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Literature Review: Stunting Prevention with Environmental and Nutrition in the Prenatal Period

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ABSTRACT

Background: Stunting increases the global public health burden by contributing 45% of all under-five deaths. Children who experience stunting as a result of someone not getting the right amount of nutritional intake for a long period of time (chronic). Thus, stunting can actually be prevented with adequate nutritional intake, especially in the First 1000 Days of Life. The target set by the government through the 2020-2024 National Medium-Term Development Plan (RPJMN) is to reduce the percentage of stunting by 14%. Stunting prevention is more effective in the prenatal period where 80% before stunting occurs, When compared to chasing from stunting to non-stunting, the success is only 20%.
Purpose: This study aims to analyze stunting prevention with enviroinmental and nutrition in the prenatal period.
Methods: The method used in this study is to use a literature study with a search method, combine the results of research and analyze facts from several scientific sources that are accurate and valid.
Results: The results showed that 69% of households defecated in open areas. hazard defecation behavior can cause environmental pollution due to the spread of pathogenic germs from the anus. The kinds of nutritions better consumted by prenatal are Moringa leaves**,** The Tubaramure Food, iron folic acids (IFA), lipid based nutritional supplements (LNS).
Conclusion: The meal preparation, amount of food, energy intake, and protein intake to prevent stunting. We noted there are many kinds of nutrition and supplements such as food from Moringa leaves, Moringa leaf extract supplementation, Moringa powder, and blood-added tablets, IFA, iron and folic acid supplements (IFA), iron supplements, folic acid (IFA), and lipid supplements given to pregnant women can significantly prevent stunting in children. Continuous education and monthly monitoring of pregnant women diet during pregnancy classes at the Posyandu are suggested to prevent stunting in children.

Keywords: environmental, nutition, prenatal, prevention, stunting

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BACKGROUND

Stunting is one of the targets of the Sustainable Development Goals (SDGs) which is included in the second sustainable development goal, namely eliminating hunger and all forms of malnutrition by 2030 and achieving food security. The target set by the government through the 2020-2024 National Medium-Term Development Plan (RPJMN) is to reduce the percentage of stunting by up to 14% (kementerian kesehatan RI, 2021).

Based on the 2021 SSGI results, the national stunting rate has decreased by 1.6 percent per year from 27.7 percent in 2019 to 24.4 percent in 2021. In 2022, SSGI data decreased stunting rate to 21.6%. However, stunting increases the global public health burden by contributing 45% of all under-five deaths. More than two million children under five die each year from malnutrition worldwide. Another impact of stunting is disease, lack of intelligence and productivity which is of course very beneficial for people (García Cruz et al., 2017).

Children who experience stunting as a result of someone not getting the right amount of nutritious food for a long time (chronic). Thus, stunting can actually be prevented with adequate nutritional intake, especially in the First 1000 Days of Life. Community based interventions should be formulated and implemented to improve child health. At the individual level, interventions should focus on increasing the knowledge of pregnant women and mothers with young children about the basics of proper nutrition and the need to utilize available health services. At the community level, health systems that facilitate public health interventions including maternal and child health programs need to be made accessible to women in remote areas. Based on this description, researchers are interested in researching "Literature riveuw: Factors Influencing Stunting Prevention in the Prenatal Period". Prevention in prenatal stunting is more effective where 80% before stunting occurs, when compared to chasing from stunting to not stunting the success is only 20%. Prevention of stunting during the prenataal period is carried out by examining pregnant women, so that routine checks during pregnancy are one of the early detection and strategies in preventing stunting (Sumiati et al., 2020) Efforts to prevent stunting must be carried out together to achieve the targets that have been set, one of which starts from the smallest unit in society, namely the family, the family is a key actor in overcoming the causes of stunting. Families must have understanding and awareness in stunting prevention efforts. If you do not understand, it is necessary to be given understanding and if you are not aware then it is necessary to be given special counseling guidance on nutrition, especially in the prenatal period (Ipan et al., 2021).

METHODS

The method used in this research is a Literature Review Study. There are several steps carried out in this literature review, This review analyzed stunting prevention with Environmentaland nutrition in prenatal period and after complete screening only 10 articles were analyzed

RESULTS

This review analyzed environment and nutrition for pregnant women to prevent stunting. A total of 1.738 published articles were identified. After the initial screening 95 articles were removed for duplication and 1.600 articles were removed for not meeting the criteria. 23 articles were excluded and three articles were not taken and after complete screening only 10 articles were analyzed.

