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Motor and Social Independence Skills Among Stunted Toddlers in Tegal City, Indonesia

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Abstract

Background: Slow maturation of nerve cells, social responses, motor movements, and lack of intelligence are signs of abnormal developmental delay in stunting toddlers. The purpose of this study was to find out how stunted toddlers develop in the city area, especially from the aspects of gross motor development and social independence skills.

Method: This research is a descriptive study design. The study was conducted in 4 sub-districts in Tegal City, namely the Margadana, East Tegal, South Tegal, and West Tegal Districts from March 2023 to March 2024 with a sample of 300 respondents. The results of the study were obtained by measuring the motoric and social independence development of respondents using the Denver II table. Data is presented in the form of a frequency distribution in the form of the number of stunted toddlers, motoric development and social independence development by univariate analysis.

Result: The incidence of stunting in Tegal city, where 1,002 out of 12,201 children under five were stunted, with an average of over 20% for each district. For motor development, where the most is normal development by 111 respondents (37%), followed by questionable development by 107 respondents (36%) and the least toddlers with deviant development by 82 respondents (27%).

Conclusion: The incidence of stunted toddlers is a dangerous alarm for the government looking to the future of the next generation. Problems in motor development will also have an impact on children's social development and the development of the country in the future.

Keywords: stunting, toddlers, motorik development, social development



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Introduction

Child development is generally defined as attaining gross and fine motor skills, social behaviour and cognitive abilities.^{1,2} Although many factors can influence child development, many studies have shown evidence of a linear relationship between impaired growth and poor development.³

The behaviour of stunted children is often associated with apathetic child responses, social withdrawal, lack of cognitive abilities, poorer learning outcomes and lower educational attainment, as well as reduced economic prospects in the future, thus sustaining the intergenerational transfer of malnutrition and poverty.⁴ If stunting leads to developmental deficits, then the consequences at the population level are enormous, as there are 156 million children worldwide who are stunted.⁵

An analysis of the data shows that children as young as two years of age impact their cognitive and motor development. In addition, there is evidence that of the 15 countries participating in the Multiple Indicator Cluster Survey, there is a relationship between stunting and child development. However, the results vary according to country conditions.^{6,7} Moreover, the causal relationship between stunting and child development should not be inferred based on evidence from observational studies due to the potential for many factors, such as socioeconomic status and environment. For example, depressed children are more likely to grow up in conditions of generalised deprivation, which affects both physical growth and child development.^{8,9}

Stunting is one of the most common growth and development problems. According to the World Health Organisation (WHO), the prevalence of stunting in Indonesia is more than 20% of the Indonesian population and is a serious public health problem.⁴ The causes of stunting are multifactorial and related to insufficient nutrient intake or increased nutrient requirements. Stunting has both short-term and long-term irreversible impacts.^{1,3} Stunting is defined as linear growth failure in children, caused by poor nutrition over a long period where the child is too short for their age due to this growth failure.^{6,10} Stunting is a major problem in the world, especially in poor and developing countries, including Indonesia. Stunting and malnutrition are the leading causes of death for children worldwide. About one-third of all deaths that occur each year are caused by malnutrition. The World Health Organisation mention that stunting can lead to suboptimal cognitive or intelligence, motor, and verbal development, increase

the risk of obesity and other degenerative diseases, increase health costs, and increase the incidence of morbidity and mortality due to nutritional problems, causing severe consequences. Ultimately, stunting can hinder economic growth, increase poverty, and widen inequality in a country because children have less than optimal levels of intelligence. Students' cognitive development affects their success in school, which includes thinking skills such as memory, problem-solving, learning, and rationality.¹¹⁻¹⁴

Stunting is considered a linear growth failure in children caused by poor nutrition that persists for a long period. Stunting can lead to reduced cognitive, productivity, and work performance, and children become vulnerable due to an increased risk of childhood health problems.^{15,16} In addition, stunting can also lead to poverty, increase morbidity and mortality, increase the risk of having low birth weight (LBW) babies, increase the risk of communicable and non-communicable diseases, and reduce economic income. Symptoms of stunting are seen after the baby is two years old and has the anthropometry characteristics of below-average height or shortness.^{17,18}

