	42.1	77	29.5	35	32.4		66	29.6	54	32.7		79	27.9	41	39.0	
Have not been given	8	42.1	131	50.2	53	49.1		108	48.4	84	50.9		145	51.2	47	44.8	
Daily frequency of solid foods feeding																	
1 time	1	9.1	7	5.4	2	3.6	0.839 ^a	7	6.1	3	3.7	0.271 ^a	7	5.1	3	5.2	1.000 ^a
2 times	4	36.4	34	26.2	13	23.6		25	21.7	26	32.1		36	26.1	15	25.9	
3 times	6	54.5	86	66.2	38	69.1		81	70.4	49	60.5		91	65.9	39	67.2	
>3 times	0	0.0	3	2.3	2	3.6		2	1.7	3	3.7		4	2.9	1	1.7	

MEP: milk enriched porridge

^aFisher's exact test, significant at p<0.05^bChi-square test, significant at p<0.05

DISCUSSION

Most of the children were currently breastfed (86.1%), however, the number was higher in those aged ≤1 year (58.7%). In addition, the number of children who were currently breastfed was higher than in the provincial and national level (83.8% and 78.8%, respectively), where the number was also higher in the age of ≤1 year. 34.8% of children received exclusive breastfeeding, however,

this was lower than the national and provincial level (68.2% and 58.2%, respectively) (12).

The introduction of infant formula within the ages of 0 – 6 months was higher in the working mother group (35.8%), while in the unemployed group 55.2% of mothers did not begin infant formula feeding within this age group. This is lower than the previous study which observed infant formula feeding in 0 – 6 months old

in Indonesia and discovered that it ranged from 55% to more than 70% (13–16). The first initiation of infant formula in this study was significantly associated with maternal employment ($p < 0.001$). Furthermore, working mothers were more likely to feed infant formula > 3 times a day (35.8%), while the number of unemployed mothers were higher for giving infant formula 1 time a day (42.9%). Therefore, the daily frequency of infant formula was significantly associated with maternal employment ($p = 0.008$). This is similar to the previous study conducted in Indonesia which stated that infant formula feeding in < 6 months old children was associated with the maternal occupation. Furthermore, based on those studies, working mothers chose to feed infant formula because it is practical, does not interrupt the work, and they have less time to spend with their children (13–17). A previous study in Malaysia shows that working mothers can still practice breastfeeding if their workplace supports it, and mothers' self-efficacy is present (18). Furthermore, it was discovered that maternal education is associated with infant formula feeding (13,14). According to a study in Central Java, Indonesia, mothers with higher education were more likely to have an occupation and higher incomes, which encourages them to feed their children with infant formula (17). Contrastingly, a previous study in China found that maternal education influences breastfeeding practice, due to that, mothers with higher education have better knowledge and health behaviours, therefore, they were more likely to breastfeed their children (19).

The first initiation of fruits and MEP, occurred mainly in the 6 – 9 months old group (63.1% and 46.6%, respectively), and this is considered accurate. This shows an identical result to a previous research in Northeast Ethiopia, which discovered that most of the children began complementary feeding at 6 months old (57.7%) (20). The first initiation of soft foods, which is considered timely for children aged 9 – 12 months, occurred mainly in the 6 – 9 months old group (49.0%). Furthermore, 49.5% had not began taking solid foods at > 12 months, which is the right age to begin, while 30.9% had began.

Fruits and MEP were mainly given once (74.7%), and twice (48.8%) daily, respectively. Furthermore, since they were both fed to children of ages 6 – 9 months old, the only way to define the adequacy of nutrition intake from complementary foods is to consider whether they were consumed alone or combined. Meanwhile, soft foods and solid foods were mainly given 3 times a day (46.1% and 66.3%, respectively). This is similar to the previous research conducted in Northeast Ethiopia, which found only 50.4% of mothers feeding their children three times or more per day (20). Furthermore, this is in line with the previous finding that showed that the number of children who meet the minimal feeding frequency was 67.3% in Southern Ethiopia (6), 50.9% in Uttar Pradesh (21), 57.6% in Myanmar (3), and 47% in Ethiopia (5). These findings were higher from the study

in Sindh District, Pakistan (38%) (4).

Mothers with higher education were more likely to feed fruits and MEP everyday. Fruits feeding twice and three times a day were higher in the higher education group (28.0% and 4.9%), as well as the administration of soft food 3 times daily (50.0%). Therefore, maternal education was significantly associated with the daily frequency of fruits ($p = 0.020$) and soft foods feeding ($p = 0.013$). This is consistent with the previous study that showed a significant association between the daily frequency of complementary foods and maternal education in Southern Ethiopia. Based on the study, maternal education is associated with better health and nutrition practices in children (6). Other findings showed a significant correlation between maternal occupation and the minimal frequency needed in Southern Benin. Caregivers who were working were less likely to meet the minimum meal frequency due to their activities and availability to take care of their children (22).

The strength of this study is that we used the data from the Sleman HDSS that is established in 2015. The Sleman HDSS was the second established in Indonesia, after the only HDSS in Purworejo District, Central Java. The data provides community-based demographic and health trends over time, include the feeding practice among children under two years old. However, our study also has limitations. Due to using secondary data, there might be potential variables that not be measured in the data collection. Based on previous findings that show some maternal determinants to child feeding, in this study we only have 3 determinants, there are education, employment and age. The meal diversity of the children and the type of food are also needed to discover more.

CONCLUSION

In this study, early complementary feeding practice, such as the feeding of infant formula that interfered with exclusive breastfeeding, early or late feeding of complementary food, and insufficiency of frequency feeding were observed. Maternal education and employment are the determinants of feeding practices in children under the age of two. Furthermore, working mothers might have less time to take care of their children. However, with a higher level of education, they will have more knowledge and therefore, engage in better feeding practice. There is still need to put effort in improving complementary feeding practices, based on guidelines, to optimize nutrition care in the first two years of child's life. Furthermore, education on child feeding and care is recommended for the increase in their practice.

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