The Influence Of Growth Disorders In Stunting Children On Development

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ABSTRACT

Indonesia is one of the countries in the Asian region with a high prevalence of stunting, which if not addressed can lead to long-term consequences, namely health, development and economic problems. This study aims to provide information about the effect of stunting on child development. Research methods use literature review with narrative review. Research articles/data were obtained through Google Scholar, Pubmed, The Garba Rujukan Digital (Garuda) and DOAJ. The keywords used are stunting, child growth, growth and development, growth disorders, child development, risk factors and the impact of stunting. Some literature states that stunting can affect children's development. The impact on development is both short-term and long-term. In addition, the causes and risk factors for stunting are numerous and multifactor so that stunting must be addressed immediately and the literature related to stunting will add information and knowledge in overcoming stunting cases.

Keywords: Development, Growth, Pediatric, Stunting,

INTRODUCTION

Efforts to realize the dream of a prosperous nation require the next generation who are alert, responsive, caring, and intelligent as well as physically and mentally healthy. The world's dream to realize equal and fair welfare in various aspects of life is the reason for the creation of a global action plan agreed upon by world leaders, namely the Sustainable Development Goals (SDGs) which has 17 goals with 169 targets with the hope of being achieved by 2030. The health and well-being aspect of life is in the 3rd goal point which is highlighted to get special attention. Good health and well-being are the main capital for the realization of the world's dreams. Poor health and unrealized life welfare will complicate the human journey in realizing the world dream (1).

Efforts to realize the world's dreams are also inseparable from the nation's superior seeds who are healthy and prosperous. A child from the time he or she is conceived in a mother's womb until he or she is born in the world is the figure of a nation's superior seed. The health and welfare of children is still a problem that is highlighted in global action to achieve the world's hopes in 2030 or SDGs (2). Indonesia is still facing nutrition problems that have a serious impact on the quality of human resources (HR). One of the nutritional problems that is a major concern today is the high number of stunted children under five (3).

Stunting is a growth disorder in children due to chronic nutrient deficiencies that cause children to be shorter for their age. The benchmark used to determine whether a child is stunted is the height-for-age index (TB/U) according to the World Health Organization (WHO) growth standard curve, which is a z score value below -2 Standard Deviation (SD) (2). The prevalence of stunting in children under 5 years of age globally stated in some literature is 22.9%, or in other words 154.8 million children under 5 years of age in the world are stunted. This is a major problem especially in some poor and developing countries. A literature states that the prevalence of stunting in several countries in Africa, among others, South Africa is 18.6%, Ethiopia is 26.4%, and Nigeria is 22.2%. The prevalence of stunting in several countries in Asia includes India 38.4%,

Pakistan 45%, Bangladesh 36.1%, Malaysia 20.7%, Thailand 10.5% and Indonesia 30.8%. Based on these data, it is also known that Indonesia is ranked as the third country in Asia with the highest prevalence of stunting (4).

Brain development is strongly influenced by nutritional status during pregnancy until the age of 5. Malnutrition experienced by children from an early age will generally have difficulties in facing the future and potentially have low physical and intellectual abilities and low productivity. One of the most talked about nutritional disorders that affect development is stunting (6). WHO states that stunting can affect the ability of personal, motor, cognitive, social and language development which is a short-term consequence for the development of toddlers so that if not overcome it can have long-term consequences, namely developmental, economic and health problems (7).

Child malnutrition can be a serious problem and will affect the quality of human resources in Indonesia. The problem of inadequate nutritional intake can begin when the baby is in the womb and can occur early after the child is born. The impact of malnutrition is only apparent when the child is 2 years old, where the nutritional state of the mother and child is an important factor in child growth (8). Protein resulting in malnutrition is of particular concern as it is one of the essential substances containing amino acids to synthesize structural and functional proteins (enzymes, neuropeptides, and neurotransmitters). Protein deficiency in early life can reduce enzyme activity resulting in disruption and synthesis of protein structures. This causes the incorporation of lipids into cell membranes including neuronal cells to be disrupted. Incompletely formed neuronal membranes can disrupt neural circuits and lead to decreased quality of learning (9).

Stunting, wasting and micronutrient deficiencies have also been shown to be associated with developmental deficits during early to mid-childhood. A study in Jamaica also suggested that children born to stunted parents are at higher risk of cognitive impairment than children born to non-stunted parents. A meta-analysis also found that children with higher Z scores on the TB/U scale had better motor and cognitive ability scores (10). Information on the effect of stunting on child development is limited. Based on this, this literature review will discuss the effect of stunting on child development.

