

Fulfilment of Minimum Acceptable Diet as Dominant Factor in Wasting in Children Aged 6–23 Months in Central Jakarta, Indonesia, 2019

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Abstract

Wasting is a form of acute malnutrition characterized by significant and rapid weight loss resulting from inadequate food intake and infectious diseases. This study was to investigate the factors associated with wasting in children aged 6–23 months and the dominant factor among these. The study followed a cross-sectional study design. A total sample of 261 children was selected using multistage random sampling from 13 integrated healthcare centres in six administrative villages located in three sub-districts of Central Jakarta. Data was collected by measuring body weight and height and questionnaires completed through interviews carried out by trained data collectors. This study shows that the prevalence of wasting in children aged 6–23 months in Central Jakarta is 6.9%. Based on logistic regression analysis, fulfilment Minimum Acceptable Diet (MAD) (OR=3.2 90% CI 1.1-9.5) was found to be the dominant factor in wasting after controlling by mother's level of education (OR=1.7 90% CI 0.7–4.2) and the level of family income (OR=2.9; 90% CI 0.9-8.9). This research shows that there is a need for improvement of maternal behaviour in providing appropriate care for children. Based on this research, we recommend that intervention on appropriate breastfeeding and complementary feeding practices be strengthened, especially for mothers with low levels of education and family income.

Keywords: wasting, minimum acceptable diet, children aged 6–23 months

Abstrak

Wasting adalah salah satu bentuk malnutrisi akut yang ditandai dengan penurunan berat badan yang signifikan dan cepat akibat asupan makanan yang tidak memadai dan penyakit infeksi. Penelitian ini bertujuan untuk mengetahui faktor-faktor yang berhubungan dengan wasting pada anak usia 6-23 bulan dan untuk mengetahui faktor dominan di antaranya. Penelitian menggunakan desain studi cross-sectional. Sampel berjumlah 261 anak dipilih dengan menggunakan multistage random sampling dari 13 puskesmas di enam kelurahan yang berada di tiga kecamatan di Jakarta Pusat. Pengumpulan data dilakukan dengan mengukur berat badan dan tinggi badan serta pengisian kuesioner melalui wawancara yang dilakukan oleh pengumpul data terlatih. Hasil penelitian menunjukkan bahwa prevalensi wasting pada anak umur 6–23 bulan di Jakarta Pusat sebesar 6,9%. Berdasarkan analisis regresi logistik, pemenuhan Minimum Acceptable Diet (MAD) (OR = 3,2 90% CI 1,1-9,5) ditemukan menjadi faktor dominan kejadian wasting setelah dikontrol oleh tingkat pendidikan ibu (OR = 1,7 90% CI 0,7– 4.2) dan tingkat pendapatan keluarga (OR = 2.9; 90% CI 0.9-8.9). Penelitian ini menunjukkan perlunya peningkatan perilaku ibu dalam memberikan pengasuhan yang tepat kepada anak. Berdasarkan penelitian ini, kami merekomendasikan agar intervensi praktik pemberian ASI dan MP-ASI yang tepat diperkuat, terutama bagi ibu dengan tingkat pendidikan dan pendapatan keluarga yang rendah.

Kata kunci: wasting, Minimum Acceptable Diet, anak usia 6–23 bulan.

Introduction

Wasting is an important health problem closely related to the risk of functional disorders, morbidity and mortality (1). It results from incompatibilities between the nutritional intake and nutritional needs of children that impact on their growth and development (2). The prevalence of wasting in children under two years of age is higher than in the under-five group, at 11.7% and 10.1%, respectively (3). DKI Jakarta has a prevalence of wasting, at 12.7%, while in Central Jakarta the prevalence is 11%. This rate is greater than the global figure and is therefore classified as currently causing serious health problems in society (3,4).

There are several factors that cause wasting in children. These include the practice of breastfeeding with reference to such factors as early breastfeeding initiation, practice of colostrum feeding and exclusive breastfeeding (2,5–8). From the age of six months, children require complementary food (9), and among the indicators recommended for assessing complementary feeding in children are fulfilment of minimum dietary diversity (MDD), minimum meal frequency (MMF), and minimum acceptable diet (MAD), all of which are considerations in the occurrence of wasting (10).

The other relevant factors are the incidence of infection and history of low birth weight (2,11), immunization status and vitamin A supplementation (12–15). Family characteristics such as mother's level of education (16), family income (2), number of family members (17) and birth order (18) also contribute to the risk of wasting. The purpose of this study was to study the dominant factor and other factors associated with wasting in children aged 6–23 months in Central Jakarta in 2019.