Children's motor development falls into two categories: gross motor and fine motor. Fine movements involving specific parts performed with small muscles are known as fine motor skills. These are performed because they do not require much energy but require careful coordination.^{19,20} Fine motor skills include making scribbles on paper, arranging blocks, making straight lines and circles, selecting longer lines, and making age-appropriate plus signs. Furthermore, Gross motor skills are body movements that move muscles in part or all of the limbs that can be influenced by child growth. A study conducted in Sleman Regency, Yogyakarta, involving 106 children aged 12 to 60 months found a significant association between stunting and children's motor development, with the test results obtaining an OR value of 3.9, indicating that children with stunting have a 3.9 times greater risk than children with normal development.^{21,22}

There is a relationship between stunting and gross motor development, according to another study conducted in the Aceh region on kindergarten children aged 3-5 years. Another study conducted in the North Coast of Cirebon City also found similar results: there was a significant relationship between stunting and fine motor skills (p -value <0.01) and there was a significant correlation between stunting and gross motor skills.^{23,24} The study involved 166 children aged between 12 and 60 months.



Slow maturation of nerve cells, social responses, motor movements, and lack of intelligence are signs of abnormal developmental delay in children. Yuliana, 2004. According to the results of a 2006 survey, at least 16% of under-fives in Indonesia have neurodevelopmental and brain delays that range from severe to mild. In recent years, the incidence of childhood delays in motor skills, language, behaviour and autism has increased in the United States 12-16%, Argentina 22%, Thailand 24% and Indonesia 13-18%. Two in a thousand babies have motor developmental delays. Stunting, a nutritional condition of under-fives, is a problem experienced by many under-fives around the world.^{1,25-27}

Compared to other nutritional problems, such as undernutrition, wasting, and obesity, stunting has become more common in the past three years, according to the results of the Nutrition Status Monitoring (NMS) data. Short stature, or stunting, increased to 29.6% in 2017 from 27.5% in 2016. Based on the 2018 Basic Health Research (Riskesdas), the prevalence of stunting in Indonesia in 2018 was 30.8%, well below the WHO target of 14%.^{28,29} Tegal City is one of the cities in Central Java with the highest number of stunted children under five years old, with 830 children aged 0 to 5 years.⁴ Therefore, the purpose of this study was to find out how stunted toddlers develop in the city area, especially from the aspects of gross motor development and social independence skills.

Methods

Study design

This research is a descriptive study design, the study was conducted to determine the description of the development of stunted toddlers in Tegal City in terms of gross motor development and social independence skills.

Subjects, time and settings

The study was conducted in 4 sub-districts in Tegal City, namely the Margadana, East Tegal, South Tegal, and West Tegal Districts from March 2023 to March 2024 with a population of 1,002 respondents and a sample of 300 respondents.

Outcome measures

The results of the study were obtained by measuring the motoric and social independence development of respondents using the Denver II table.

Data analysis

Data is presented in the form of a frequency distribution in the form of the number of stunted toddlers, motoric development and social independence development by univariate analysis.

Results

The results of the study describe the stunting in Tegal City as follows:

Table 1. Frequency distribution of stunted toddlers in Tegal City Region in February 2023

District	Village	Total				% of Stunted Toddlers
		Toddlers (0-59 Bln)	Short Toddlers	Very Short Toddlers	Toddler Stunting	
Tegal South	Kalinyamat Wetan	257	6	0	6	2,33
	Bandung	320	16	3	19	5,94
	Debong Kidul	207	20	0	20	9,66
	Tunon	293	27	1	28	9,56
	Keturen	249	13	0	13	5,22
	Debong Kulon	316	28	9	37	11,71
	Debong Tengah	694	56	27	83	11,96
	Randugunting	706	56	19	75	10,62
East Tegal	Kejambon	592	45	6	51	8,61
	Slerok	835	49	2	51	6,11
	Stage	1.239	79	35	114	9,20
	Mangkukusuman	169	5	0	5	2,96
	Mintaragen	599	37	11	48	8,01
	Pesurungan Kidul	414	25	4	29	7,00
West Tegal	Debong Lor	240	22	2	24	10,00
	Kemandungan	161	9	1	10	6,21
	Pekauman	269	20	8	28	10,41
	Kraton	697	37	13	50	7,17
	Tegal Sari	1.094	41	19	60	5,48
	Muarareja	540	28	9	37	6,85
	Kaligangsa	354	14	3	17	4,80
	Margadana	Krandon	254	9	8	17
Cabawan		241	7	3	10	4,15
Margadana		672	52	16	68	10,12
Kalinyamat Kulon		222	21	8	29	13,06
Sumurpanggung		324	35	12	47	14,51
Pesurungan Lor		243	18	8	26	10,70
Total		12.201	775	227	1.002	8,21

Source: DPPKBP2PA Tegal City

Table 1 shows the incidence of stunting in Tegal City, where 1,002 out of 12,201 children under five were stunted, with an average of over 20% for each district.

