

PRACTICES OF PROVIDING MPASI AGAINST STUNTING INCIDENTS

Ayu Idaningsih¹, Ruri Yuni Astari², Heni³, Rina Nuraeni⁴
Universitas Yayasan Pendidikan Imam Bonjol^{1,2,3,4}
ayuidaningsih2011@gmail.com¹

ABSTRACT

This study aims to determine the practice of providing complementary foods in preventing stunting. This research method uses a scoping review to explore more widely the practice of providing complementary foods in preventing stunting in Indonesia. Of the 10 articles considered eligible for review by researchers, the results of the study showed that most subjects in the stunting and non-stunting groups received their first complementary foods at the age of less than six months. Children who received low variations of complementary foods were more often found in the stunting group, while the frequency of low consumption of complementary foods occurred in both groups of subjects aged 9-24 months. The average intake of energy, protein, iron, and zinc differed significantly between the stunting and non-stunting groups aged 6-24 months. In conclusion, it is necessary to increase the variety of complementary foods, consumption of animal food sources, and frequency of consumption in early childhood so that the needs for energy, protein, iron, and zinc intake can be met.

Keywords: Complementary foods, Linear Growth, Stunting

INTRODUCTION

2020 UN statistics record that more than 149 million (22%) toddlers worldwide experience stunting, of which 6.3 million are young children or stunted toddlers, namely Indonesian toddlers. Indonesia is the country with the fifth highest burden of stunting in the world, with a prevalence of 36% in children under 5 years of age (Unicef, 2020). Currently, the prevalence of stunting in Indonesia is 21.6%, while the target to be achieved is 14% by 2024 (Eco, 2023). According to UNICEF, stunting is caused by children being malnourished within two years of their age, mothers lacking nutrition during pregnancy, and poor sanitation (Unicef, 2020). According to WHO undernutrition underlies 45% of child deaths in children <5 years, although mortality rates have been described as the 'tip of the iceberg' of malnutrition. Stunting more broadly hampers the developmental potential and human capital of entire societies due to its long-term impact on the cognitive functioning and economic productivity of adults; Therefore, it is considered the best surrogate marker of child health disparities.

The importance of reducing stunting is that the number one goal of the WHO 2025 Global Nutrition Target is reducing stunting in the first 5 years of life. Babies and children are at risk of stunting from the age of six months onwards, namely when breast milk alone is not enough to meet the needs of all nutrients and it is necessary to start providing complementary breast milk (MPASI). Improving the nutritional status of stunted children is very possible. This is achieved through several factors including maternal factors through the mother's education level and height, economic status, socio-culture, nutritional supplementation, and community-based interventions.

Improving nutritional status in children is related to the type of food consumed, especially related to eating patterns based on certain ethnicities due to differences in food choices. In Indonesia, consumption of animal protein sources tends to be low (Utami & Nurhaeni, 2021). Therefore, additional food rich in protein needs to be consumed to meet nutritional needs and overcome stunting (Endrinikapoulos et al., 2023).

Inadequate intake of macro and micro nutrients can disrupt the growth and development process of toddlers and result in stunting. One of the macronutrients that plays an important role in preventing stunting is protein. Protein acts in the process of growth and maintenance of body tissue and replaces damaged cells. If protein intake is inadequate during the toddler's growth period, the toddler's growth and development process can be delayed and stunting nutritional problems can arise. The level of adequate protein nutrition is related to the incidence of stunting (Wulandari & Muniroh, 2020).

Giving MPASI to babies less than six months old can cause babies to suffer from diarrhea and constipation compared to babies who only get exclusive breast milk (Rosita, 2021). If protein intake is lacking, there is a greater risk of experiencing stunting. The correct frequency of giving MP-ASI and in accordance with the child's development and growth can reduce the rate of stunting. The frequency of giving non-standard MP-ASI is significantly related to the incidence of stunting (Virginia et al., 2020).