Methods

This research used a quantitative study with a cross-sectional design. The minimum number of samples needed in this study was calculated using a two-proportion test taking into account the design effect (1.5), indicating a minimum sample required of 207. Data was collected from 261 children aged 6–23 months who met the inclusion criteria. The subjects were determined using a multistage random-sampling technique and were drawn from three of eight sub-districts. Two administrative villages were randomly selected from each of the three chosen sub-districts, and the final random sample came from 13 selected Posyandu (Integrated Healthcare Centres) which each attend to 15 to 20 children aged 6–23 months). Primary data was collected by measuring body weight and length directly using measuring instruments in the form of a long board with an accuracy of 0.1 cm and a measuring capacity of 200 cm and a Secca brand digital scale with an accuracy of 0.01 kg and a capacity of 150 kg. Other variable data was gathered from questionnaires completed via interviews. Secondary data used in this study comprised geographical data and the number of children at each Posyandu. Data was collected by enumerators who had been appropriately trained and met specified criteria. Respondent approval was obtained in writing after explaining the purpose of the study, and their data was confidentially stored.

Children were categorized as wasting for Z-scores $< -2SD$ and not wasting for Z-scores of $\geq 2SD$, according to WHO standard, 2005. Feeding practices were measured by 24-hour dietary recall using the MDD, MMF and MAD indicators adopted from WHO's Infants and Young Children Feeding Guidelines (IYCF).

Other independent variables used in this study include the early initiation of breastfeeding (in the first hour of birth), the practice of colostrum feeding at first breastmilk feed, exclusive breastfeeding for the first six months of an infant's life, low birth weight, with cut-off point of 2500 g, history of infection (diarrhea and acute respiratory infection) in the previous month, completeness of immunization status, vitamin A supplementation, and family characteristics such as mother's education, family income measured with Jakarta UMR as the cut-off point, order of birth, and number of family members.

Bivariate analysis using chi-squared testing with significance of $p < 0,1$ was performed. Logistic regression was carried out using the statistical product and service solution, SPSS. Ethical approval for the study was obtained from the Research Committee Community Engagement, Faculty of Public Health, Universitas Indonesia No. 91/UN2.F10/PPM.00.002/2019. In addition, an informed consent letter approved by the ethics committee and signed by the respondents or their authorized representative in the presence of a witness was obtained.

Results

Wasting prevalence among infants aged 6-23 months was 6.9 % (Table 1). The results also show that 63.2% of children aged 6-23 months in Central Jakarta were able to achieve MDD and 74.7% fulfilled MMF. The MAD achieved rate was lower than for MDD and MMF, at 39.5%. The percentage of children who had experienced early breastfeeding initiation was 51.3% and colostrum feeding was 89.3%. The proportion of children who are not given exclusive breastfeeding is 70.1%. Furthermore, it was found that 92% of children had a

history of normal birth weight. The overall percentage of children who did not have a history of infection was above half, at 68.2%. 76.2% of children had received complete immunization and 83.1% had received vitamin A supplementation. In terms of family characteristics, it was found that 39.1% of mothers of the subjects had a low level of education and more than half of the respondents (59.4%) belonged to the low-income category. In terms of birth order, children born at three or above (65.9%) exceeded those who were first or second children in their families. Furthermore, 34.9% of respondents came from larger families, that is, those with more than four members. Bivariate analysis of the data found that MAD, maternal education and family income were variables that had a significant relationship with wasting events. Table 2 shows the results of the bivariate analysis.

Logistic regression analysis presented in Table 3 shows that variables continued to be analyzed in the multivariate stage after being chosen based on variation having $p < 0.25$ and variables that are substantially important, that is MDD, MMF, MAD, maternal education and family income. The final results of multivariate analysis show that only MAD variables have a relationship with wasting after controlling for maternal education and family income (OR=3.2; 90% CI 1.1–9.5).

Discussion

The prevalence of wasting identified in this study was 6.9%, and this is lower than the prevalence in DKI Jakarta as a whole of 12.6% as recorded by Indonesia Basic Health Research 2018 (3). The difference in prevalence rates is caused by differences in the number of samples used. This research result is in line with the existing hypothesis that MAD, which

Table 1. Distribution of Weight-for-Height Z-score (WHZ) nutritional status in children aged 6–23 months in Central Jakarta 2019

WHZ Nutritional Status (n = 261)	%
Severe wasting (<-3 SD)	2.3
Moderate wasting (-3 SD to <-2 SD)	4.6
Normal (\geq -2 SD)	93.1

Table 2. Factors associated with wasting in children aged 6–23 months in Central Jakarta 2019

