International Journal of Community Medicine and Public Health
Marbun RM et al. Int J Community Med Public Health. 2024 Apr;11(4):1493-1499
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20240882

Original Research Article

Factors associated with stunting incidence in toddlers in Cibungbulang sub-district, Bogor

Rosmida M. Marbun*, Rina Efiyanna, Meilinasari, Fairuz Dhia Rabbani

Department of Nutrition, Health Polytechnic Ministry of Health Jakarta II, Jakarta, Indonesia

Received: 15 February 2024
Accepted: 15 March 2024

***Correspondence:**
Rosmida M. Marbun,
E-mail: rosmida.magdalena@poltekkesjkt2.ac.id

ABSTRACT

Background: Stunting is a developmental disorder characterized by L/A or H/A index z-score ≤2 SD and contribute to various negative impacts until adulthood. The prevalence of stunting among toddlers in Bogor Regency reached 24.9 percent according to SSGI. This study aimed to determine relationships between family income, being breastfed and drinking other milks, eating habits, handwashing and oral hygiene habits with stunting incidence among toddlers in Cibungbulang sub-district.
Methods: The study used cross-sectional design with 307 samples selected through systematic randomization. Almost all data, except stunting, were collected through interview with respondents, while stunting was identified through height measurement.
Results: Most toddlers had family income under the minimum wage (81.4%), did not drink breast milk anymore (52,4%), consumed other milks (60.6%), ate independently (69.4%), washed their hands after using toilets (91.2%), and cleaned their mouths at least once a day (85%). A total of 35% toddlers were stunted. There were significant relationships between family income (p=0.001), drinking breast milk (p=0.000) and other milks (p=0.001), eating habits (p=0.001), handwashing (p=0.035) and oral hygiene habits (p=0.039) with stunting incidence in toddlers (p<0.05).
Conclusions: Family income, consumption of breast milk and other milks, eating habits, and handwashing and oral hygiene habits were associated with stunting in toddlers.

Keywords: Stunting, Family income, Breastfeeding, Milk, Handwashing, Oral hygiene

INTRODUCTION

The second goal of the Sustainable Development Goals (SDGs) set by United Nations is to end all forms of hunger, achieve food security and improved nutrition, and promote sustainable agriculture by 2030. One of the indicators is to reduce the prevalence of stunting among toddlers in accordance with international targets. Stunting is a developmental disorder in children characterized by a height or length-for-age z-score (L/A or H/A) under -2SD or also called short stature.[1]

Stunting causes a variety of negative impacts until later in life. Signals that regulate body weight and food intake are known to involve several mechanisms controlled by mTORC1 (Mechanism Target of Rapamycin Complex). Essential amino acids deficiency will suppress mTORC1, which play roles in the growth of chondral plates, skeletal muscle, nervous system, small intestine, iron metabolism, and organ growth relevant to childhood stunting and other diseases, including anemia, cognitive impairment, and immune system disorders.

Children who are stunted tend to have impaired behavioral development, lower grades at school, poorer cognitive abilities, apathetic, and perform poorly on attention, working memory, learning capabilities, and visual-spatial abilities tests, compared to children who are not stunted. In a study by Mustakim et al., stunting was shown to have significant relationship with the development of children aged 1-3 years, included increased risk of experiencing delays in visual-motor skills, both fine and gross, and language skills by up to 4 times.[2]

The impact of stunting in adult includes poor academic outcomes, low wages and productivity, and increased risks of degenerative diseases. Research by Rolfe et al. in Brazil showed that 30-year-old adults who were stunted as infants tended to be shorter and had higher ratios of visceral fat, which increased the risk of metabolic diseases, included diabetes mellitus.[3] Stunted children also have a greater risk of obesity growing up due to lower metabolic rate and fat oxidation and impaired ghrelin sensitivity.[4]