METHOD

In preparing literature review, the narrative review method is used which aims to analyze comprehensively, critically, objectively from the latest knowledge and can describe the results of analytical observations found to explain the relationship between the variables studied and the processing time is shorter than other methods. This study aims to provide information about the effect of stunting on child growth and development. Articles in this literature review were obtained from searching through databases from Google Scholar, Pubmed, The Garba Rujukan Digital (Garuda) and DOAJ. The keywords used were stunting, child growth, growth and development, growth disorders, child development, risk factors and the impact of stunting. The inclusion criteria in the selection of articles or journals that were reviewed were a minimum publication time span of 10 years (2010-2020), Indonesian or English language, original research articles, available full text, analytical observations (cross sectional), research including stunting variables, child growth, child development, the impact of long and short stunting. Exclusion criteria were literature characteristics that did not meet the inclusion criteria.

RESULT AND DISCUSSION

Definition of Stunting and Development

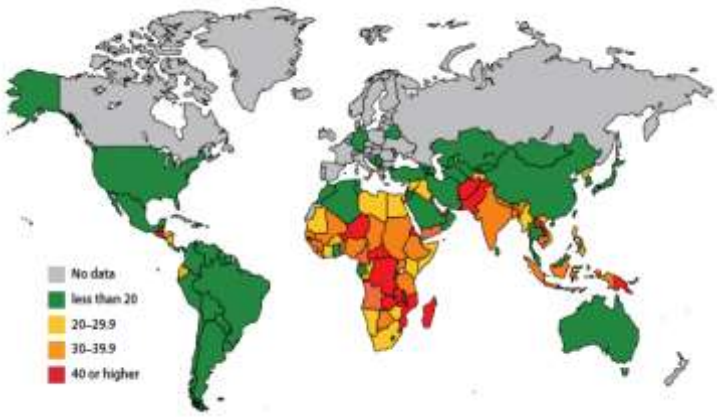
Stunting is a condition of failure to thrive in children due to chronic malnutrition, so that children are too short for their age. The definition of stunting according to the Ministry of Health (MOH) is a child with a z score of less than -2SD based on the 2006 WHO growth standard curve

based on height or length for age. The national strategy guideline for accelerating the prevention of stunting children states that stunting or often called dwarfism or shortness is a condition of growth failure in children under five years of age (toddlers) due to chronic malnutrition and repeated infections, especially in the period of the First 1,000 Days of Life (HPK), namely from the fetus to the child aged 23 months. Children are classified as stunted if their length or height is below minus two standard deviations of the length or height of children of their age (11).

Stunting is closely related to development. Some literature states that stunting can affect child development (12). Development is the process of increasing abilities in more complex body structures and functions in a regular and predictable pattern, as a result of the maturation process. Development is related to the process of differentiation of body cells, tissues, organs, organ systems that develop so that each can fulfill its function, including emotional, intellectual, and behavioral development as a result of interaction with the environment (13).

Epidemiology of Stunting

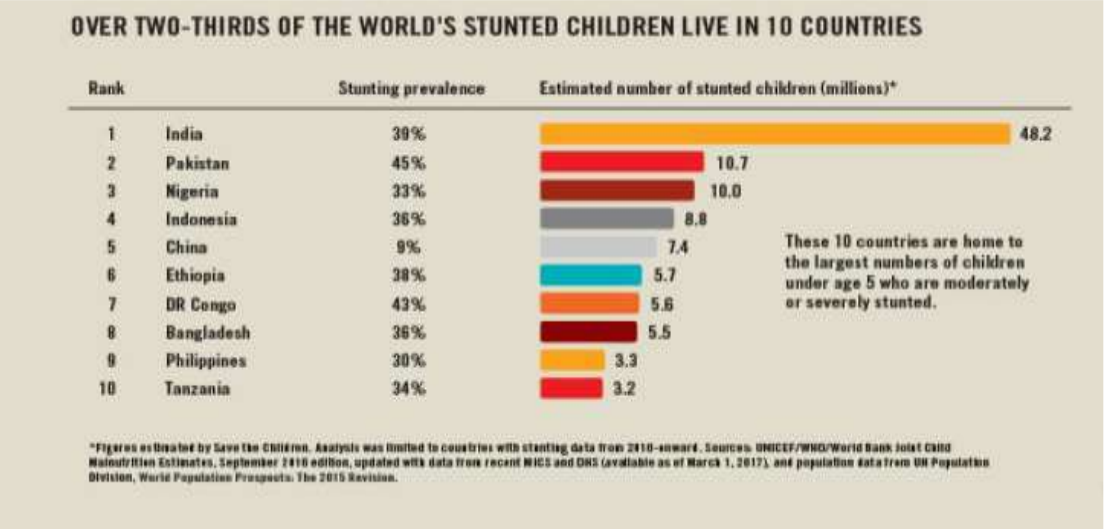
WHO data from 2016 states that 87 million stunted children live in Asia, 59 million in Africa, and 6 million in the Latin America and Caribbean region. The data also states that there are 5 regions that have a stunting rate of more than 30%. These regions include West Africa, Central Africa, East Africa, South Asia, and Oceania (excluding Australia and New Zealand) (figure 2.1). Asia and Oceania are regions with slow or no progress in reducing the incidence of stunted children, while in Latin America and the Caribbean, stunting has declined twice as fast as in Africa from 2000 to 2016 (14).