Variable	WHZ nutritional status				Total n	OR (90% CI)	p
	Wasting		Normal				
	n	%	n	%			
Fulfilment of MDD							
Not met	9	9.4	87	90.6	96	1.7	0.341
Met	9	5.5	156	94.5	165	(0.7 – 4.2)	
Fulfilment of MMF							
Not met	7	10.6	59	89.4	66	1.9	0.170
Met	11	5.6	184	94.4	195	(0.8 – 4.8)	
Fulfilment of MAD							
Not met	15	9.5	143	90.5	158	3.4	0.072*
Met	3	2.9	100	97.1	103	(1.2–11.1)	
Birth weight							
Low birth weight	1	4.8	20	95.2	21	0.6	1.000
Normal birth weight	17	7.1	223	92.9	240	(0.4 – 2.3)	
Breastfeeding initiation							
No	10	7.5	124	92.5	134	1.2	0.889
Yes	8	6.3	119	93.7	127	(0.4– 3.1)	
Colostrum feeding							
No	1	3.6	27	96.4	28	0.4	0.703
Yes	17	7.3	216	92.7	233	(0.3 – 1.7)	
Exclusive breastfeeding							
No	11	6.0	172	94.0	183	0.6	0.550
Yes	7	9.0	71	91.0	78	(0.2– 1.8)	
History of infection							
Yes	5	6.0	78	94.0	83	0.8	0.906
No	13	7.3	165	92.7	178	(0.2 – 1.9)	
Immunization status							
No	6	9.7	56	90.3	62	1.6	0.388
Yes	12	6.0	187	94.0	199	(0.6 – 3.9)	
Vitamin A supplementation							
No	3	6.8	41	93.2	44	0.9	1.000
Yes	15	6.9	202	93.1	217	(0.3–32.5)	
Mother's education level							
Low	11	10.8	91	89.2	159	2.6	0.083*
High	7	4.4	152	95.6	102	(1.1 – 6.8)	
Family income level							
Low (<Rp3.940.973,9)	15	9.7	140	90.3	155	3.6	0.058*
High (>Rp3.940.973,96)	3	2.8	103	97.2	106	(1.5–12.9)	
Birth order							
Third or higher	6	6.7	83	93.3	89	0.9	1.000
First or second	12	7.0	160	93.0	172	(0.2 – 2.6)	
Family size							
Large (>4 members)	7	7.7	84	92.3	91	1.2	0.909
Small (\leq 4 members)	11	6.5	159	93.5	170	(0.5 – 3.0)	

Table 3. Multivariate logistic regression analysis results

Variable	OR	90% CI		P
		Lower	Upper	
MAD	3.2	1.1	9.5	0.070
Mother's education level	1.7	0.7	4.2	0.282
Family income level	2.9	0.9	8.9	0.111

represents the assessment of complementary feeding being the factor most associated with wasting, is also in line with the UNICEF framework (19). It shows that intake plays an important role in the incidence of wasting in children.

Breastfeeding data gives different result relating to the achievement of MDD, MMF, and MAD. Data relating to achievement of MDD and MMF shows that children who have been given breast milk have better outcomes than those who have not. Data for the achievement of MAD indicates a different result, in that children who had not been given breast milk were better at achieving MAD. This may be because to be categorized as reaching MAD, children who are not breastfed must receive (non-breast) milk at least twice a day. In this study, this impacts the MAD results, which are lower in children who have not been breastfed than in those who are still breastfed.

According to the chi-squared result, the fulfilment of MAD was significantly related to the incidence of wasting (OR=3.4 90%, CI: 0.08-0.7), indicating that children who did not reach MAD were at 3.4 times greater risk of being wasted than children who reached MAD. This result is in line with research conducted in Kenya which found a relationship between MAD and wasting in which children who achieved MAD were 1.3 times less likely to be wasted than children who did not (10). The chi-squared results showed that wasting was significantly associated with maternal education level, with OR of 2.6 (90%, CI: 1.1-6.8), meaning that children from mothers with low levels of education are

2.6 times more at risk of wasting than children of higher-educated mothers. Research conducted by Wijndaele and colleagues found that mothers with low levels of education were more likely to introduce children to complementary foods too early than those who had achieved a higher level of education (20). The introduction of improper foods to children is related to higher risk of children experiencing nutritional problems (21). The results of this study are also in line with other studies which state that there is a significant relationship between mother's educational level and the incidence of wasting in children (22).

Family income is also found to be significantly associated with wasting (OR=3.6 90%, CI: 1.5–12.9), the results indicating that children who are born to families with low income have 3.6 times higher risk of being wasted than others. These results are in line with other studies which state that wasting is 4.1 times greater in children from low-income families (2). Families with low economic status and income are unable to buy the various basic foods needed by their children (23).