Stunting has short-term and long-term adverse consequences, including impaired motor and neuro-cognitive development, poor educational achievement, and in adulthood, lower wages and productivity (Hazard et al., 2019). It is further related to increased morbidity, mortality and risk of chronic diseases in adults as well as a reduction in the potential for physical growth and neurological development which has an impact on the quality of future generations (Endrinikapoulos et al., 2023).

Stunting is a health problem that has an impact on the growth and development of toddlers in Indonesia. The prevalence has shown a decline, however, the stunting rate is still high. Many studies have been carried out, but most of them focus on partial studies such as nutritional and family socio-economic factors. The novelty of this study is that it examines the implementation of MPASI which is currently being intensively implemented by the government. In connection with the description above, this research aims to provide an overview of MPASI in preventing stunting in Indonesia.

METHODS

This literature study uses a *scoping review approach* to analyze the effectiveness of empowering health cadres in handling stunting in toddlers. The *scoping review* approach is considered to be able to represent the author in studying this matter more deeply and to answer the author's previously determined questions. *Scoping reviews* come from various research sources that have similar topics that are collected and conclusions are made.

In setting research questions, the author refers to *the Population, Exposure and Outcome* (PEO) framework. The research question for this scoping review is "Type, frequency, quality and timing of good MPASI implementation in preventing stunting in Indonesia?"

