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Determinants of Stunting Children Under Five of Age During the COVID-19 in the Working Area of the Liwuto-Primary Public Health Center, Baubau City-Indonesia: A Community-Based Unmatched Case–Control Study

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Abstract

BACKGROUND: In Indonesia, the stunting prevalence has reached 24.4% in 2021.

AIM: The study aims to examine the determinants of stunting among children under five of age during the COVID-19 pandemic in the working area of the Liwuto-Primary Public Health Center, Baubau city.

METHODS: A community-based unmatched case–control study was conducted from January 10, to March 10, 2022, on a sample of 94, cases (n = 21), and controls (n = 73) of children aged 0–59 months with their respective mothers. Data were collected using a face-to-face interviewer-administered questionnaire and physical measurements standard. The data were analyzed using SPSS version 17. The variables were entered into the multivariable model using the backward stepwise regression approach. Multivariable logistic regression analysis was used to identify factors associated with stunting. Adjusted odds ratio (AOR) with a 95% confidence interval (95% CI) and $p < 0.05$ was used to declare the significance.

RESULTS: There are 22% of the stunting become in children under 5 years. Stunting children under 5 years was associated with maternal age (AOR = 5.71, 95%, CI: 1.91–17.03). While family income (AOR = 1.78, 95%, CI: 0.17–18.86), exclusive breastfeeding (AOR = 3.95, 95%, CI: 0.14–112.72), complementary feeding (AOR = 1.24, 95%, CI: 0.18–8.55), formal education (AOR = 0.74, 95%, CI: 0.36–1.53), and occupation (AOR = 2.98, 95%, CI: 0.24–36.55) were not associated with the stunting.

CONCLUSION: Young mother under 30 years old was an important risk factor on the incidence of stunting in children under 5 years during the COVID-19 pandemic.

Introduction

Globally, about a quarter of the child population experienced stunting at a relatively slow rate of reduction as a result of low economic growth, particularly in resource-limited settings [1]. Various factors related to the anthropometric failure of children resulting the stunting, being underweight, and wasting can be important information to formulate health agendas regionally and globally [2]. A higher stunting prevalence in children from poor families or living in rural areas of developing countries, including Indonesia. Indonesia is a very wide country, containing thousands of islands, and therefore the disparity of public health problems, including different stunting in rural and urban. Stunting and anemia in pregnant women and under-five children remain a big challenge. Even, more Indonesian children experienced the double burden of malnutrition, deficiency of protein energy, and essential micronutrient which potentially to reduce physical growth [3], [4]. Linear growth disorders or stunting is an indicator of chronic nutritional deficiency which is the result of biological abnormalities before and after the child is born [5]. Studies that have been conducted in various countries in the world show the role of stunting in increasing the risk of child mortality, and susceptibility to infectious diseases that can inhibit the growth and development of children [6], [7]. Stunting was found to be a result of multiple factors, besides the contribution of inappropriate feeding practices, also as socioeconomic, and environmental factors [8], [9]. Various studies have also observed the contribution of different dietary and behavioral factors related to water, sanitation, and hygiene to linear growth disorders [10], [11].

Furthermore, it is essential to improve the capacity of the village community for increasing awareness of health activities, especially early prevention of stunting [12]. The Indonesian government

launched various programs to handle public health problems, including stunting cases, and stunting is expected significantly reduced in the village, while there has been a minimum of information on predictors of stunting disparities and stunting risk factors from socioeconomic status and location of residence (rural or urban) [13]. However, reducing stunting prevalence during COVID-19 pandemic periods in the number of villages, especially in Baubau City, has been no information on the predictor. This study was conducted to analyze the determinants factor associated with the stunting of children under five of age during the COVID-19 pandemic in the working area of the Liwuto-Primary Public Health Center – Baubau City and this research has passed the ethical clearance review.