In this study, no significant relationship was found between wasting and MDD and MMF. This result is in line with another study carried out in Aceh and West Jakarta which also did not identify a relationship between MDD and MMF and wasting (9,13). This may be because there is no proper cut-off point defined related to the amount of food consumed. There is no relationship between wasting and variable relating to early breastfeeding initiation, the practice of giving

colostrum, and exclusive breastfeeding. This may reflect mothers' misconceptions regarding the feeding of children who are still breastfed (24).

Infection, measured in this study as the frequency of illness in the previous month, has no significant relationship with wasting. This result is in line with research conducted in Bolaang Mongondow which states that there was no relationship between incidence of wasting and a history of infection (25). Birth weight was also not found to be significantly related to wasting. Research in Ghana found no significant relationship between wasting and low birth weight in children (26). There was no significant relationship between wasting and immunization status and vitamin A supplementation. This result is in line with with a study conducted in Ethiopia which found no relationship between vitamin A coverage and wasting. This may be because the body's acceptance or response to vitamin A supplementation and immunization is different for each child (27). This study also did not find a relationship between wasting and birth order and the number of family members. This result is in line with other studies that found no relationship between wasting and birth order of children and size of family (13,28). This may be related to the availability of food served at home which showed a reduction in food intake in line with the increase of family size (28).

Based on the results of the multivariate analysis, MAD is the dominant factor associated with wasting in children aged 6–23 months in Central Jakarta in 2019. The statistical test produces an OR value of 3.2, (90%, CI: 1.1-9.5) which suggests that children who do not reach MAD are at 3.2 times greater risk of wasting than children who do reach MAD, after controlling for family income variables and mother's level of education.

Conclusion

As its prevalence is still above 5%, wasting continues to be a problem in Indonesia especially in Jakarta. This study shows that children's dietary intake measured using the MAD indicator is the factor most associated with wasting, controlling for the variables of maternal education and family income. This implies that maternal education and family income play an important role in determining parenting related to the food provided by mothers to their children; this can influence the fulfilment of children's nutrition which ultimately plays a role in determining their nutritional status. Based on the results of this study, it is recommended that the Health Office of Central Jakarta strengthens intervention regarding breastfeeding and complementary feeding practices, especially for mothers with low education and low family income, to improve the quality of maternal parenting.

Conflict of interest

There is no conflict of interest in this study.

References

1. WHO. WHA Global Nutrition Targets 2025: Low Birth Weight Policy Brief [Internet]. 2014. Available from: https://www.who.int/nutrition/topics/globaltargets_lowbirthweight_policy_brief.pdf
2. Yassin MM, Abujami SM. Risk factors associated with wasting among children aged 6 to 24 months old in Gaza strip. *Int J Med*. 2016;1(May):26–31.
3. Kemenkes RI. Laporan Nasional RISKESDAS 2018. Jakarta; 2018.