Based on the stages that have been carried out, 10 articles were found that met the inclusion criteria and met the objectives of the literature review. Then further analysis was carried out to obtain information regarding stunting prevention with environment and nutrition

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in the prenatal period. Of the 10 articles, four relate to stunting prevention with the environment, six articles relate to stunting prevention with food, where the articles come from Africa, Ethiopia, Indonesia, Bangladesh, Guatemala and Nepal. The results of this analysis are listed in table 1.

Table 1: Article summary

No	title	Objective study	Place	Design	Subject	Data collection tecniques	Finding
1	Impact of air pollution on stunting among children in Africa (deSouza et al., 2022)	The aim of this study was to evaluate the relationship of prenatal and early life exposure to PM2.5 and child malnutrition as captured by high-for-age zscores (HAZ), and stunting in 32 countries in Africa	Africa	Randomized controlled trials	The sample in this study was 264,207 toddlers	observational analytic research using a cohort research design	There is a relationship between in utero and early life exposure to PM 2.5 as an important sign of malnutrition in childhood.
2	Factors associated with stunting: gut inflammation and child and maternal-related contributor	The purpose of this study was to determine the relationship between intestinal inflammation and	Ethiopia	Randomized controlled trials	The sample in this study were 82 toddlers	observational analytic research using cross sectional research design.	There is a relationship between intestinal inflammation due to diarrheal infectious

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	s among under-five children in Hawassa City, Sidama Region, Ethiopia (Lefebo et al., 2023)	stunting in toddlers					diseases caused by environmental enteric dysfunction and the incidence of stunting in toddlers
3	Geographical Weighted Regression of Risk Factor of Stunting in Malang Regency, Indonesia (Yudono et al., 2021)	The aims of this study is to analyze the effect of spatially correlated sanitation risk on the incidence of stunting in toddlers in Malang, Indonesia.	indonesia	observational analytic research using a cohort	The sample in this research is 3000 respondents.	observational analytic research using cohort	Research states that environmental factors related to stunting, namely environmental drainage (greywater), solid waste, and domestic waste water (black water), according to researchers of a clean and healthy lifestyle and water sources have a smaller influence on sanitation risks. This study explain

							that sanitation has an important influence on the incidence of stunting.
4	Stunting among children aged 24–59 months and associations with sanitation, enteric infections, and environmental enteric dysfunction in rural northwest Ethiopia" (Gizaw et al., 2022)	This study was conducted to assess the relationship between stunting and sanitation, enteric infections, and EED in children aged 24–59 months in rural north western Ethiopia.	ethiopia	l analytic research using cross sectional research design	The sample in this study was 224 children aged 24-59 months in rural areas in the eastern Dembiya district that randomly selected	observational analytic research using cross sectional research design.	Research shows that poor food intake, the practice of hazard defecation, animal waste in living environment, sources of drinking water, and environmental enteric dysfunction are the causes of stunting in toddlers.
5	Prenatal supplementation with multiple micronutrient supplemen	The aim was to compare the effect of prenatal MMS, medium	Niger	Compared with IFA, MMS and MQ-LNS	1144 women	Pregnant woman received Nutritional supplements	Audiovisual education is proven to increase knowledge of stunting

	ts or medium quantity lipid – basednutrient supplements has limited effect on child growth up to 24 months in rural Niger (Olney et al., 2018)	quantity LNS (MQ-LNS), and IFA on child growth up to 2 y of age				weekly until delivery, and children were followed up monthly 6-8 wk to 24 mo of age	from 50% to 78.6%
6	Prevention stunting from an early age with nutritious food for pregnant women (Sukmawati et al., 2021)	To increase the knowledge of pregnant women regarding the need for good nutrition during pregnancy and increase the skills of pregnant wo men in managing nutrient-rich foods	Indonesia	Education with lectures and demonstrations	40 pregnant women	Food recall technique	There is an improvement in the diet of pregnant women after being given education with food recall. There is an increase in knowledge about nutrition as indicated by the accuracy of pregnant women in answering questions from health wokers
7	Iron-Folic Acid Supplementation During	To investigate the effect of antenatal	Nepal	Studi kohort retrospektif	5235 most recent live births 2 years prior	Interview from three Nepal Demographic and	The adjusted relative risk of being