Table 2. Frequency distribution of motor development of stunted toddlers in the Tegal City area in 2023

District	Village	Motor Development						Total
		Normal		Doubtful		Deviate		
		n	%	n	%	n	%	
Tegal South	Kalinyamat Wetan	1	50	1	50	0	0	2
	Bandung	1	17	4	67	1	17	6
	Debong Kidul	3	50	2	33	1	17	6

District	Village	Motor Development						Total
		Normal		Doubtful		Deviate		
		n	%	n	%	n	%	
Tegal Timur	Tunon	3	38	1	13	4	50	8
	Keturen	1	25	2	50	1	25	4
	Debong Kulon	4	36	3	27	4	36	11
	Debong Tengah	15	60	2	8	8	32	25
	Randugunting	15	65	5	22	3	13	23
	Kejambon	5	33	8	53	2	13	15
	Slerok	8	53	3	20	4	27	15
	Stage	18	53	8	24	8	24	34
	Mangkukusuman	1	50	0	0	1	50	2
	Mintaragen	4	29	5	36	5	36	14
Tegal Barat	Pesurungan Kidul	2	22	1	11	6	67	9
	Debong Lor	1	14	2	29	4	57	7
	Kemandungan	1	33	1	33	1	33	3
	Pekauman	1	13	6	75	1	13	8
	Kraton	2	13	12	80	1	7	15
Margadana	Tegal Sari	4	22	12	67	2	11	18
	Muarareja	3	27	5	45	3	27	11
	Kaligangsa	2	40	2	40	1	20	5
	Krandon	1	20	3	60	1	20	5
	Cabawan	1	33	1	33	1	33	3
	Margadana	3	15	11	55	6	30	20
	Kalinyamat Kulon	6	67	0	0	3	33	9
	Sumurpanggang	4	29	5	36	5	36	14
Pesurungan Lor	1	13	2	25	5	63	8	
Total		111	37	107	36	82	27	300

Source: Primary data processed

Table 2 shows the results of measuring the development of toddlers who experience stunting in the Tegal City area, where the most is normal development of 111 respondents (37%), followed by questionable development of 107 respondents (36%) and the least toddlers with deviant development of 82 respondents (27%).

Discussion

Stunting results from chronic undernutrition and is a major problem for children in developing countries.^{30,31} It is important to evaluate the impact of stunting on child development. This study aims to investigate the impact of stunting on the growth and development of children aged 1-3 years. Methods: A study conducted from July 2020 to March 2021 in Surabaya, Indonesia showed the results of three hundred children included in the study consisting of 150 stunted children and 150 non-stunted children. Stunted children had a higher risk of suspected developmental delay compared to non-stunted children. The Crude Odd Ratio was 2.98, 4.24,

and 4.75 with p values of 0.006, 0.001, and 0.001 respectively. The adjusted Odd Ratio was 0.34, 0.24, 0.21 with p values of 0.008, 0.001, and 0.001 respectively.^{23,29} Stunting is associated with suspected developmental delay in children aged 1-3 years. Prevention-related initiatives need to be established and nutritional advice needs to be provided.^{2,32} The results showed that stunting increases the risk of abnormal development in children (aOR=3.71; 95%CI=2.35 to 5.86; p=0.760). Stunting increases the risk of abnormal development in children.³³⁻³⁵