Methods

A community-based case–control study was conducted in Liwuto-Baubau City, Southeast Sulawesi from January 10, to March 10, 2022. The children aged 0–59 months during the COVID-19 and their mothers were taken as a study population by matching age and unmatching sample size among cases and controls. Verbal consent was obtained from each respondent after explaining the objectives and methods of the study. Children 0–59 months were included because this is the age to expose to external factors and is the average age of weaning. If there were more than one eligible child in the family, the oldest one was selected. The child with a physical disability was excluded from the study.

The criterion for cases (stunting) was: Z-value <−2 standard deviations (SDs) below the median height-for-age. Controls were children without stunting: Z-value equal to or above −2 SDs in families that had no stunted children. Height, weight, and BMI were expressed as z-scores. Weight-for-age-z-score <−2 was categorized as underweight, height-for-age-z-score <−2 as stunted, and BMI-z-score >+1, >+2, >+3 as at-risk, overweight and obese, respectively [4], [14].

The total sample size was 94, that is, cases = 21 and control = 73. The list of households having stunting children aged 0–59 months was taken from the work area of the primary of Public Health Service in Liwotu District. A random sampling method was applied to identify the required control sample size. Data collection techniques are interviews and measurement of the height of a child or length through the anthropometric method. Before measurement, pretesting was carried out to ensure the suitability of the instrument. The age accuracy is calculated for the nearest month and the height of a child is measured to the nearest 0.1 cm so that the correct measurement is obtained. Respondents are mothers who have children aged 0–59 months. Data collection was carried out directly through house-to-house visits. The height of children aged 25–59 months was measured using a measuring tape, while the length of children aged 0–24 months was measured using a portable calibration board. The interviewer measured and recorded the length/height of each child between the ages of 0 and 59 months. Mothers of stunted children were interviewed about past exposures, both as cases and as controls. The same questionnaire was used to collect data for cases and controls.

Analysis was carried out at two levels. First, a bivariate analysis was performed to determine the differentials of under-five stunting by explanatory variables. A Chi-square test was performed to test the existence of a significant association between stunting and selected risk factors. Second, the significant variables ($p < 0.05$) observed in bivariate analysis were included in multivariate analysis. A logistic regression model was applied to examine independent associations between explanatory variables and a binary dependent variable (stunting). The statistical analysis was carried out using SPSS 17.0. Hosmer and Lemeshow's Chi-square test was applied to test the logistic regression model for the goodness of fit.

Results

Demographic and socioeconomic characteristics of the parents

This study used respondents who were all biological mothers of children under 5 years of age. Both the case group and the control group received the same information about self-identity and socioeconomic conditions during the COVID-19 pandemic. Socioeconomic and demographic characteristics are shown in Table 1.

Maternal characteristics

Mothers of children under five have an age range between 19 and 45 years, are Muslim (100%), have formal education from elementary school to university graduation, and generally work as housewives, both in the case group and the control group, respectively, 95.24% and 89.04% (Table 1).

Based on Table 1 above, it appears that there is no significant difference in the relationship between the socioeconomic conditions of the respondents between the case group and the control group on the incidence of stunting in children under the age of 5 years at $p < 0.05$. However, there was a significant relationship between maternal age and the incidence of stunting ($p = 0.003$).

Table 1: Socioeconomic-demography characteristics of the respondent of children under five of age in the working area of Liwuto-Primary Public Health Center, Baubau city