Pregnancy Reduces the Risk of Stunting in Children (Nisar et al., 2016)	iron-folic acid (IFA) supplementation on child stunting in Nepalese children age		Health Surveys (2001, 2006 and 2011)	stunted was 14% lower in children whose mothers used IFA supplements compared to those whose mothers did not use (aRR = 0.86, 95% CI = 0.77–0.97). Additionally, the adjusted relative risk of being stunted was significantly reduced by 23% when antenatal IFA supplementation was started ≤6 months with ≥90 IFA supplements used during pregnancy (aRR = 0.77, 95% CI = 0.64–0.92). Antenatal IFA

							supplementation significantly reduced the risk of stunting in Nepalese children age
8	Lipid-based nutrient supplements for pregnant women reduce newborn stunting in a cluster-randomized controlled effectiveness trial (Mridha et al., 2016)	To evaluated the effect of lipidbased nutrient supplements for pregnant and lactating women (LNS-PLs) on birth	Bangladesh	Randomized controlled trials	4011 pregnant womwn with 20 weeks gestation	To performed by 2 separate teams: the "SDU visit team," which collected clinical and anthropometric data at the SDU, and the "home visit team," which enrolled mothers and collected baseline and follow-up data at participants' homes	Infants in the LNS-PL group had higher birth weights, weight-for-age z scores, head-circumference-forage z scores and body mass index z scores ($p < 0.05$). The effects of LNS-PL on newborn stunting were greatest in infants born before a 10-wk interruption in LNS-PL distribution (n = 1301; 15.7%)
9	PROCOMIDA, a Food-Assisted	To evaluated the impact of an FA-	Guatemala	Randomized controlled trials	All pregnant women served by	Survey and interview	It was possible to significantly improve

	Maternal and Child Health and Nutrition Program, Reduces Child Stunting in Guatemala : A Cluster-Randomized Controlled Intervention Trial (Olney et al., 2018)	MCHN program, PROCOM IDA, on linear growth (stunting [length-for-age z score (LAZ) < –2] and length-for-age difference [LAD]) among children aged 1–24 mo. PROCOM IDA was implemented in Guatemala by Mercy Corps and was available to beneficiaries throughout the first 1000 day			PROCOM IDA's 100 health convergence centers are eligible. 120 (out of 215) eligible health convergence centers were stratified by size and randomly assigned to 1 of 6 study groups.		linear growth and reduce stunting in the first 1000 day through a well-designed FA-MCHN program that targeted mothers during pregnancy and the child up to 24 mo of age.
10	Effects of prenatal multiple micronutrient supplementation on growth and cognition through 2 years of age in rural Banglades	To assessed the effects of prenatal multiple micronutrient (MM) supplementation on child growth and cognitive developme	Bangladesh	Cluster Randomized Control Trial	8529 children with a subsample of 754 from newborns to children aged 24 months	Observation	Giving multiple micronutrient to mothers before and after giving birth can increase LAZ to reduced stunting

h: the JiVitA-3 Trial (Christian et al., 2016)		until the age of 4–4 months (p < 0.001)

DISCUSSION

Research states that there are 81% of E-coly bacteria found in drinking water sources, inadequate drinking water sources are a risk factor of stunting (OR = 4.2) The results showed that 69% of households defecated in open areas. Research states that the practice of haphazard defecation in open area is associated with the incidence of stunting in toddlers. Haphazard defecation behavior can cause environmental pollution due to the spread of pathogenic germs from the anus, if these germs are touched by a child in growth period that has behavior putting his finger in his mouth can cause the child to consuming a number of bacteria which can infect the intestines. Intestinal infection conditions can be diarrhea and Environmental Enteric Dysfunction (EED) that can affect the nutritional status of children by reducing appetite, interfering with nutrient absorption which causes children to experience malnutrition and growth disorders. The results of the study stated that the practice of haphazard defecation is a risk factor for stunting (OR=3.0) (Gizaw et al., 2022).