Another study conducted in Surakarta on children aged 1-3 years showed no difference in gross motor

development between stunted and non-stunted children because the average gross motor development score of stunted children was almost the same as non-stunted children.³⁶ This may occur because gross motor development can be influenced by factors other than stunting, namely the quality of interaction with parents. In this case, of course, the role of parents, especially mothers, is very important because they are the closest people who interact directly with children. In this study, it was found that almost all mothers did not work or were housewives (97.8%)^{26,33}. So that mothers have more time to directly monitor the process of child growth and development by providing training and motivation. Mothers have a very important role in child development, especially in this case, namely gross motor development. The environment, which includes training, motivation and experience, can also be a factor that can influence gross motor development.^{8,37} If parents provide training and motivation for children to develop, then children will have a good experience to develop potential, especially gross motor development. Parents are expected not to limit the child's space so that the child can explore the abilities that exist within him, but still closely monitor every developmental progress made by the child. Not only in the family sphere, the scope of peers also has an impact on children's gross motor development.^{28,38}

A supportive play environment can have a positive impact on children. In the research location, children generally play actively with their friends by doing activities outside the home. They usually play running around, playing ball, playing long jump, playing games using the strength of one leg and other games. The age line that children pass during the implementation of Denver II, especially in the gross motor category, is mostly truncated in the tests of running, jumping, kicking the ball, long jump, standing on one leg and so on. Thus, when the gross motor development test was carried out, only a small proportion had suspect test results (8.7%).^{14,39,40}

The majority of children had normal gross motor development. This difference may be due to the relatively smaller sample size and almost all subjects received good stimulation. Frequent stimulation can have a major effect on brain maturation.^{41,42} Research explains that stimulation can increase the number of dendrite cells. The more the number of dendrites, the more the relationship between dendrites increases and affects better motor skills. The results of fine motor development show that the results of suspected fine motor development disorders in children with stunting

nutritional status are higher than those in the non-stunting group.^{43,44} Motor development in research conducted by Solihin et al. that nutritional status correlates with motor skills. Children with stunting nutritional status have low fine motor skills. Low fine motor skills also interfere with aspects of gross motor development.⁴³ The results of statistical tests show a significant relationship between stunting and gross and fine motor development. The results of the coarse motor relationship strength parameter obtained that children with stunted nutritional status have five times the probability of suspected coarse motor development disorders compared to children who are not stunted.^{45,46}

The results of the fine motor relationship strength parameter obtained that stunted children have six times the chance of suspected fine motor development disorders compared to non-stunted children. Malnutrition disrupts cellular activity, causing the brain to not be able to achieve optimal function. Malnutrition that occurs early in life can cause the cerebellum of the brain that coordinates motor movements to be disrupted.⁴⁷ Decreased motor function in stunted children is related to low mechanical delay in the triceps muscle which causes delayed maturity of muscle function so that motor abilities are impaired.⁷ In stunting conditions, chronic malnutrition causes the formation and maturation of muscle tissue to be inhibited compared to normal nutritional status children who have strong muscles so that they master motor movements faster.⁴⁸

Conclusion

The incidence of stunted toddlers is a dangerous alarm for the government looking to the future of the next generation especially in Tegal City, Indonesia. The incidence of stunting in Tegal city, where 1,002 out of 12,201 children under five were stunted, with an average of over 20% for each district. Problems in motor development will also have an impact on children's social development and the development of the country in the future. Motor development among stunting toddlers in Tegal City was normal development by 111 respondents (37%), followed by questionable development by 107 respondents (36%) and the least toddlers with deviant development by 82 respondents (27%).

Declarations

Ethical Consideration:

This study has been approved by the Health Research ethics commission Universitas Muhammadiyah Purwokerto, with number: KEPK/UMP: 23/IX/2024



Author contributions:

Nilatul Izah was involved in all aspects of the study. Satriya Pranata was the supervisor. Linda Rofiasari, Ratna Dewi Handayani and Seventina Nurul Hidayah reviewed the literature and final-checked the draft. Ni'matul Ulya and Bardiati Ulfah were data curation.

Conflict of Interest

The authors affirm no conflict of interest in this study.