Characteristics of respondent	Categories	Frequency, n (%)		p
		Case (n=21)	Control (n=73)	
Gender	Women	21 (100)	73 (100)	
Maternal age	≤19	1 (4.76)	1 (1.37)	0.003
	20–29	16 (76.19)	25 (34.25)	
	30–39	4 (19.05)	41 (56.16)	
	≥40	0	6 (8.22)	
Address	Bonelalo	15 (71.43)	47 (64.38)	0.731
	Banabungi	6 (28.57)	26 (35.62)	
	Tapanabatu	5 (23.82)	8 (10.96)	
	Matanayo	2 (9.52)	6 (8.22)	
	Tanjungbatu	2 (9.52)	10 (13.7)	
	Bone	1 (4.76)	9 (12.33)	
	Others	1 (4.76	6 (8.22)	
Religion	Islam	21 (100)	73 (100)	
Formal education	Primary school	0	11 (15.07)	0.200
	Junior high school	4 (19.05)	10 (13.7)	
	Senior high school	12 (57.14)	30 (41.1)	
	University	5 (23.81)	22 (30.14)	
Occupation	Housewife	20 (95.24)	65 (89.04)	0.667
	Employee	1 (4.76)	8 (10.96)	
Family income	Low	16 (76.19)	51 (69.86)	0.771
	Middle	5 (23.81)	22 (30.14)	
	High	0	0	
Husband's income fulfills children's nutritional needs	Yes	19 (90.5)	69 (94.5)	0.87
	No	2 (0.5)	4 (5.5)	
Husband's income is different before and during the COVID-19 pandemic	Yes	21 (100)	71 (97.3)	1.00
	No	0	2 (2.7)	
Husband's income decreased during the COVID-19 pandemic	Yes	21 (100)	69 (94.5)	0.63
	No	0	4 (5.5)	
Looking for a job for increasing income	Yes	8 (38.1)	68 (93.2)	0.23
	No	13 (61.9)	5 (6.8)	
Reducing expenses during the COVID-19 pandemic	Yes	13 (61.9)	33 (45.2)	0.51
	No	8 (48.1)	40 (54.8)	

Family income

Family income has contracted or decreased during the COVID-19 pandemic, both for the case group and the control group, by 76.19% and 69.86%, respectively. However, the head of the family continues to try to get additional income to meet the nutritional needs of children, as many as 38% (cases) and 93.2% (controls).

Child characteristics

Based on records from the Liwuto-Primary Public Health Center, there were 94 children under 5 years old, 21 of whom were stunted. In this study, 73 children were exposed to stunting as controls (Table 2).

Table 2: Characteristic of the children under five of age in the working area of Liwuto-Primary Public Health Center, Baubau city

Characteristic of children	Categories	Frequency, n (%)		p
		Case (n=21)	Control (n=73)	
Gender	Girls	12 (57.14)	37 (50.68)	0.784
	Boys	9 (42.86)	36 (49.31)	
Children age	1–12	9 (42.86)	32 (43.84)	0.202
	13–24	3 (14.29)	17 (23.29)	
	25–36	8 (38.1)	12 (16.44)	
	37–48	1 (4.76)	9 (12.33)	
	49–60	0	3 (4.11)	
Body weight	Low	9 (38.36)	28 (39.79)	0.834
	Normal	10 (57.53)	42 (55.91)	
	Over	1 (4.11)	3 (4.3)	

Based on Table 2, it appears that the age and weight of children are not associated with the incidence of stunting in children under 5 years of age ($p > 0.05$). For children aged 1–12 months, both in the case group and in the control group, the frequency was relatively higher, respectively, 42.86% and 43.84%. Meanwhile, children with below normal weight were 38.36% (case group) and 39.79% (control group). Likewise, children with overweight in the case and control groups were 4.11% and 4.3%, respectively.

Child care practices

Full child care is carried out by the mother from the womb until the age of 2 years, even at the age of 5 years. During pregnancy, the mother was happy to get adequate nutritional intake, the case group (66.7%) and control (71.2%). Children were exclusively breastfed for 6 months, case groups (85.7%) and controls (94.5%). Likewise with the provision of complementary feeding until the child is 2 years old, the case group (85.7%) and control (79.5%). The nutritional intake of children during growth and development up to the age of 5 years continues to receive attention from their biological mothers by providing nutrient-rich foods regular basis, both in the case group and the control group (Table 3).