Sanitation and environmental factors affect the health of pregnant mother and also the growth and development of children because children under 2 years are very vulnerable to exposure to various diseases. Exposure to animal feces that enter the mouth of a toddler while playing if it occurs continuously can increase bacterial infections which make it difficult for the body to absorb nutrients. The growth of brain cells which should be growth very rapid in the first two years of birth is hampered, the impact is that the child is at risk of suffering from stunting which results in impaired mental and physical growth so that the child's potential cannot develop optimally. Research states that there is 76% of animal waste in residents' homes, and research concludes that there is a significant relationship between the presence of animals in the neighborhood and the incidence of stunting [OR = 3.4] (Nur Amalia et al., 2023).

Particulate Matter (PM 2.5) are air particles smaller than or equal to 2.5 µm (micrometer). PM 2.5 concentration was measured using the Beta Attenuation Monitoring method with units of micrograms per cubic meter (µm/m3). Exposure to PM 2.5 in Africa is relatively high, research states that PM 2.5 is a risk factor for stunting in Africa (deSouza et al., 2022)

Household waste protection is carrying out waste management activities in the household by prioritizing the principles of reducing, reusing, and recycling. The review of household waste protection is to avoid unsafe waste storage, which is the collection, transportation, processing, recycling or disposal of waste material in a way that endangers public health and environment. Research has found that there is a significant relationship between household waste and the incidence of stunting.(Lefebo et al., 2023).

Clean and healthy behavior is health behavior that is carried out because of personal awareness that the family and all the members are able to help themselves in the health sector and have an active role in community activities. Clean and healthy behavior is basically an effort to pass on experiences regarding healthy behaviors through individuals, groups or the wider community with communication line as a medium for sharing information. There is a variety of information that can be shared such as educational materials to increase

knowledge and improve attitudes and behavior related to a clean and healthy life. Clean and healthy behavior is a social engineering to make as many members of the community as agents of change so that they are able to improve the quality of daily behavior to have a clean and healthy life. Research states that there is a significant relationship between clean and healthy behavior and the incidence of stunting in toddlers (Yudono et al., 2021).

The main study findings of this study are summarized in Table 1. There were 13 studies conducted in 11 different countries; Indonesia (n = 1), Nepal (n = 1), Bangladesh (n = 2),Guatemala (n=1) The findings from the main studies are summarized in Table 1. There were 13 studies conducted in 11 different countries; most of the research was conducted on pregnant women (n = 7), pregnant women and newborns as well as pregnant women and children under two (n = 5). Most of the studies had a randomized control trial (RCT) (n=7), cross-sectional (n = 1), quasi-experimental (n = 3), retrospective (n = 1), and experimental (n = 1) cohort. The sample size ranged from 15 to 96,512 respondents. The main results selected in the study we found three articles on providing education and ten provision of nutrition and supplements to prevent stunting (Jaacks et al., 2019).

Moringa leaves for pregnant Moringa Ice Cream: Product Innovation as an Effort to Prevent Stunting in the First 1000 Days of Life (Hpk) in pregnant women. Moringa leaf extract given during pregnancy is proven to be more effective in preventing stunting in children aged 36–42 months because the nutrients contained in Moringa leaf extract are abundant and varied, such as fat, Vitamin A, Vitamin C, and selenium. Giving Moringa extract to pregnant women provides an abundant supply of micronutrients including Fe, Vitamin A, Vitamin C, and selenium during pregnancy. Therefore, mothers who consume Moringa are filled with micronutrients, such as Fe in Moringa extract which increases hemoglobin in pregnant women and prevents DNA damage due to oxidative stress (Lefebo et al., 2023).

Iron Folic Acid SupplementationduringPregnancy Reduces the Risk of Stunting in Children <2 years of Age. The results of the study show that antenatal iron folic acid (IFA) supplementation significantly reduces the risk of stunting in Nepalese children aged <2 years. The greatest impact on reducing the risk of child stunting was when IFA supplements were started at 6 months with 90 supplements used. Maternal use of IFA supplements during pregnancy significantly reduced the adjusted risk of stunting by 14% compared to mothers who never used supplements (Yudono et al., 2021). The results of this study are in line with Kusmawati's research (2017) Prenatal lipid based nutritional supplements can increase birth rates in women, especially those who are at higher risk of developing fetal growth restriction. LNS contains vegetable fat, peanut or peanut paste, and powdered milk and sugar; other ingredients include whey, soy protein isolate, sesame, cashew nuts, and chickpea paste which are used to treat moderate and severe acute malnutrition in infants and young children (Mohammad et al., 2022).