According to UNICEF, toddler's nutrition status is directly determined by food intake and infectious diseases, while the indirect factors include food availability, feeding and parenting practices, and services, including health care, education, social protection, and sanitation.[5] Energy and nutrient intake, breast milk consumption, and consumption of animal milk in toddlers are included in the food intake factor. In a study by Sari et al. on toddlers in Lampung, it was shown that toddlers who were not exclusively breastfed had a 3.1 times greater risk of stunting when compared to toddler who received exclusive breastfeeding.[6] However, a study in Pakistan showed that toddlers who were still breastfed until the age of three had a higher risk of stunting compared to others who were breastfed until two.[7] Regarding consumption of animal milk, a study on toddlers in low- and middle-income countries showed that milk consumption was associated with improved H/A z-scores and reduced odds of stunting.[8] Independent eating habits in toddlers also affect the nutritional status of toddlers. In a study by Hanindita et al. in Surabaya, it showed that toddlers who used the baby-led weaning (BLW) method had higher prevalence of stunting compared to toddlers who were fed by adults.[9] It could be attributed to the difficulty in estimating the amount of consumed by toddlers with BLW method and inadequate food intake.

Family income is known to affect the intake and parenting patterns that directly affect toddlers' nutritional status. Research by Firmania et al. showed that there was significant relationship between family income and the incidence of stunting in toddlers.[10] Nutritional status of toddlers is also indirectly influenced by their hygiene practices. Inappropriate hygiene practices will make toddlers prone to infectious diseases that lead to reduced appetite and nutrient intake, thus worsen malnutrition. Handwashing appropriately with soap was positively associated with H/A z-score.[11] In addition, there was a 14 percent reduction of stunting risk every time a toddler washed his or her hands in a day.[12] Besides hand hygiene, poor oral hygiene and health also impact the energy and nutrient intake, which affects toddlers' nutritional status. There was positive relationship between the prevalence and severity of dental caries and stunting incidence in children aged 6–18 years.[13]

Globally, WHO together with UNICEF and World Bank estimated that 148.1 million or 22.3 percent of toddlers were stunted with most of them came from Asia and Africa.[14] Riskesdas (Basic Health Research) in 2018 showed that 30.8 percent of toddlers in Indonesia were stunted with prevalence in West Java reached 31.06 percent.[15] In Bogor Regency, the prevalence of stunted toddler reached 32.86 percent.[16] Based on the result of Indonesian Nutrition Status Study (SSGI) in 2022, the prevalence of stunting in West Java decreased to 20.2 percent and it decreased to 24.9 percent in Bogor Regency.[17] Although the prevalences decreased, they were still above the WHO threshold of 20 percent, thus stunting still considered as an urgent public health problem.

This study aimed to determine relationships between family income, consumption of breast milk and other milks, eating independently, hand washing and oral hygiene habits with stunting incidence among toddlers in Cibungbulang Sub-District, Bogor Regency, West Java, Indonesia. This research could be used to develop stunting prevention programs for the government and disseminate information regarding factors associated with stunting for the community, so that they could contribute to prevent stunting.

METHODS

This study was conducted in May 2023 in Cibungbulang sub-district, Bogor Regency, West Java with descriptive observational design and cross-sectional approach. In this approach, independent and dependent variables are observed simultaneously to study the relationship between those variables. The sample in this study were 307 children aged 6-59 months (toddlers) who were chosen by systematic random sampling. Several conditions to use this sampling method are the availability of sample frame, regular pattern of population, and slightly homogeneous.

The data collected in this study included anthropometric data (height), family income, breast milk and other milk intake, personal hygiene, and supporting data which were the characteristics of samples. Height was measured using microtoise and ShorrBoard with 0.1 cm accuracy. Other data were collected through interviews with questionnaires.

Characteristics of samples in this study, included age and gender of toddlers and the age and education level of parents. Toddlers' ages were divided into 6-11 months, 12-23 months, and 24-59 months' categories. Gender data were grouped into male and female. Parents' ages, both mother and father, were categorized into the <21 years, 21-35 years, and >35 years' groups. Education level were divided into no education, elementary school, junior high school, senior high school, and university graduates.

The independent variables in this study were family income, breast milk and other milk consumptions, eating habits, hand washing and oral hygiene habits of toddlers. Family income were divided into under the minimum wage if they were less than Rp 4,520,212.00 (Bogor Regency's minimum wage) and equal to minimum wage if the income reached Rp 4,520,212.00 or higher. Breast milk consumption were categorized into Yes if the toddler was still breastfed at their current age and No if the toddler was no longer breastfed. Consumption of other milk were grouped into Yes if the toddler drank milk other than breast milk and No if the toddler did not consume milk or only drank breast milk. Hand washing habits were categorized into Yes if the toddler washed their hands and feet after urinating or defecating and No if the toddler tended not to wash their hands and feet after urinating or defecating. Oral hygiene habits were divided into Yes if the toddler's mouth was cleaned at least once a day and No if the toddler's mouth was not cleaned at all in a day. The dependent variable was stunting incidence based on the H/A or L/A index z-scores. Toddlers were stunted if their z-scores were less than -2SD.