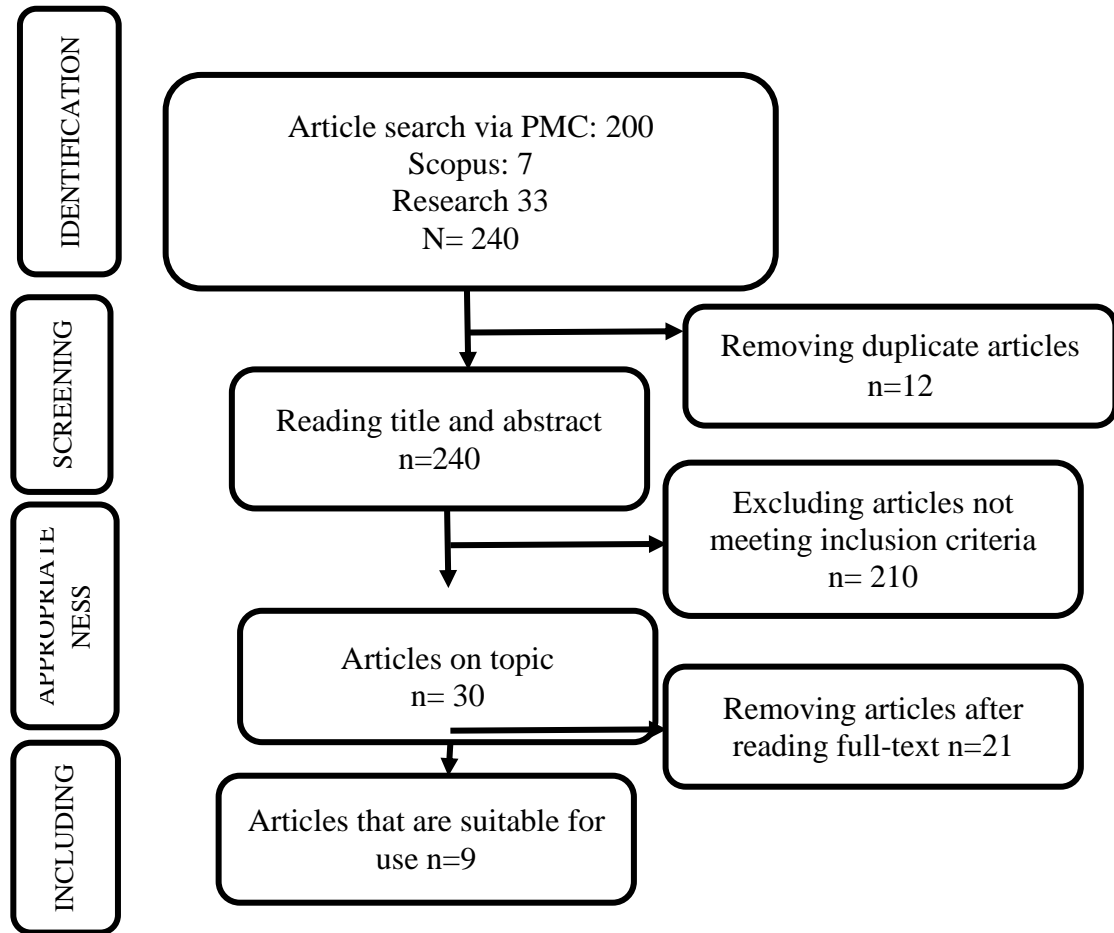


Figure. 1
Flow Diagram of the Article Search Process

At this stage, the author filters the literature obtained from various article search engines using previously determined keywords. The total number of articles obtained was 240 articles with details from each search engine, namely from PMC 200 articles, SCOPUS 7 articles, and Neliti 33 articles.

In preparing this scoping review, the author documented the literature search in the *preferred reporting items for systematic reviews and Meta-Analyses (PRISMA)* guidelines. The author also attached the literature selection flow to the PRISMA diagram to identify the number of literature from the search results, the screening process, the number of studies that met the eligibility criteria, and the number of articles included in the comprehensive review (Figure 1).

RESULTS

Table. 1
Data Extraction

Writer	Year	Objective	Results
Wulandari & Muniroh, The relationship between the level of nutritional adequacy, the level of maternal knowledge, and the	2020	Analyzing the relationship between the level of nutritional adequacy, the mother's level of knowledge and the parent's height with the incidence	The level of nutritional adequacy (energy, protein, calcium) and the level of knowledge of mothers in non-stunting toddlers are better than stunting toddlers aged 24-59 months

height of parents with the incidence of stunting in toddlers in the working area of the Tambak Wedi Community Health Center, Surabaya		stunting in toddlers at the Tambak Wedi Community Health Center	
Bogale et al., Prevalence of Stunting and Its Associated Factors among Children of 6–59 Months in Arba Minch Health and Demographic Surveillance Site (HDSS), Southern Ethiopia: A Community-Based Cross-Sectional Study	2020	assessed the prevalence of stunting and associated factors among children aged 6–59 months at the Arba Minch Health and Demographic Surveillance Site, Southern Ethiopia	Stunting is a serious public health problem in the region. Therefore, efforts must be made to improve maternal empowerment, household welfare, and feeding practices for infants and children to reduce stunting in children.
Amalia et al., Associations of Complementary Feeding Practice History and Protein Adequacy Level with Childhood Stunting in the Working Area of Bantaran Community Health Center in Probolinggo Regency	2022	to analyze the relationship between the practice of providing complementary breast milk (MP-ASI) and the level of protein adequacy with the incidence of stunting in toddlers in the working area of the Bantaran Community Health Center, Probolinggo Regency, East Java	The conclusion of this research is that toddlers with inappropriate MP-ASI feeding practices have a 7.87 times risk of experiencing stunting and toddlers with a sufficient level of protein deficit have a 6.5 times risk of experiencing stunting.
Uwiringiyimana et al., Predictors of stunting with particular focus on complementary feeding practices: A cross-sectional study in the northern province of Rwanda	2018	to examine factors associated with stunting in the northern provinces of Rwanda by assessing anthropometric status, food intake and overall complementary feeding practices.	Interventions that focus on optimal nutrition at the complementary feeding stage, exclusive breastfeeding, and the use of deworming tablets have the potential to significantly reduce stunting in children in the northern provinces of Rwanda.
Qolbiyah et al., The Relationship between Feeding Practices and Stunting Incidents in Toddlers at the Barong Tongkok Community Health Center, West Kutai Regency	2021	to determine the relationship between feeding practices and the incidence of stunting in toddlers at the Barong Tongkok Health Center, West Kutai	There is no relationship between the frequency, type, amount and practice of feeding and the incidence of stunting. Providing adequate nutritional food in a short period of time results in inadequate nutritional intake
Haszard et al., Development of a nutrient quality score for the complementary diets of Indonesian infants and relationships with linear growth and	2019	to develop a nutritional quality score using principal component analysis (PCA) on a sample of Indonesian infants aged 6, 9 and 12 months and to evaluate the	Eight correlated nutrients (vitamin A, ascorbic acid, thiamine, riboflavin, niacin, Ca, Fe and Zn) were summarized using PCA into a single nutrient pattern that explained 56-65 % of the total variability. Nutritional quality