Source : WHO, 2018

Figure 1. Prevalence of stunting in children under 5 years of age worldwide

Indonesia is one of the countries in the Asian region with a high prevalence of stunting. WHO data in 2017 states that Indonesia is one of the countries with a high prevalence of stunting. The data states that Indonesia ranks 5th in the top 10 countries with the highest prevalence of stunting. The prevalence of stunting in Indonesia is below Pakistan (45%), Congo (43%), India (39%), and Ethiopia (38%) (12). The top ten countries with the highest prevalence in the world are presented in Figure 2.2. The 2014 Human Development Report data also states that Indonesia is the third country with the highest prevalence of stunting in Southeast Asia (ASEAN). Indonesia has a stunting prevalence of 37%, and is below Papua New Guinea and Cambodia which have a prevalence of 43% and 40% respectively (15).



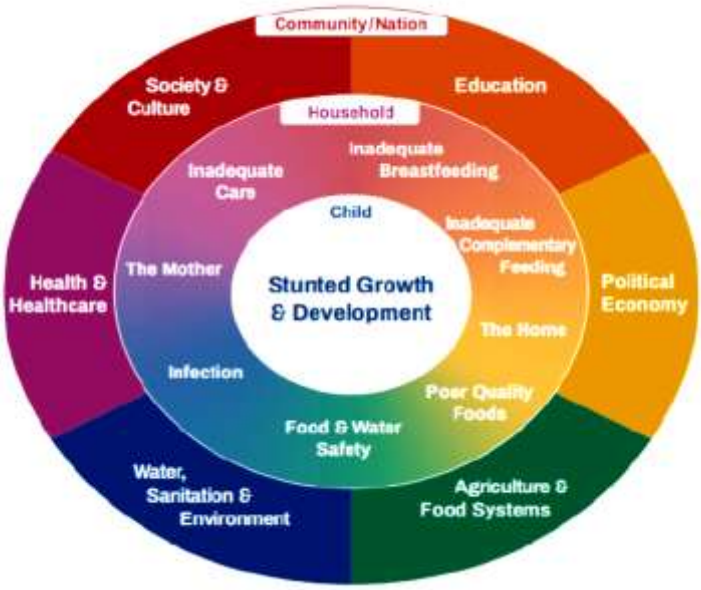
Source: Siswanti, 2018

Figure 2. Top ten countries with the highest prevalence of stunting in the world based on WHO data in 2017

Basic Health Research (Riskesdas) data in 2013 stated that the national prevalence of stunting was 37.20%. This figure has increased when compared to 2010, which was 35.6% and 2007, which was 36.8%. Riskesdas data also stated that 37.2% of stunted children in Indonesia consisted of 18% very short and 19.2% short. Provinces with low stunting prevalence (<30%) include Riau Islands, Yogyakarta Special Region, Jakarta Special Capital Region, and East Kalimantan. The province with the highest prevalence of stunting (>50%) is East Nusa Tenggara (15).

Etiology and Risk Factors of Stunting

Stunting is a condition caused by various factors. WHO states that stunting is caused by 2 main factors, namely external and internal factors. External factors consist of the community and state environment, while internal factors consist of conditions in the child's home environment (16). The state and society can play a role in the incidence of stunting. Various conditions of the country and society that affect it include culture, education, health services, economic and political conditions, agriculture and food systems, water, sanitation and environmental conditions. Meanwhile, internal factors within the child's own home also affect stunting. Home conditions that allow for adequate child care, exclusive breastfeeding and optimal complementary feeding, mother's condition, home conditions, food quality, food and water safety, and infections are some of the important internal factors for stunting (16). External and internal factors affecting stunting are presented schematically in Figure 2.3.