All data were analyzed statistically. Univariate analysis was conducted on all data to show the percentages of each data. Bivariate analysis was conducted using the chi-square test to see if there was a significant relationship between the independent and dependent variables. The relationship was significant if the p value was less than 0.05.

RESULTS

Table 1 shows the characteristics of toddlers and their parents in this study. The biggest proportion of toddlers' age came from the 24-59 months' group (49.2%), followed by 12-23 months (29.9%) and 6-11 months (20.9%) groups. More than half of the toddlers were male (52.4%) and the rest were female (47.6%). More than half of the fathers were older than 35 years (52.8%) and the highest proportion (36.5%) were senior high school graduates. Most mothers were in the 21-35 years' group (74.6%) and 34.5 percent of them had completed senior high school or its equivalent. From 307 toddlers, 30.3 percent of them had stunting (Table 1).

Based on the analysis between the independent and dependent variables, there were significant relationships between family income (p=0.001), breast milk (p=0.000) and other milk consumptions (p=0.001), eating habits (p=0.000), handwashing habits after urinating or defecating (p=0.035), and oral hygiene habits (p=0.039) in toddlers with stunting incidence among toddlers in Cibungbulang District with p<0.05 (Table 2).

Table 1: Demographic characteristics of samples.

Characteristics	N	%
Toddler age (months)		
6-11	64	20.9
12-23	92	29.9
24-59	151	49.2
Gender of toddlers		
Male	161	52.4
Female	146	47.6
Father's age (years)		
21–35	145	47.2
>35	162	52.8
Father's education level		
No education	2	0.7
Elementary school	87	28.3
Junior high school	85	27.7
Senior high school	112	36.5
University	21	6.8
Mother's age (years)		
<21	6	1.9
21-35	229	74.6
>35	72	23.5
Mother's education level		
No education	5	1.6

Continued.

Characteristics	N	%
Elementary school	97	31.6
Junior high school	85	27.7
Senior high school	106	34.5
University	14	4.6
Incidence of stunting		
Stunting	93	30.3
Normal	214	69.7
Total	307	100

Table 2: Distribution of family income, breast milk and milk consumption, eating habits, handwashing and oral hygiene habits by incidence of stunting in toddlers in Cibungbulang.

Independent variables	Stunting incidence				Total		P value
	Stunting		Normal				
	N	%	N	%	N	%	
Family income							
Under minimum wage	86	34.4	164	65.6	250	100	0.001*
Equal to minimum wage	7	12.3	50	87.7	57	100	
Breastmilk consumption							
Yes	30	20.5	116	79.5	146	100	0.000*
No	63	39.1	98	60.9	161	100	
Consumption of other milk							
Yes	69	37.1	117	62.9	186	100	0.001*
No	24	19.8	97	80.2	121	100	
Independent eating habits							
Yes	78	36.6	135	63.4	213	100	0.000*
No	15	16	79	84	94	100	
Handwashing habits							
Yes	80	28.6	200	71.4	280	100	0.035*
No	13	48.1	14	51.9	27	100	
Oral hygiene habits							
Yes	85	32.6	176	67.4	261	100	0.039*
No	8	17.4	38	82.6	46	100	

*The relationship is significant if p<0.05. Analyzed with chi-square test.

DISCUSSION

The prevalence of stunting in this study was far above the national, West Java, and even Bogor Regency's prevalences based on 2022 SSGI's results. The national prevalence reached 21.6 percent, while the prevalence in West Java and Bogor reached 20.2 and 24.9 percents.[17] Meanwhile, stunting prevalence in this study reached 30.3 percent. It showed that the stunting incidence in Cibungbulang sub-district was still an urgent matter and needed to be improved.