4. WHO. Nutrition Landscape Information System (NLIS). Geneva, Switzerland; 2010.
5. Liben ML, Abuhay T, Haile Y. The Role of Colostrum Feeding on the Nutritional Status of Preschool Children The Role of Colostrum Feeding on the Nutritional Status of Preschool Children in Afambo District , Northeast Ethiopia : Descriptive Cross Sectional Study. *Eur J Clin Biomed Sci.* 2016;2(6):87–91.
6. Blaney S, Februhartanty J, Sukotjo S. Feeding practices among Indonesian children above six months of age : a literature review on their magnitude and quality (part 1). *Asia Pac J Clin Nutr.* 2015;24:16–27.
7. Ahmed R, Sultana P, Al-fuad S, Islam A. Association between Breastfeeding Practices and Nutritional Status of International Journal of Health Sciences and Research Association between Breastfeeding Practices and Nutritional Status of Children Aged 6-24 Months in Jessore , Bangladesh. *Int J Heal Sci Res.* 2017;7(11).
8. Tariku A, Bikis GA, Woldie H, Wassie MM, Worku AG. Child Wasting is a Severe Public Health Problem in the Predominantly Rural Population of Ethiopia: A Community Based Cross-sectional Study. *Arch Public Heal.* 2017;75(26):1–9.
9. Ahmad A, Madanijah S, Dwiriani CM, Kolopaking R. Complementary feeding practices and nutritional status of children 6-23 months old : formative study in Aceh , Indonesia. *Nutr Res Pract.* 2018;12(6):512–20.
10. Wairimu MJ. Feeding Practices And Nutrition Status Among Children Aged 6-23 Months Following Discharge from Supplementary Feeding Program in Isiolo County, Kenya. Kenyatta University; 2018.
11. Vitolo MR, Gama CM, Bortolini GA, Campagnolo PDB, Drachler MDL. Some risk factors associated with overweight , stunting and wasting among children under 5 years old. *J Pediatr (Rio J).* 2008;84(3):251–7.
12. Afriyani R, Malahayati N. Faktor – faktor yang Mempengaruhi Kejadian Wasting pada Balita Usia 1-5 Tahun. *J Kesehat.* 2015;VII(1):66–72.
13. Amalia ML. Suplementasi Vitamin Asebagai Faktor Determinan yang Berhubungan dengan Kejadian Wasting pada Anak USia 6 - 23 Bulan di Jakarta Barat Tahun 2017. Universitas Indonesia; 2017.
14. Meindayati R, Wulansari R, Hanifah L, Laksmningsih E. Wasting and Associated Factors Among Infants Aged 0-23 Months in 13 Provinces in Indonesia : Evidence from Indonesia Family Life Surveys (IFLS) 2000 , 2007 and 2014. *Mal J Nutr.* 2018;24(3):323–31.
15. West Jr. KP. Vitamin A Deficiency Disorders in Children and Women. *Food Nutr Bull Bull [Internet].* 2003;24(4):S78-90. Available from: http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=17016949
16. Mitchodigni IM, Hounkpatin WA, Ntandou-bouzitou G, Avohou H, Termote C, Kennedy G, et al. Complementary feeding practices : determinants of dietary diversity and meal frequency among children aged 6 – 23 months in Southern Benin. *Food Sec.* 2017;9:1117–30.
17. Adeba A, Garoma S, Fekadu H, Garoma W. Prevalence’s of Wasting and its Associated Factors of Children among 6 - 59 Months Age in Guto Gida District, Oromia Regional State, Ethiopia. *J Food Process Technol.* 2014;05(01).

18. Mukuria A, Cushing J, Sangha J. Nutritional Status of Children: Result from the Demographic and Health Surveys 1994-2001. DHS Comparative Reports No. 10. Calverton, Maryland, USA; 2005.
19. WHO, UNICEF. Operational Guidance for Tracking Progress in Meeting Targets for 2025. Geneva, Switzerland: World Health Organization; 2017.
20. Wijndaele K, Lakshman R, Landsbaugh JR, Ong KK, Ogilvie D. Determinants of Child Feeding Practices. *J Nutr*. 2006;22:233–40.
21. Kumar D, Goel NK, Mittal PC, Misra P. Influence of Infant-feeding Practices on Nutritional Status of Under-five Children. *Indian J Pediatr*. 2006;73:417–8.
22. Haq I, Wasila H, Nawsherwan, Khan A, R KC, Imtiaz M, et al. Maternal Formal Education in Association with Nutritional Status of Children (Less-than Two Years). *Indian J Nutr*. 2017;4(2):1–5.
23. Daka B, Chibwili E, Mwiitwa DH, Malama S. Determination of the Correlation Between Nutritional and Socio-Economic Status of Under-Five Children in Lusaka District. *ARC J Nutr Growth*. 2018;4(2):21–6.
24. Mogre V, Dery M, Gaa PK. Knowledge, Attitudes, and Determinants of Exclusive Breastfeeding Practice among Ghanaian Rural Lactating Mothers. *Int Breastfeed J* [Internet]. 2016;11(12):1–8. Available from: <http://dx.doi.org/10.1186/s13006-016-0071-z>
25. Putri maya S, Kapantow N, Kawengian S. Hubungan antara Riwayat Penyakit Infeksi dengan Status Gizi pada Anak Batita di Desa Mopusi Kecamatan Lolayan Kabupaten Bolaang Mongondow. *J e-Biomedik*. 2015;3(2):1–5.
26. Ali Z, Saaka M, Adams A, Kamwininaang SK, Abizari A. The Effect of Maternal and Child Factors on Stunting , Wasting and Underweight among Preschool Children in Northern Ghana. *BMC Nutr*. 2017;3(31):1–13.
27. Ridwan E. Kapsul Vitamin A dan Morbiditas Anak Balita: RISKESDAS 2007. *Gizi Indones*. 2012;35(1):64–72.
28. Ajao K, Ojofeitimi E, Adebayo A, Fatusi A, Afolabi O. Influence of Family Size , Household Food Security Status , and Child Care Practices on the Nutritional Status of Under-five Children in Ile-Ife, Nigeria. *Afr J Reprod Health*. 2010;14(4):123–32.