Source : Nirmalasari, 2020

Figure 3. External and internal factors affecting stunting according to WHO

Research on the causes and risk factors of stunting are numerous and multifactorial. A study in Demak Regency, Central Java stated that one of the risk factors for stunting that plays a role in the region is food quality. The results of the study found that one-third of the subjects studied in the region were stunted and this was caused by the quality of food that was low in energy, calcium and iron intake (16).

The results of the 2017 Riskesdas study show that there are several factors that play a role in the incidence of stunting in children aged 12-23 months. These factors include gender, low birth weight (LBW), and neonatal illness. This is based on the results of the study which states that boys have a 1.27 times risk of being stunted compared to girls. Meanwhile, LBW babies and those with a history of disease during the neonatal period had a 1.74 and 1.27 times greater risk of stunting, respectively (16). Another study in Brebes District, Central Java on children aged 12-24 months showed that stunting is influenced by several factors. Some of these factors include low levels of energy and protein adequacy, low zinc levels, LBW, and high exposure to pesticides. These five variables are known to contribute 45% to the incidence of stunting. The factor known to play the most role of the five variables is high pesticide exposure (16).

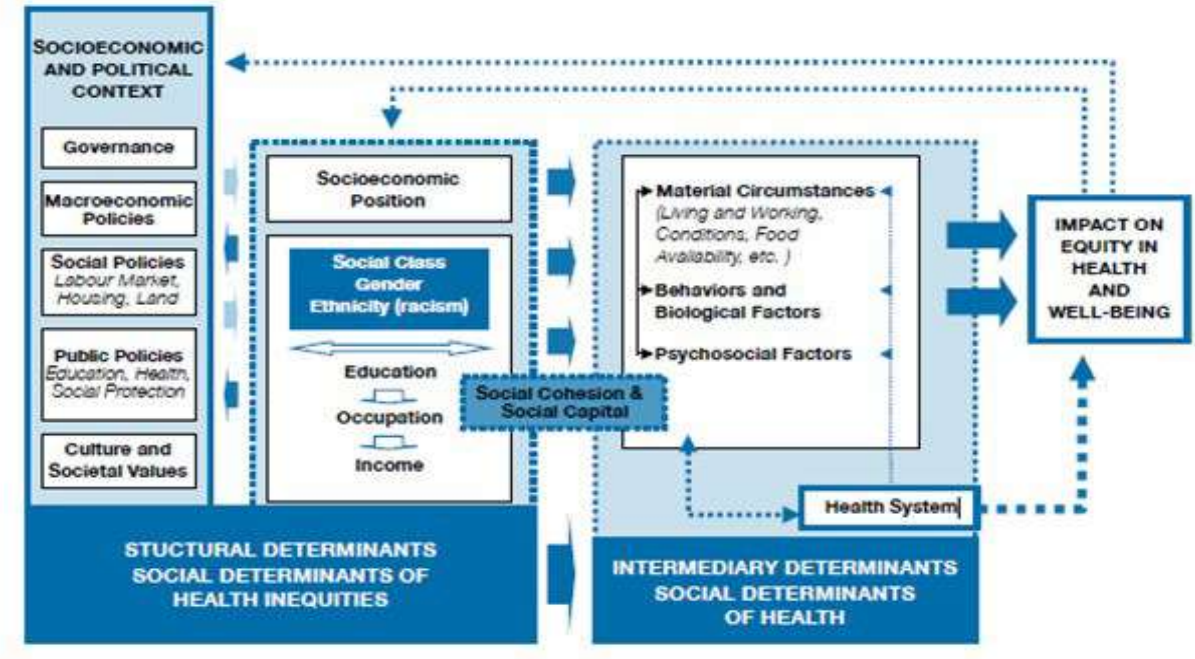
The data mentioned in the previous paragraph shows that the causes of stunting are extensive. These causes consist of distal, intermediate, proximal, direct, and indirect causes. WHO in 2005 issued a social determinant of health (SDH) concept to make it easier to understand and recognize these causes (17). The SDH concept developed by WHO explains that the social hierarchy at the macro level, namely the government and the micro level, namely the structure of the community or household through various interactions can affect a person's health status. Social factors at the macro level include political, economic, social, educational, agricultural, health, health insurance, social and cultural policies, and others. Differences in these macro-level social policies lead to inequalities that require a political process involving the role of government and the responsibility of the state to address them. Micro or household-level social factors include social class, gender, race, education, employment and income.