There was significant relationship between family income and the incidence of stunting in toddlers in Cibungbulang with 81.4 percent families had income under the minimum wage. There was higher prevalence of stunting in family with lower income or under the Bogor's minimum wage with 34.4%, compared to 12.3% in family with income that were equal to minimum wage. Similar result was shown in a study by Agustin on toddlers (24–59 months) in Kediri, East Java that there was significant relationship between family income and stunting incidence.[18] But different result was shown in research by Hasbiah et al where family income were not associated with stunting in toddlers in Banjarmasin.[19] In this study, samples were dominated by male toddlers, compared with the research in Banjarmasin which was dominated by female toddlers.

According to UNICEF, family income is one of the supporting factors that determine toddler's nutritional status. Family income can affect the ability to purchase foods, the choice and diversity of food purchased, and the availability of food in the household. Families with low-income levels tend to have low purchasing abilities, both qualitative and quantitative. Although staple foods and side dishes may be available, the quality and quantity are often not considered, which can worsen the quality of intake and increase the risk of malnutrition in toddlers.[20]

Regarding breast milk consumption, this study showed that breast milk consumption significantly related with stunting incidence. In addition, 52.4 percent toddlers in

this study did not drink breast milk anymore and most toddler who still drank breast milk were under two years old (78%). In a study by Langi et al. on toddlers (24-59 months) in Balikpapan, similar result was shown that there was significant relationship between drinking breast milk until the age of 2 years with stunting incidence in toddlers.[21] Another study on toddlers (7-23 months) in rural Ecuador also showed similar result with protective effect of breastfeeding until 23 months on stunting incidence among toddlers.[22]

Consumption of breast milk for more than 6 months and even up to 24 months provide various benefits, for both toddlers and mothers. Protein and lipid in breast milk are known to increase after 12 months of breastfeeding and even higher by the time children reach 2 years, along with vitamin A, sodium, and iron content. In addition, immune system components in breast milk also increase after 12 months, including lactoferrin, secretory immunoglobulin A (sIgA), IgA, and lysozyme, which can support toddlers' immune system and reduce infections that cause malnutrition.[23] Getting breastfed for more than 12 months reduce the risk of obesity and diarrhea, as well as impact cognitive development and learning ability of toddlers.[24] For the breastfeeding mothers, breastfeeding beyond 12 months may delay ovulation, prolong the interval between births, and reduce the risk of breast cancer.[25]

Although less than 30 percent of toddlers still drank breast milk after 24 months in this study, it might become a concern. Several studies linked prolong breastfeeding duration with malnutrition in toddlers. A study by Syeda on toddlers in Pakistan showed that there was higher risk of stunting in toddlers who were still drinking breast milk at the age of three, compared with toddlers who drank breast milk until the age of two.[7] It was due to toddlers' reduced appetite and reluctance to consume family foods since they were full from the breast milk.

In this study, there was significant relationship between consumption of other milk and stunting incidence in toddlers with 60.6 percent of toddlers drank milk other than breast milk. A quite similar result was shown in a study by Sjarif et al on toddlers aged 1–3 years in Jakarta that consuming at least 300 ml of formula milk in a day was significantly related to stunting prevention.[26] Another study on toddlers in low- and middle-income countries showed that consuming milk other than breast milk reduced the risk of stunting by 1.9 percent.[8] Milk has higher amino acid score than plant-based proteins and also a source of calcium, potassium, and IGF-1, which plays important role in toddlers' growth and development.

As many as 50.5 percent of toddlers in this study drank commercial milk, such as UHT milk in bottles or boxes, followed by 39.2 percent toddlers who drank formula milk and 10.2 percent who drank condensed milk. According to WHO guidelines on infant and toddler feeding, children aged 12-23 months are recommended to drink animal milk and avoid formula milk since there are no significant differences in weight, height, and developmental indicators between toddlers who consume animal milk and formula.[27] Flavoured or sweetened milk should not be consumed by toddlers under two-year-old. Based on the guideline, sweetened condensed milk should not be consumed by toddlers due to the added sugar content that reached 43-48 percent.[28] Parents also need to pay attention to the amount of added sugar in packaged UHT milk and avoid flavored UHT milk for toddlers. Children under two years old should avoid drinks with added sugar, while children aged 2-18 years old are recommended to limit the added sugar intake to 25 grams per day.[29] Excessive sugar consumption causes dental problems, obesity, and increasing risk of insulin resistance and diabetes mellitus in children.