stunting: a longitudinal analysis		relationship of this score with linear growth and stunting	scores were associated with demographic, inflammatory and complementary feeding indicator variables in the hypothesized directions. Although no significant association was seen with linear growth, the odds of stunting at 9 and 12 months of age were lower in infants with higher nutritional quality scores at 9 months of age (OR 0.75, 95 % CI 0.59, 0.95 and OR 0.69, 95 % CI 0.55, 0.88), respectively, for the fully adjusted model. A nutritional quality score based on data is a valid tool for assessing the effect of nutritional quality on stunting in at-risk babies.
Hartini et al., The Relationship between the Practice of Providing Complementary Foods for Breast Milk in Children and the Incident of Stunting	2022	Rejosari Health Center	The results of this study show that there is a relationship between the age of first administration (p=0.006) and the incidence of stunting, while the frequency (p=0.815), texture (p=0.681), dose (p=0.695) and content (p= 0.374) show there is no relationship. with stunting incidents. In this study, it can be concluded that complementary breastfeeding given to children must be age appropriate so that it can reduce the incidence of stunting in children.
Resti et al., Providing Complementary Food for Breast Milk (MP-ASI) is Associated with the Incident of Stunting in Toddlers	2021	to determine the relationship between providing complementary breast milk (MP-ASI) and the incidence of stunting in mothers with children aged 7-24 months at the Hanura Teluk Pandan Health Center, Pesawaran Regency	There is a relationship between providing complementary breast milk (MP-ASI) with the incidence of stunting in toddlers in the working area of the Hanura Community Health Center, Teluk Pandan District, Pesawaran Regency in 2020
Andriani et al., Description of Mother's Characteristics, Knowledge, and Practices of Providing Complementary Feeding with Breast Milk to Babies in Pontianak City	2021	As a first step in preventing stunting, a survey was conducted to determine the characteristics of mothers, knowledge and practices of giving MPASI to babies in the city of Pontianak.	Mothers' lack of knowledge regarding the latest evidence-based practice of giving MPASI is still the main cause of suboptimal MPASI practice.
Garcia et al., An Exploration of Complementary Feeding Practices, Information Needs and Sources	2019	to explore complementary feeding practices (MP-ASI), information needs, and channels used to obtain information among parents living in areas of socioeconomic deprivation	Our findings showed that parents in NL had introduced foods earlier than the recommended 6 months of age, fed infants commercial foods, fruits and vegetables, and rarely used vitamin and mineral supplements.

Characteristics

Table. 2
Article Characteristics

Characteristics	Article
Language	
a. Indonesia	(1), (5), (7), (8), (9)
b. English	(2), (3), (4), (6), (10)
Publication Year	
a. 2018	(4)
b. 2019	(6), (10)
c. 2020	(1), (2)
d. 2021	(5), (8), (9)
e. 2022	(3), (7)
Location	
a. Indonesia	(1), (5), (7), (8), (9), (6)
b. International	(2), (3), (4), (10)

MPASI Analysis

Table. 5
Themes and Sub-Themes

Theme	Subtheme	Information
MPASI	Precatics of Giving MPASI	All Selected Journals
	Frequency of Giving MPASI	All Selected Journals
	Types of MPASI Giving	All Selected Journals
	Quality of MPASI Provision	All Selected Journals
	Time to give MPASI	All Selected Journals

Based on the table above, it is known that one of the efforts to prevent stunting is by providing MPASI after 6 months. MPASI to prevent stunting is given with good quality, the right frequency and given after 6 months. Apart from that, other MPASI factors that can influence stunting include the mother's knowledge about stunting, family economics and the environment.