Table 3: Maternal care of children under five of age in the working area of Liwuto-Primary Public Health Center, Baubau city

Care of children	Categories	Frequency, n (%)		p
		Case (n=21)	Control (n=73)	
Mothers exclusively breastfeed their children for up to 6 months	Yes	18 (85.7)	69 (94.5)	0.53
	No	3 (14.3)	4 (5.5)	
Mother gives vitamins to children who have difficulty eating	Yes	14 (66.7)	52 (71.2)	0.50
	No	7 (33.3)	21 (28.8)	
Mother gives breakfast regularly to children	Yes	20 (95.2)	73 (100)	0.50
	No	1 (0.3)	0	
The mother gives rice, bread, and milk as breakfast food for the children	Yes	14 (66.7)	47 (64.4)	1.00
	No	7 (33.3)	26 (33.6)	
Pregnant women consume vegetables, fruits, and foods that contain lots of protein	Yes	14 (66.7)	52 (71.2)	1.00
	No	7 (33.3)	21 (28.8)	
Mother trying to find out the cause of stunting	Yes	14 (66.7)	58 (79.5)	0.35
	No	7 (33.3)	15 (20.5)	
Mother takes care of child's diet	Yes	5 (23.8)	57 (78.1)	0.08
	No	16 (76.2)	16 (19.9)	
The mother always gives breast milk until the children of 2-year-old	Yes	21 (100)	71 (97.3)	1.00
	No	0	2 (2.7)	
Mothers are looking for good nutrition information for children	Yes	21 (100)	73 (100)	
	No	0	0	
Mother learns the types of nutritional intake rich in protein, carbohydrates, minerals, and vitamins	Yes	10 (47.6)	36 (47.3)	1.00
	No	11 (52.4)	37 (52.7)	
Mothers provide foods that contain protein, carbohydrates, and fats during the child's growth period	Yes	17 (81)	45 (61.6)	0.17
	No	4 (19)	28 (38.4)	
Children are fed three times a day	Yes	18 (85.7)	55 (75.3)	0.65
	No	3 (14.3)	18 (24.7)	
Mothers give complementary feeding after the child is 6–2-year-old	Yes	18 (85.7)	58 (79.5)	0.74
	No	3 (14.3)	15 (20.5)	
Mothers try to provide complete nutritious food for children	Yes	21 (100)	69 (94.5)	0.81
	No	0	4 (5.5)	
The mother takes them to the doctor if the child has difficulty eating	Yes	14 (66.7)	52 (71.2)	0.50
	No	7 (33.3)	21 (28.8)	
The mother takes the child to the doctor when the child is unwell or sick	Yes	20 (95.2)	73 (100)	0.50
	No	1 (0.3)	0	

Based on Table 3, it appears that there is no relationship between maternal care habits and the incidence of stunting in the working area of the Liwuto Health Center, Baubau City ($p > 0.05$).

Factors associated stunted child

Based on the results of logistic regression analysis, it appears that maternal age is significantly related to the incidence of stunting in children under

5 years old in the working area of the Liwuto Health Center, Baubau City (Adjusted odds ratio [AOR]:5.74: 95%, Confidence interval [CI]:1.90–17.29) with p = 0.003, while the factors that are not related to the incidence of stunting are family income (AOR: 1.19: 95%, CI: 0.13–11.30), maternal knowledge (AOR: 1.87: 95%, CI: 0.64–5.54), exclusive breastfeeding (AOR: 7.37: 95%, CI: 0.63–85.68), and complementary feeding (AOR: 1.91: 95%, CI: 0.70–5.24), as shown in Table 4.