Related to eating habit, eating habit of toddlers significantly associated with stunting incidence and most toddlers (69.4%) could eat independently. There was a higher prevalence of stunting in toddlers who ate independently (36.6%), compared with toddlers who were fed by adults (16%). A study by Hanindita et al. showed that toddlers who used the baby-led weaning (BLW) method had higher prevalence of stunting compared to toddlers who were fed by adults.[9] Baby-led weaning is an approach by allowing children to hold and put food into their own mouth and not being fed by adults, so children determine the amount of food they eat and their meal duration.

Toddlers who use BLW method tend to be underweight and consume more breast milk than solid food, which can lead to lack of energy and nutrient intake in toddlers.[30] Research by Rowan et al showed that there were significant differences in energy intake from solid foods and milk between infants aged 6-10 months who were fed by adults and infants who used the BLW method. Infants that were fed by adults had higher intake of solid foods.[31] Independent eating habits, including BLW, pose a risk of insufficient food intake considering that it is difficult to estimate the amount of food actually consumed by children and the amount of food wasted.

Handwashing habit after urinating or defecating in toddlers was significantly associated with stunting incidence. Most toddlers (91.2%) in this study washed their hands after defecating or urinating. Similar result was shown in a study by Hasanudin et al. where the habit of washing hands with soap in toddlers had significant relationship with stunting incidence in Central Sulawesi.[32] In addition, a study in Armenia showed that washing hands could reduce the risk of stunting in toddlers as many as 14 percent for each time they washed their hands.[12]

By practicing good handwashing habits, about one-third of infectious diseases can be prevented and even transmission of worm eggs through the fecal-oral route.[33] Infectious diseases have reciprocal relationship with

malnutrition, including stunting. Toddlers who are stunted tend to have weak immune system, making them prone to infectious diseases. While toddlers who have infectious diseases may experience decreased appetite and digestive disorders, such as diarrhea, that cause malnutrition.

In this study, there was significant relationship between oral hygiene habits and stunting incidence in toddlers with more than 80 percent of toddlers cleaned their mouth at least once a day using wet cloth, gauze, or toothbrush. Research by Putri et al on toddlers aged 1-3 years showed that toddlers who were stunted tend to have poor oral hygiene habits, included drinking milk before bed, brushing teeth for less than 2 minutes, brushing teeth only once day, and brushing teeth with horizontal movements.[34] However, different result was shown in a study by Badruddin et al. that dental caries incidence and self-reported oral health were not associated with stunting incidence in toddlers.[35] The differences could be caused by different variable focus between studies. In this study, oral hygiene variable focused on oral cleaning habits, while in Badruddin's study, it focused on dental caries incidence.

Poor oral hygiene habits can affect toddlers' intake and nutritional status by causing oral disorders. Tooth decay due to caries or gum pain associated with improper oral hygiene would affect toddlers' ability to chew and swallow food, thus reduced their energy and nutrient intake. Toddlers with impaired chewing function tend to eat soft foods and foods with less nutritional value, increasing malnutrition risk. In addition, nutritional status and malnutrition can also affect oral health of toddlers. A study by Abdat in Aceh showed that there was significant relationship between stunting and oral health in toddlers.[36] Chronic malnutrition in toddlers lead to atrophy of salivary gland and reduced saliva production, which plays important roles in cleaning and maintaining oral health and reducing plaque build-up.

Based on the results, it is important to assist pregnant women and mothers of toddlers directly by health workers regarding the importance of breast milk for infants and toddlers and balanced diet in toddlers. Mothers should be assisted to wash their hands after urinating or defecating and cleaning their mouths in order to prevent infectious diseases.

CONCLUSION

Based on the result of this study, we concluded that there were significant relationships between family income, consumption of breast milk and other milk, eating habits, and handwashing and oral hygiene habits with the incidence of stunting in toddlers in Cibungbulang district. Most families in this study had income below the minimum wage of Bogor Regency. Most toddlers drank other milk, had the habit of eating independently, washed their hands after toilet, cleaned their mouths at least once a day, and did not drink breast milk anymore.