Based on the results of screening and determining the suitability of articles, 10 articles were found that were suitable for deeper study. The articles reviewed used observational, cross-sectional, longitudinal, analytical and experimental studies. The results of the study are explained in table 1 data extraction.

Journal 1 examines the level of nutritional adequacy, mother's level of knowledge, and parent's height with the incidence of stunting in toddlers. The nutritional intake of toddlers was obtained using the SQ-FFQ form and the research findings explained that almost all stunted toddlers had insufficient energy levels. This is caused by low awareness of mothers of toddlers, which is characterized by allowing their children not to eat because they are busy playing. Most stunting sufferers get MPASI before 6 months.

DISCUSSION

The second journal examines stunting from the socio-economic aspects of the family, exclusive breastfeeding, decision making in the family. The research findings explain that the risk of stunting is significantly higher in children who live in households with moderate wealth

status, children who are not exclusively breastfed, and whose mothers do not participate in major household purchasing decisions. The recommendations put forward by researchers to prevent stunting are by increasing maternal empowerment, household welfare, and providing food to babies and children (Bogale et al., 2020).

The third journal examines the history of giving MPASI and the level of protein adequacy with the incidence of stunting in Probolinggo. The research, which was conducted with a sample size of 44 people, used an analytical observational method with a retrospective design and case control. The research findings show that toddlers who are given inappropriate complementary foods have a 7.87 times higher risk of experiencing stunting and toddlers with sufficient levels of protein deficit have a 6.5 times higher risk of experiencing stunting. Mothers must be able to increase the amount of protein intake and provide appropriate complementary foods for breast milk. The recommendations given are increasing the amount of protein intake and providing appropriate complementary foods for breast milk (Amalia et al., 2022).

The fourth journal examines the factors associated with stunting in the northern provinces of Rwanda by assessing anthropometric status, food intake and overall complementary breastfeeding practices. This research is a cross-sectional study involving 138 children aged 5 to 30 months. A structured questionnaire was used to collect information on each mother's and child's sociodemographic characteristics as well as breastfeeding and complementary feeding practices. Anthropometric status was assessed using height-for-age z scores for children and body mass index for caregivers. Food intake was estimated using a 24-hour recall. Multiple linear and logistic regression models were carried out to study the predictors of height z score on age and stunting. Research findings include that exclusive breastfeeding and the use of deworming tablets in the previous 6 months significantly reduce the possibility of stunting in children. In addition, caregivers' body mass index and dietary zinc intake ($\beta = 1.89 \text{ mg/day}$) were positively associated with height-for-age z scores. So the research concluded that interventions focusing on optimal nutrition at the complementary feeding stage, exclusive breastfeeding, and the use of deworming tablets have the potential to significantly reduce stunting in children in the northern provinces of Rwanda (Uwiringiyimana et al., 2019).

The fifth journal examines feeding practices and the incidence of stunting in toddlers. The research was conducted using an analytical observational design with a case control method. Data was obtained from questionnaires and patient data at the Barong Tongkok Community Health Center using a purposive sampling technique to obtain 32 cases and 32 controls. The findings show that there is no relationship between the frequency, type, amount and practice of feeding and the incidence of stunting. Providing adequate nutritional food in a short period of time results in inadequate nutritional intake (Qolbiyah et al., 2021).