Table 4: Factors related with stunting children under 5 years in the working area of Liwuto-Primary Public Health Center, Baubau city

Variable	Categories	Frequency, n (%)		p	AOR (95% CI)
		Case (n = 21)	Control (n = 73)		
Family income	Good	1 (4.76)	4 (5.63)	0.877	1.19
	Poor	20 (95.24)	67 (94.37)		(0.13–11.30)
Maternal knowledge	Good	14 (66.67)	56 (78.87)	0.389	1.87
	Poor	7 (33.33)	15 (21.13)		(0.64–5.54)
Exclusive breastfeeding	Good	19 (90.48)	70 (98.59)	0.066	7.37
	Poor	2 (9.52)	1 (1.41)		(0.63–85.68)
Complementary feeding	Good	12 (57.14)	51 (71.83)	0.315	1.91
	Poor	9 (42.86)	20 (28.17)		(0.70–5.24)
Maternal age	<20	1 (4.76)	1 (1.37)	0.003*	5.74
	20–29	16 (76.19)	25 (34.25)		(1.90–17.29)
	30–39	4 (19.05)	41 (56.16)		
	>40	0	6 (8.21)		

*Significant associated p < 0.05. AOR: Adjusted odds ratio, CI: Confidence interval.

Discussion

In low- and middle-income countries (LMICs), maternal height enough has the potential to give birth to stunted children [15]. The prevalence of stunting in the working area of the Liwuto Public Health Center during the COVID-19 pandemic still reached 22%. Several studies show that the key determinants associated with stunting and underweight are low or short parents, the nutritional status of children, exposure to undernutrition and infections in children, exposure to poor WASH environment induces diarrheal diseases and other infections, poverty, and poor maternal education, low birth weight, and height, inadequate energy from protein, unstable job, breast-feeding longer than 6 months, farming occupation of mother, lack of postnatal vitamin A supplementation, poorer household wealth status, and accessing family food from farms [4], [15], [16], [17], [18]. The results of the examination of determinants of stunting show that no significant association between family income, maternal knowledge, exclusive breastfeeding, and complementary feeding with the incidence of stunting in children aged under 5 years in the working area of the Liwuto Health Center, Baubau City.

Based on the results of the multivariate logistic regression test, it appears that among all the variables examined, only maternal age is significantly related to the incidence of stunting during the COVID-19 pandemic. This is mainly due to the different maternal ability to manage to spend and give priority to nutritional fulfillment for under-five children, including the provision of complementary foods to accompany breastfeeding [19]. Even, the greatest stunting protective effect was found in children cared for exclusively by their mothers [18]. This study shows that 90% of the employment of the mother of children was housewife status and full-time childcare. Those are relevant with found by Chavez-Zarate [20], no association between maternal employment status and the presence of stunting in children. Meanwhile, the prevalence of stunting was significantly higher among children of mothers performing unpaid work compared with those of paid working mothers.

Good parenting patterns must be based on sufficient knowledge. Improvements in maternal education and poverty reduction are accompanied by behavioral changes in a more positive direction to prevent stunting in children [14]. In developing countries is essential to reduce child malnutrition through poverty alleviation, improved maternal education, and family nutrition programs strategies. In this study, mothers with a formal education level from high school to university reached 73.4%. Most mothers who have stunted children have formal education in junior high school. The results of logistic regression analysis show that the level of maternal education was not associated with the incidence of stunting in children under 5 years of age (Table 4). Even, for mothers trying to find out the cause of stunting, their children stunted reached 66.7% (Table 3).

Improvement of family income through cash transfers has succeeded in reducing stunting significantly in several areas of India which have multiple burdens, stunting, and high poverty. This model shows that income transfer can increase income and contribute to improving nutritional status in some areas, although other activities are still needed as a complement to reducing stunting [2]. Likewise in Indonesia, even though family income has decreased, the government provides cash transfer social financial assistance to families affected by the COVID-19 pandemic so that mothers' care of providing complete exclusive breastfeeding and complementary feeding are still relatively high, respectively, 94.68% and 79.74%.