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References

1. Sufri S, Nurhasanah, Jannah M, Dewi TP, Sirasa F, Bakri S. Child Stunting Reduction in Aceh Province: Challenges and a Way Ahead. *Matern Child Health J.* 2023 Nov 6;27(5):888–901.
2. Gabain IL, Ramsteijn AS, Webster JP. Parasites and childhood stunting – a mechanistic interplay with nutrition, anaemia, gut health, microbiota, and epigenetics. *Trends Parasitol.* 2023 Nov 6;39(3):167–80.
3. Cloft SE, Kinstler SR, Reno KE, Sellers HS, Franca M, Ecco R, et al. Runting Stunting Syndrome in Broiler Chickens Is Associated with Altered Intestinal Stem Cell Morphology and Gene Expression. *Avian Dis.* 2022 Nov 6;66(1):85–94.
4. Izah N, Mulyani Y, Desi NM, Hidayah SN, Fatimah OZS, Rakhimah F, et al. Efforts to Accelerate Stunting Reduction in Tegal City, Indonesia. *J Res Heal.* 2024;14(5). 427-438.
5. Hoffman DJ, Kassim I, Ndiaye B, McGovern ME, Le H, Abebe KT, et al. Childhood Stunting and Wasting Following Independence in South Sudan. *Food Nutr Bull.* 2022 Nov 6;43(4):381–94.
6. Fauziah N, Ar-Rizqi MA, Hana S, Patahuddin NM, Diptyanusa A. Stunting as a Risk Factor of Soil-Transmitted Helminthiasis in Children: A Literature Review. *Interdiscip Perspect Infect Dis.* 2022 Nov 6;2022:8929025.
7. Gilano G, Hailegebreal S, Sako S, Seboka BT. Stunting and Associated Factors Among 6-23 Months Age Children in Ethiopia: Application of Generalized Linear Latent and Mixed Modeling. *Ecol Food Nutr.* 2022 Nov 6;61(5):608–23.
8. Haque MA, Wahid BZ, Tariqujjaman M, Khanam M, Farzana FD, Ali M, et al. Stunting Status of Ever-Married Adolescent Mothers and Its Association with Childhood Stunting with a Comparison by Geographical Region in Bangladesh. *Int J Environ Res Public Health.* 2022 Nov 6;19(11):6748.
9. Kalinda C, Phri M, Qambayot MA, Ishimwe MCS, Gebremariam A, Bekele A, et al. Socio-demographic and environmental determinants of under-5 stunting in Rwanda: Evidence from a multisectoral study. *Front Public Heal.* 2023 Nov 6;11:1107300.
10. Bevis L, Kim K, Guerena D. Soil zinc deficiency and child stunting: Evidence from Nepal. *J Health Econ.* 2022 Nov 6;87:102691.
11. Brou AM, Djalega FA, Tokpa V, Seri ECG, Anoua ALF, Robinson JA. Urban–rural differences in the relationship between stunting, preschool attendance, home learning support, and school readiness: A study in Côte d'Ivoire. *Front Public Heal.* 2023 Nov 6;10:1035488.
12. Marume A, Archary M, Mahomed S. Predictors of stunting among children aged 6–59 months, Zimbabwe. *Public Health Nutr.* 2023 Nov 6;26(4):820–33.
13. Ejigu H, Tafese Z. Stunting at birth: linear growth failure at an early age among newborns in Hawassa city public health hospitals, Sidama region, Ethiopia: a facility-based cross-sectional study. *J Nutr Sci.* 2023 Nov 6;12:e63.
14. Siddiqia M, Shah GH, Mayo-Gamble TL, Zubair A. Determinants of Child Stunting, Wasting, and Underweight: Evidence from 2017 to 2018 Pakistan Demographic and Health Survey. *J Nutr Metab.* 2023 Nov 6;2023:2845133.
15. Tola G, Kassa A, Getu M, Dibaba B, Neggesse S. Prevalence of stunting and associated factors among neonates in Shebadino woreda, Sidama region South Ethiopia; a community-based cross-sectional study 2022. *BMC Pediatr.* 2023 Nov 6;23(1):276. doi.org/10.1186/s12887-023-04080-4
16. Wulandari RD, Laksono AD, Kusri I, Tahangnacca M. The Targets for Stunting Prevention Policies in Papua, Indonesia: What Mothers' Characteristics Matter? *Nutrients.* 2022 Nov 6;14(3):549. doi.org/10.3390/nu14030549
17. Nemerimana M, Havugarurema S, Nshimyiryo A, Karambizi AC, Kirk CM, Beck K, et al. Factors associated with recovery from stunting at 24 months of age among infants and young children enrolled in the Pediatric Development Clinic (PDC): A retrospective cohort study in rural Rwanda. *PLoS One.* 2023 Nov 6;18(7):e0283504.
18. Mertens A, Benjamin-Chung J, Colford JM, Hubbard AE, van der Laan MJ, Coyle J, et al. Child