The sixth journal develops nutritional quality scores for complementary foods for breast milk for babies in Indonesia and infrastructure with linear growth and stunting: longitudinal analysis. This is based on plant-based diets in low-income countries, deficiencies in some micronutrients that inhibit growth can contribute to stunting. Complementary food intake was assessed using 2-day weighed food records. Eight nutrient deficiencies (vitamin A, ascorbic acid, thiamine, riboflavin, niacin, Ca, Fe and Zn) were summarized using PCA into a single nutrient pattern that explained 56–65% of the total variability. Nutritional quality scores were associated with demographic, inflammatory and complementary feeding indicator variables in the hypothesized directions (Haszard et al., 2019).

The seventh journal examines the relationship between the practice of giving complementary breast milk to children and the incidence of stunting. The research was conducted using a cross sectional approach, with a sample of 150 mothers with children aged 6-24 months and recruited using a purposive sampling method. The results of the study explain

that there is a relationship between the age of first administration and the incidence of stunting, while the frequency, texture, dosage and content show that there is no relationship with the incidence of stunting. In this study it can be concluded that complementary breastfeeding given to children must be age appropriate so that it can reduce the incidence of stunting in children (Zulfa, 2024; Afriyani et al., 2022).

The eighth journal examines Providing complementary foods for breast milk (MP-ASI) is related to the incidence of stunting in toddlers. This quantitative research uses a cross sectional design and the population of this study is mothers who have toddlers aged 7-24 months in the Hanura Community Health Center working area with a total of 41 respondents using a total sampling technique. The findings of this research are that there is a relationship between the provision of complementary breast milk (MP-ASI) and the incidence of stunting among toddlers in the working area of the Hanura Community Health Center, Teluk Pandan District, Pesawaran Regency in 2020. Suggestions are for the Hanura Health Center, Teluk Pandan District, Pesawaran Regency to increase its outreach program to the community, especially in mothers who have toddlers to prevent stunting in the future (Resti et al., 2021).

The ninth journal examines maternal characteristics, knowledge and practice of providing complementary foods with breast milk to babies in Pontianak City. This research used a cross-sectional study conducted in November-December 2018 at three Pontianak City District Health Centers. Sampling and primary data were collected using consecutive sampling methods, interviews and filling out questionnaires. The results of the research explain that mothers' lack of knowledge regarding the latest evidence-based practice of providing MPASI is still the main cause of MPASI practices that are not yet optimal. Comprehensive educational interventions through mobile media are needed to optimize the practice of providing MPASI by mothers (Andriani et al., 2021).

The tenth journal examines the exploration of complementary breastfeeding practices, needs and sources of information. Study findings showed that parents in NL had introduced foods earlier than the recommended age of 6 months, fed babies commercial foods, fruits and vegetables, and rarely used vitamin and mineral supplements. Parents also have very specific information needs that are currently met through non-evidence-based sources, such as online media. Parents provided a range of suggestions which can be used to inform the development of resources to complement the advice provided by official sources such as the NHS (Garcia et al., 2019).

Time to Give MPASI

As this research shows, the possibility of stunting is more common in children who are not exclusively breastfed in the first six months. This can be explained because giving any complementary food before the age of six months can cause diseases such as diarrhea and lower respiratory tract infections, due to the immaturity of the child's digestive and immune systems Bogale et al., (2020) and has a 2.8 times risk of becoming stunted. (z score <-2). This means that the time to start giving MP-ASI is significantly related to the incidence of stunting (Wandini et al., 2021; Uwiringiyimana et al., 2019). Explains that in babies who received exclusive breast milk and early MPASI compared to babies who received MPASI at the age of 4-6 months, waist circumference, back fat mass, body mass index and whole body fat percentage were found to be higher. high in childhood and early adolescence (Andriani et al., 2021).

The results of this research are strengthened by the results of research by Virginia (2019) which explains that there is a relationship between the age of first giving complementary foods and the incidence of stunting in children aged 6-24 months ($p=0.002$), showing an OR value=4.583 so that giving Complementary breast milk foods that are not age appropriate have

a 4.6 times risk of stunting compared to age appropriate foods (Afriani et al., 2022). The reasons for giving food to children before the age of 6 months are mainly because the child wants to eat, is sick, or suffers from colic (Uwiringiyimana et al., 2019).