Children who are stunted and malnourished at an early age can have negative impacts later in life, such as the occurrence of health problems and cognitive delays [21]. Theoretically found that health promotion to increase motivation to exclusively breastfeed is very important to protect children from stunting [22]. Thus, a multisectoral approach is needed to intervene in the form of increasing maternal knowledge and nutritional adequacy to prevent stunting in infants and children, especially in rural areas in LMICs [23] and health promotion is needed to improve the nutritional intake of children under 5 years and pregnant women in areas with a high prevalence of stunting [9].

Conclusion

Based on the results of the analysis of the determinants of stunting during the COVID-19 pandemic, it was known that 22% of stunting become in children under 5 years. Maternal age is significantly associated with the incidence of stunting children under 5 years. Intervention nutrition in the early life is needed to improve the growth the stunted child in the working area of the Liwuto-Primary Public Health Center, Baubau city.

References

1. Budge S, Parker AH, Hutchings PT, Garbutt C. Environmental enteric dysfunction and child stunting. Nutr Rev. 2019;77(4):240-53. https://doi.org/10.1093/nutrit/nuy068
   PMid:30753710
2. Li Z, Kim R, Vollmer S, Subramanian SV. Factors associated with child stunting, wasting, and underweight in 35 low-and middle-income countries. JAMA Netw Open. 2020;3(4):e203386. https://doi.org/10.1001/jamanetworkopen.2020.3386
   PMid:32320037
3. Siswati T, Susilo J, Kusnanto H, Waris L. Risk factors of mild and severe stunting children in rural and urban areas in Indonesia. Iran J Public Health. 2022;51(1):213-5. https://doi.org/10.18502/ijph.v51i1.8316
   PMid:35223645
4. Rachmi CN, Agho KE, Li M, Baur LA. Stunting, underweight and overweight in children aged 2.0-4.9 years in Indonesia: Prevalence trends and associated risk factors. PLoS One. 2016;11(5):e0154756. https://doi.org/10.1371/journal.pone.0154756
   PMid:27167973
5. Rah J, Akhter N, Semba RD, de Pee S, Bloem MW, Campbell AA, *et al*. Low dietary diversity is a predictor of child stunting in rural Bangladesh. Eur J Clin Nutr. 2010;64(12):1393-8. https://doi.org/10.1038/ejcn.2010.171
   PMid:20842167
6. Pollitt E, Gorman KS, Engle PL, Rivera JA, Martorell R. Nutrition in early life and the fulfillment of intellectual potential. J Nutr. 1995;125(4 Suppl):1111S-8S. https://doi.org/10.1093/jn/125.suppl_4.1111S
   PMid:7536831
7. Victora CG, Adair L, Fall C, Hallal PC, Martorell R, Richter L, *et al*. Maternal and child undernutrition: Consequences for adult health and human capital. Lancet. 2008;371(9609):340-57. https://doi.org/10.1016/S0140-6736(07)61692-4
   PMid:18206223
8. Paudel R, Pradhan B, Wagle RR, Pahari DP, Onta SR. Risk factors for stunting among children: A community based case control study in Nepal. Kathmandu Univ Med J (KUMJ). 2012;10(39):18-24. https://doi.org/10.3126/kumj.v10i3.8012
   PMid:23434956
9. Fahmida U, Pramesthi IL, Kusuma S, Wurjandaru G, Izwardy D. Problem nutrients and food-based recommendations for pregnant women and under-five children in high-stunting districts in Indonesia. Curr Dev Nutr. 2022;6(5):nzac028. https://doi.org/10.1093/cdn/nzac028
   PMid:35542385
10. Ngure FM, Reid BM, Humphrey JH, Mbuya MN, Pelto G, Stoltzfus RJ. Water, sanitation, and hygiene (WASH), environmental enteropathy, nutrition, and early child development: Making the links. Ann N Y Acad Sci. 2014;1308:118-28. https://doi.org/10.1111/nyas.12330