The FA-MCHN and nutrition program can encourage a child's growth during the first 1000 days (pregnancy and the first 2 years of a child's life). The FA-MCHN program can reduce stunting during the first 1000 days, even in populations that are relatively energy/food safe. Large family rations with individual CSB or MNP rations are most effective. The widespread impact as children age highlights the importance of intervening during the full first 1000 days (Olney et al., 2018).

Prenatal Iron-Folic Acid Supplementation Is Associated with Improved Linear Growth and Reduced Risk of Stunting or Severe Stunting in South Asian Children <2 Years of Age: A Pooled Analysis from Seven Countries, The results of this study explain that stunting and low birth weight are health problems that often occur in children. Stunting in children shows poor nutrition and frequent infections before and after birth which can cause a decline

in cognitive function and socio-economic development. Globally, 1 in 5 pregnant women has anemia caused by iron deficiency. In several studies, it has been proven that not only to treat anemia, but IFA supplements are related to baby's weight at birth. A pooled analysis conducted in Nepal found that taking IFA supplements during pregnancy Asia, IFA antenatal supplementation could reduce the risk of stunting in children <2 years of age by 8% and reduce the severity of stunting by 9%. Consumption of 120 supplements and added IFA supplements during pregnancy at 1–4 months of gestation can reduce the risk of stunting by 14% and increase body length/age results higher. If only IFA supplements are taken at 1–4 months of gestation, the risk of stunting can be reduced by only 10% (Yudono et al., 2021).

LNS in the first 1000 day improves child growth in Bangladesh: A cluster-randomized effectiveness trial, stated that stunting in children is a health problem with a high prevalence that is associated with developmental disorders, increased mortality due to infection, and adverse consequences when children grow up. This study aims to evaluate the effectiveness of community- based programs as prevention of maternal and child malnutrition within 1000 days of birth. A common program is the provision of nutritional supplements as complementary foods for infants and children. Research using a mixture of micro and macro nutrition products shows a positive effect on children's growth. Lipid based supplements as additional nutrients play an important role in brain development, immune function and child growth, so that the administration of lipid-based supplements given to mothers and children during the first 1000 days of life can increase growth so that it can be prevented (Mridha et al., 2016).

Iron-folic acid supplementation Stunting occurs due to lack of nutrition during pregnancy and the failure of the baby's growth to contribute to the risk of stunting in the first 2 years of a child's life. From research conducted in the past three decades, it was found that there are three nutrients that can increase birth weight and reduce the risk of a child being smaller than gestational age so as to prevent stunting. These nutrients are supplements with balanced protein and energy, IFA supplements, and micronutrient supplements. In this study, giving micronutrient supplements to mothers in the pre and postnatal period can increase body length/age in children born and reduce stunting at the age of 3 months of birth (Christian et al., 2016).

CONCLUSION

The results of this review study stated that environmental factors associated with the incidence of stunting were sources of drinking water, the practice of haphazard defecation, the presence of animal feces in living environment, environmental enteric dysfunction, the availability of proper toilet and the practice of washing hands with soap when feeding children. Exposure to cigarette smoke, exposure to PM 2.5, household waste and clean and healthy behavior. From this systematic review, it was found that the most dominant factor was the source of drinking water.

The meal preparation, amount of food, energy intake, and protein intake to prevent stunting. We noted there are many kinds of nutrition and supplements such as food from Moringa leaves, Moringa leaf extract supplementation, Moringa powder, and blood-added tablets, IFA, iron and folic acid supplements (IFA), iron supplements, folic acid (IFA), and lipid supplements given to pregnant women can significantly prevent stunting in children. Continuous education and monthly monitoring of prenatal diet during pregnancy classes at the Posyandu are suggested to prevent stunting in children.

CONFLICTS OF INTEREST

Commitment, participation and involvement of state administrators, special attention to certain matters, preventive steps, policy enforcement are driving forces to accelerate the reduction of stunting.

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