Frequency of Giving MPASI

If providing complementary food in a day is sufficient, but a small amount cannot meet the child's energy and nutritional requirements. So, to meet energy and nutritional requirements, babies must be given food with a higher nutritional and energy content and fed more frequently. At a baby's age, the stomach is still small, therefore the portion at each meal should not be too large so that babies can eat more often than adults (Afriani et al., 2021). Children who have stopped breastfeeding should eat at least 4 times. The energy intake requirements for each subject are calculated using the Nelson formula, while the iron and zinc intake requirements refer to the 2013 Nutritional Adequacy Rate (AKG) according to age group. Intake data was processed using the Nutrisurvey 2005 application, then categorized into the category of adequate nutritional intake based on the provisions of the 2004 National Food and Nutrition Widyakarya (WNPG) 200421, namely $\geq 120\%$ was categorized as excessive, 90-119% sufficient, and $< 90\%$ insufficient (Nurkomala et al., 2018).

The low adequate intake of energy, protein, iron and zinc in the stunting group is due to insufficient consumption of animal food sources such as fish, chicken, eggs and beef. Apart from that, based on the 3x24 hour Recall interview, most of the subjects in the stunting group consumed MPASI in low portions, namely around 2-3 tablespoons of rice or nasi tim, and several subjects were found who consumed MPASI with a liquid and soft texture in the form of porridge and nasi tim, where the texture should be based on age is solid food such as rice. Meanwhile, on average, subjects in the non-stunted group were able to meet each individual's energy and nutritional intake needs. This is because the majority of subjects consumed MPASI with portions and textures appropriate to their age (Nurkomala et al., 2020).

MPASI quality

In this study, low rates of exclusive breastfeeding and low quality of complementary foods may have played a role in this. In rural Rwanda, similar results were found when age > 12 months was a risk factor for stunting (Uwiringiyimana et al., 2019). MPASI is often given in quantities that do not meet needs and is often of lower quality compared to breast milk. The quality and quantity of MPASI can positively influence linear growth, however simply increasing the quantity of food will not be effective if the quality of the food is poor (Nurkomala et al., 2018). Exclusive breastfeeding and use of deworming tablets in the previous 6 months were independently associated with a lower risk of stunting in children. Exclusive breastfeeding is known to provide all the essential nutrients for a child's growth and immunity in the first 6 months of life, thereby offering a protective effect against stunting.

Types of MPation

Nutrients that are sensitive to linear growth include protein and zinc which act through insulin, insulin-like growth factor 1 (IGF-1) and its binding protein, triiodothyronine, amino acids and Zn^{2+} to stimulate growth plate protein and proteoglycan synthesis. In addition, protein intake produces an anabolic drive which is largely related to the endocrine system in bone growth, through passive stretching, and activating skeletal muscle growth. 31 If a baby or child experiences a lack of protein intake, the bone growth process will also be disrupted, causing stunting (Nurkomala et al., 2018).

Zinc intake causes an increase in bone mass. Zinc is found in the crystalline structure and enzymes of bone. Beta-alanine-histidine (carnosine) is a zinc component that stimulates intensive bone formation and restores lost bone. 34 The occurrence of mineral deficiencies in the body will have an impact on children's growth and development. Consuming low iron and zinc intake in early childhood can result in children being easily infected, disrupting the development of cognitive function, disrupting growth and contributing to stunting.

CONCLUSION

Most subjects in the stunting and non-stunting groups received their first MPASI when they were less than six months old. Children who received a low variety of MPASI ingredients were more often found in the stunting group, while low frequency of MPASI consumption occurred in both groups of subjects aged 9-24 months. The mean intake of energy, protein, iron and zinc was significantly different between the stunted and non-stunting groups aged 6-24 months.

SUGGESTION

There is a need to increase the variety of MPASI ingredients, consumption of animal food sources, and frequency of consumption in early childhood so that energy, protein, iron and zinc intake needs can be met.

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