    PMid:24571214
11. Mbuya MN, Humphrey JH. Preventing environmental enteric dysfunction through improved water, sanitation and hygiene: An opportunity for stunting reduction in developing countries. Matern Child Nutr. 2016;12 Suppl 1(Suppl 1):106-20. https://doi.org/10.1111/mcn.12220
    PMid:26542185
12. Indra J, Khoirunurrofik K. Understanding the role of village fund and administrative capacity in stunting reduction: Empirical evidence from Indonesia. PLoS One. 2022;17(1):e0262743. https://doi.org/10.1371/journal.pone.0262743
13. Widyaningsih V, Mulyaningsih T, Rahmawati FN, Adhitya D. Determinants of socioeconomic and rural-urban disparities in stunting: Evidence from Indonesia. Rural Remote Health. 2022;22(1):7082. https://doi.org/10.22605/RRH7082
    PMid:35306826
14. Bloem M. The 2006 WHO child growth standards. BMJ. 2007;334(7596):705-6. https://doi.org/10.1136/bmj.39155.658843.BE
    PMid:17413142
15. Wu H, Ma C, Yang L, Xi B. Association of parental height with offspring stunting in 14 low-and middle-income countries. Front Nutr. 2021;8:650976. https://doi.org/10.3389/fnut.2021.650976
    PMid:34458296
16. Tariku A, Biks GA, Derso T, Wassie MM, Abebe SM. Stunting and its determinant factors among children aged 6-59 months in Ethiopia. Ital J Pediatr. 2017;43(1):112. https://doi.org/10.1186/s13052-017-0433-1
    PMid:29258578
17. Karlsson O, Kim R, Bogin B, Subramanian SV. Maternal height-standardized prevalence of stunting in 67 low-and-middle-income countries. J Epidemiol. 2021;32(7):337-344. https://doi.org/10.2188/jea.JE20200537
    PMid:33612705
18. Reyes H, Perez-Cuevas R, Sandoval A, Castillo R, Santos JI, Doubova SV, *et al*. The family as a determinant of stunting in children living in conditions of extreme poverty: A case-control study. BMC Public Health. 2004;4:57. https://doi.org/10.1186/1471-2458-4-57
    PMid:15571622
19. Kishore S, Thomas T, Sachdev H, Kurpad AV, Webb P. Modeling the potential impacts of improved monthly income on child stunting in India: A subnational geospatial perspective. BMJ Open. 2022;12(4):e055098. https://doi.org/10.1136/bmjopen-2021-055098
    PMid:35383064
20. Chavez-Zarate A, Maguina JL, Quichiz-Lara AD, Zapata-Fajardo PE, Mayta-Tristan P. Relationship between stunting in children 6 to 36 months of age and maternal employment status in Peru: A sub-analysis of the Peruvian demographic and health survey. PLoS One. 2019;14(4):e0212164. https://doi.org/10.1371/journal.pone.0212164
    PMid:30943197
21. Emerson E, Savage A, Llewellyn G. Prevalence of underweight, wasting and stunting among young children with a significant cognitive delay in 47 low-income and middle-income countries. J Intellect Disabil Res. 2020;64(2):93-102. https://doi.org/10.1111/jir.12698
    PMid:31845425

22. Hadi H, Fatimatasari F, Irwanti W, Kusuma C, Alfiana RD, Asshiddiqi MI, *et al*. Exclusive breastfeeding protects young children from stunting in a low-income population: A study from Eastern Indonesia. Nutrients. 2021;13(12):4264. https://doi.org/10.3390/nu13124264
PMid:34959815

23. Goudet SM, Bogin BA, Madise NJ, Griffiths PL. Nutritional interventions for preventing stunting in children (birth to 59 months) living in urban slums in low-and middle-income countries (LMIC). Cochrane Database Syst Rev. 2019;6(6):CD011695. https://doi.org/10.1002/14651858.CD011695.pub2
PMid:31204795