ACKNOWLEDGEMENTS

Authors would like to convey our gratitude to the Head of Cibungbulang sub-district, Health Department of Bogor Regency, and community in Cibungbulang sub-district for their help and participations in this study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Kementerian Kesehatan Republik Indonesia. Peraturan Menteri Kesehatan Republik Indonesia Nomor 2 Tahun 2020 tentang Standar Antropometri Anak. Vol. 2, Kementerian Kesehatan Republik Indonesia. Indonesia; 2020: 1-12.
2. Mustakim MRD, Irwanto, Irawan R, Irmawati M, Setyoboedi B. Impact of Stunting on Development of Children between 1-3 Years of Age. Ethiopian Journal of Health Science. 2022;32(3):569-78.
3. Rolfe EDL, França GVA De, Vianna CA, Gigante DP, Miranda JJ, Yudkin JS, et al. Associations of stunting in early childhood with cardiometabolic risk factors in adulthood. PLoS One. 2018;13(4):e0192196.
4. Muhammad HFL. Obesity as the Sequel of Childhood Stunting: Ghrelin and GHSR Gene Polymorphism Explained. Vol. 50, Acta medica Indonesiana. 2018.
5. UNICEF. UNICEF Conceptual Framework on Maternal and Child Nutrition. Nutrition and Child Development Section, Programme Group 3 United Nations Plaza New York, NY 10017, USA. 2021.
6. Sari N, Manjorang MY, Zakiyah, Randell M. Exclusive breastfeeding history risk factor associated with stunting of children aged 12-23 months. Kesmas. 2021;16(1):28-32.
7. Syeda B, Agho K, Wilson L, Maheshwari GK, Raza MQ. Relationship between breastfeeding duration and undernutrition conditions among children aged 0-3 Years in Pakistan. Int J Pediatr Adolesc Med. 2021;8(1):10-7.
8. Herber C, Bogler L, Subramanian SV, Vollmer S. Association between milk consumption and child growth for children aged 6-59 months. Sci Rep. 2020;10(1):6730.
9. Hanindita MH, Widjaja NA, Irawan R, Hidayat B. Comparison between baby led weaning and traditional spoon-feeding on iron status and growth in breastfed infants. Carpathian J Food Sci Tech. 2019;11(5):96-100.
10. Nabila Fasiha Firmania, Septriana D, Djojosugito A. Hubungan Tingkat Penghasilan Orangtua dengan Kejadian Stunting pada Balita usia 0-59 Bulan.