- wasting and concurrent stunting in low- and middle-income countries. *Nature*. 2023 Nov 6;621(7979):558–67.
19. Sahiledengle B, Mwanri L, Blumenberg C, Agho KE. Gender-specific disaggregated analysis of childhood undernutrition in Ethiopia: evidence from 2000–2016 nationwide survey. *BMC Public Health*. 2023 Nov 6;23(1):2040. doi.org/10.1186/s12889-023-16907-x
20. Tariq I, Khan JI, Malik MA. Decomposing acute malnutrition by educational inequality of mother's among under five children in Jammu and Kashmir. *Sci Rep*. 2023 Nov 6;13(1):10493. doi.org/10.1038/s41598-023-37587-y
21. Amusa LB, Bengesai AV, Khan HTA. Childhood stunting and subsequent educational outcomes: a marginal structural model analysis from a South African longitudinal study. *Public Health Nutr*. 2022 Nov 6;25(11):3016–24.
22. Hermawan D, Kurniasari D, Sandayanti V, Sari N, Listyaningsih E. Relationships of deworming drug consumption and animal protein intake with stunting. *Parasite Epidemiol Control*. 2023 Nov 6;23:e00326.
23. Handryastuti S, Puspongoro HD, Nurdadi S, Chandra A, Pramita FA, Soebadi A, et al. Comparison of Cognitive Function in Children with Stunting and Children with Undernutrition with Normal Stature. *J Nutr Metab*. 2022 Nov 6;2022:9775727.
24. Sianturi E, Primarti RS, Setiawan AS. A self-reported cross-sectional study on the oral function and the quality of life in children with stunted growth. *Front Pediatr*. 2023 Nov 6;10:1019143.
25. Steyn NP, Nel JH. Prevalence and Determinants of the Double Burden of Malnutrition with a Focus on Concurrent Stunting and Overweight/Obesity in Children and Adolescents. *Curr Nutr Rep*. 2022 Nov 6;11(3):437–56.
26. Atamou L, Rahmadiyah DC, Hassan H, Setiawan A. Analysis of the Determinants of Stunting among Children Aged below Five Years in Stunting Locus Villages in Indonesia. *Healthcare*. 2023 Nov 6;11(6):810. doi.org/10.3390/healthcare11060810
27. Ekholuenetale M, Okonji OC, Nzopotam CI, Barrow A. Inequalities in the prevalence of stunting, anemia and exclusive breastfeeding among African children. *BMC Pediatr*. 2022 Nov 6;22(1):333. doi.org/10.1186/s12887-022-03395-y
28. Laksono AD, Wulandari RD, Amaliah N, Wisnuwardani RW. Stunting among children under two years in Indonesia: Does maternal education matter? *PLoS One*. 2022 Nov 6;17(7):e0271509.
29. Suratni MAL, Putro G, Rachmat B, Nurhayati, Ristrini, Pracoyo NE, et al. Risk Factors for Stunting among Children under Five Years in the Province of East Nusa Tenggara (NTT), Indonesia. *Int J Environ Res Public Health*. 2023 Nov 6;20(2):1640. doi.org/10.3390/ijerph20021640
30. Bhutta ZA, Akseer N, Keats EC, Vaivada T, Baker S, Horton SE, et al. How countries can reduce child stunting at scale: lessons from exemplar countries. *Am J Clin Nutr*. 2020 Sep;112(Suppl 2):894S-904S.
31. Luzingu JK, Stroupe N, Alaofe H, Jacobs E, Ernst K. Risk factors associated with under-five stunting, wasting, and underweight in four provinces of the Democratic Republic of Congo: analysis of the ASSP project baseline data. *BMC Public Health*. 2022 Nov 6;22(1):2422. doi.org/10.1186/s12889-022-14842-x
32. Bella FD, Fajar NA, Misnaniarti M. Hubungan antara Pola Asuh Keluarga dengan Kejadian Balita Stunting pada Keluarga Miskin di Palembang. *J Epidemiol Kesehat Komunitas*. 2020;5(1):15–22.
33. Gaiser ML, Winkler AS, Klug SJ, Nkurunziza S, Stelzle D. Determinants of stunting among children under age five in Burundi: Evidence from the 2016–2017 Burundi Demographic and Health Survey (BDHS 2016–17). *Food Sci Nutr*. 2023 Nov 6;11(7):4100–12.
34. Dewi IC, Auliyah NRN. Penyuluhan Stunting sebagai Sarana untuk Meminimalisir Tingginya Angka Stunting di Desa Gambiran Kecamatan Kalisat. *Jiwakerta J Ilm Wawasan Kuliah Kerja Nyata*. 2020;1(2):25–9.
35. Dewey KG. Reducing stunting by improving maternal, infant and young child nutrition in regions such as South Asia: evidence, challenges and opportunities. *Matern Child Nutr*. 2016 May;12 Suppl 1(Suppl 1):27–38.
36. Mulyani S, Soetrisno, Andayani TR, Perestroika GD. Factors Affecting Village Apparatus, Integrated Service Post and Early Childhood Education in Stunting Prevention. *Ethiop J Health Sci*. 2023 Nov 6;33(2):237–44.
37. Siswati T, Iskandar S, Pramestuti N, Raharjo J, Rubaya AK, Wiratama BS. Drivers of Stunting Reduction in Yogyakarta, Indonesia: A Case Study. *Int J Environ Res Public Health*. 2022 Nov 6;19(24):16497.
38. Bansal A. Is mother's financial autonomy associated with stunting among children aged 7–35 months: An empirical study from India. *PLOS Glob Public Heal*. 2022 Nov 6;2(1):1-18..
39. Haq IU, Mehmood Z, Afzal T, Khan N, Ahmed B, Nawsherwan, et al. Prevalence and determinants of