Bandung Conference Series: Med Sci. 2023;3(1):24-59.
11. Saxton J, Rath S, Nair N, Gope R, Mahapatra R, Tripathy P, et al. Handwashing, sanitation and family planning practices are the strongest underlying determinants of child stunting in rural indigenous communities of Jharkhand and Odisha, Eastern India: a cross-sectional study. Matern Child Nutr. 2016;12(4):869-84.
12. Demirchyan A, Petrosyan V. Hand hygiene predicts stunting among rural children in Armenia. Eur J Public Health. 2017;27(suppl_3):ckx186.287.
13. Tanner L, Craig D, Holmes R, Catinella L, Moynihan P. Does Dental Caries Increase Risk of Undernutrition in Children? JDR Clin Trans Res. 2022;7(2):104-17.
14. WHO, UNICEF, World Bank Group. Levels and trends in child malnutrition: UNICEF/WHO/World Bank Group joint child malnutrition estimates: key findings of the 2023 edition. 2023. Available at: https://www.who.int/publications/i/item/9789240073791. Accessed on 01 February 2024.
15. Riset Kesehatan Dasar (RISKESDAS). Laporan Nasional Riskesdas 2018. Badan Penelitian dan Pengembangan Kesehatan Riset. 2019.
16. Kementerian Kesehatan RI. Laporan Provinsi Jawa Barat, Riskesdas 2018. Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan. 2019.
17. Kementerian Kesehatan Republik Indonesia. Buku Saku: Hasil Survei Status Gizi Indonesia (SSGI) 2022. Kementerian Kesehatan Republik Indonesia. 2023.
18. Agustin L, Rahmawati D. Hubungan Pendapatan Keluarga dengan Kejadian Stunting. Indonesian Journal of Midwifery (IJM). 2021;4(1):30-4.
19. Hasbiah H, Widyarni A, Inayah HK. Hubungan Pengetahuan. Pendapatan Keluarga dan Pola Asuh Dengan Kejadian Stunting pada Balita di Wilayah Kerja Puskesmas Pekauman Kota Banjarmasin Tahun 2021. Jurnal kesehatan UNISKA. 2021.
20. Rahma IM, Mutalazimah M. Correlation between Family Income and Stunting among Toddlers in Indonesia: A Critical Review. In: Proceedings of the International Conference on Health and Well-Being (ICHWB 2021). 2022.
21. Louisa A. Langi RACT. Hubungan Pemberian Asi Terhadap Kejadian Stunting Pada Balita Usia 2-5 Tahun Di Puskesmas Manggar Baru, Balikpapan Periode Juli-Agustus 2019. Pro-Life. 2020;7.
22. Tello B, Rivadeneira MF, Moncayo AL, Buitrón J, Astudillo F, Estrella A, et al. Breastfeeding, feeding practices and stunting in indigenous Ecuadorians under 2 years of age. Int Breastfeed J. 2022;17(1):19.
23. Czosnykowska-Łukacka M, Orczyk-Pawiłowicz M, Broers B, Królak-Olejnik B. Lactoferrin in human milk of prolonged lactation. Nutrients. 2019;11(10):2350.
24. Lackey KA, Fehrenkamp BD, Pace RM, Williams JE, Meehan CL, McGuire MA, et al. Breastfeeding beyond 12 Months: Is There Evidence for Health Impacts? Annu Rev Nutr. 2021:41:283-308.
25. Stordal B. Breastfeeding reduces the risk of breast cancer: A call for action in high-income countries with low rates of breastfeeding. Vol. 12, Cancer Medicine; 2023.
26. Sjarif DR, Yuliarti K, Iskandar WJ. Daily consumption of growing-up milk is associated with less stunting among indonesian toddlers. Medical Journal of Indonesia. 2019;28(1):70-6.
27. World Health Organization. WHO Guideline for complementary feeding of infants and young children 6-23 months of age. 2023. Available at: https://www.who.int/publications/i/item/9789240081864. Accessed on 01 February 2024.
28. Badan Standardisasi Nasional. Susu kental manis SNI 2971:2011. [Jakarta]: Badan Standardisasi Nasional; 2011.
29. Korioth T. Added sugar in kids' diets: How much is too much? Nutrition. 2019.
30. Townsend E, Pitchford NJ. Baby knows best? The impact of weaning style on food preferences and body mass index in early childhood in a case-controlled sample. BMJ Open. 2012;2(1): e000298.
31. Rowan H, Lee M, Brown A. Estimated energy and nutrient intake for infants following baby-led and traditional weaning approaches. J Human Nutrition Dietetics. 2022;35(2):325-36.
32. Hasanudin, Djaafar T, Saharudin, Bungawati A. Factors related to the incidence of stunting in Nupabomba and Guntarano Villages, Tanantovea District, Donggala Regency. In: IOP Conference Series: Earth Environmental Sci. 2021.
33. Randle J, Metcalfe J, Webb H, Luckett JCA, Nerlich B, Vaughan N, et al. Impact of an educational intervention upon the hand hygiene compliance of children. J Hospital Infection. 2013;85(3):220-5.
34. Putri TN, Indriyanti R, Setiawan AS. A descriptive study on oral hygiene practice and caries increment in children with growth stunting. Frontiers Oral Health. 2023;4:1236228.
35. Badruddin IA, Muthia K, Darwita RR, Setiawati F, Adiatman M, Maharani DA, et al. Relationship between Oral Health Status and Stunting in 5-Year-Old Children in Indonesia. J Int Dent Med Res. 2021;14(3):1039-43.
36. Abdat M, Usman S, Chairunas, Suhaila H. Relationship between stunting with dental and oral status in toddlers. J Dentomaxillofacial Sci. 2020;5(2):32-40.

Cite this article as: Marbun RM, Efiyanna R, Meilinasari, Rabbani FD. Factors associated with stunting incidence in toddlers in Cibungbulang sub-district, Bogor. Int J Community Med Public Health 2024;11:1493-9.