- stunting among preschool and school-going children in the flood-affected areas of Pakistan. *Brazilian J Biol.* 2022 Nov 6;82:e249971.
40. Shahid M, Cao Y, Ahmed F, Raza S, Guo J, Malik NI, et al. Does Mothers' Awareness of Health and Nutrition Matter? A Case Study of Child Malnutrition in Marginalized Rural Community of Punjab, Pakistan. *Front Public Heal.* 2022 Nov 6;10:792164.
41. Tadele TT, Gebremedhin CC, Markos MU, Fitsum EL. Stunting and associated factors among 6–23 month old children in drought vulnerable kebeles of Demba Gofa district, southern Ethiopia. *BMC Nutr.* 2022 Nov 6;8(1):9.
42. Permatasari TAE, Chadirin Y, Ernirita, Elvira F, Putri BA. The association of sociodemographic, nutrition, and sanitation on stunting in children under five in rural area of West Java Province in Indonesia. *J Public health Res.* 2023 Nov 6;12(3):22799036231197170.
43. Laksono AD, Sukoco NEW, Rachmawati T, Wulandari RD. Factors Related to Stunting Incidence in Toddlers with Working Mothers in Indonesia. *Int J Environ Res Public Health.* 2022 Nov 6;19(17):10654.
44. Ndagijimana S, Kabano IH, Masabo E, Ntaganda JM. Prediction of Stunting Among Under-5 Children in Rwanda Using Machine Learning Techniques. *J Prev Med Public Heal.* 2023 Nov 6;56(1):41–9.
45. Tesfaye A, Egata G. Stunting and associated factors among children aged 6–59 months from productive safety net program beneficiary and non-beneficiary households in Meta District, East Hararghe zone, Eastern Ethiopia: a comparative cross-sectional study. *J Heal Popul Nutr.* 2022 Nov 6;41(1):13.
46. Rachmah DN, Zwagery RF, Azharah B, Azzahra F. Psikoedukasi mengenai stunting pada anak dan peran pengasuhan orangtua untuk meningkatkan pengetahuan mengenai stunting. *Altruus J Community Serv.* 2022;3(1):116–22.
47. Woodruff BA, Wirth JP, Bailes A, Matji J, Timmer A, Rohner F. Determinants of stunting reduction in Ethiopia 2000 - 2011. *Matern Child Nutr.* 2017 Apr;13(2):e12307
48. Rahmadhita K. Permasalahan Stunting dan Pencegahannya. *J Ilm Kesehat Sandi Husada.* 2020;11(1):225–9.