Ultimately, a good diet will result in a good nutritional status. Education can stimulate nutritional status both directly and indirectly through the influence of cultural awareness and preferences that can shape food consumption habits. Education also influences hygiene and sanitation including drainage systems, housing conditions and drinking water sources. Reducing cases of infection can be done with good hygiene and sanitation practices that will improve health. Education level can play a role in understanding health issues that will have a major impact on nutritional status, in this case stunting. The higher the level of education, the better the family income which will have an impact on family food security. A person's level of education will affect family income. In addition, parents' education level is also assumed to affect the level of knowledge, including family health and nutrition knowledge. This will increase efforts to utilize health services, childcare, sanitary hygiene, and other behaviors (18).

Employment is one of the factors that influence the socioeconomic status of the family. Working mothers can certainly increase income for the family and determine the economic status of the family. With the mother's role in increasing family income, the mother has fewer opportunities to care for the child, which will affect the child's nutritional status. In addition, low economic status is associated with family limitations in meeting the needs of both macro and micro nutrients and affects the quality and quantity of food consumed by the family. The food obtained is usually small in quantity and less varied, especially in foods that function for child growth such as sources of protein, vitamins and minerals, thus increasing the risk of malnutrition in children. In addition, the low quality and quantity of food consumed by pregnant women can also affect breast milk production. As a result of inadequate breastmilk production, children do not receive essential nutrients for growth and development through breastmilk, putting them at risk of malnutrition and developmental disorders (19). An indicator of the success of nutritional fulfillment of toddlers that affects their growth and development is exclusive breastfeeding (5). The high number of mothers of toddlers who are active workers in various sectors can reduce the fulfillment of exclusive breastfeeding for toddlers, so the risk of malnutrition is higher. Exclusive breastfeeding plays an important role in preventing malnutrition in children, including stunting, underweight, wasting, overweight and micronutrient deficiencies. Exclusive breastfeeding can minimize the risk of infectious diseases (20).

The toddler's diet and food history greatly affect the growth and development of toddlers, this is related to the golden period of 1000 days of life to promote optimal child development, from early pregnancy to 2 years of age. Research has found that parenting patterns, especially feeding, are still low. Riskesdas data proves that the incidence of stunting occurs more at the age of over 24 months, which means that stunting occurs more after children are breastfed and weaned on family food. Most mothers understand exclusive breastfeeding and try to give it to their babies. Feeding problems begin to occur after the child is over 24 months old and parents cannot handle it well (21).

All these macro and micro factors lead to different disease exposure, vulnerability, health conditions, availability of material resources, and access to health services, so that the impact or severity of the disease experienced is also different (17). The macro and micro factors, as well as the concept of SDH developed by WHO are presented schematically in Figure 2.4.



Source : Solar, 2010

Figure 4. The concept of Social Determinant of Health (SDH) according to WHO in 2005

Height-for-age index and stunting diagnosis

One indicator of nutritional status is the body length or height-for-age index (PB/U or TB/U). The first thing to know the index is by measuring height (22). The measurement of TB depends on the child's ability to stand. If the child to be measured can already stand, then the measurement is done by standing. Conversely, if the child is unable to stand, the measurement is carried out by lying down. Measurement by lying down was carried out using an infantometer length board. The measurement was carried out with 2 officers and positioned the child sleeping on his back. The first officer holds the baby's head so that it remains attached to the number 0 barrier and the second officer presses the baby's knees with the left hand and the right hand presses the foot limit to the sole of the foot (Figure 2.5) (23).

Source : ministry of health, 2016

Figure 5. Measurement of child height lying down

Standing TB measurement can be done with 1 or 2 officers using a stadiometer. The child to be measured removes footwear. Next, the child stands upright facing forward with the back, buttocks, and heels against the measuring pole. The stadiometer is then lowered until the upper limit is attached to the fontanel, and read the number at that limit (Figure 2.6). In addition, if TB is measured lying down, the measurement is corrected by subtracting 0.7 cm, and vice versa, if TB is measured standing up, it is corrected by adding 0.7 cm (23).

Body height (TB) is one of the important anthropometric measures in addition to body weight (BW), head circumference (LK), upper arm circumference (LLLA). TB measurement is very simple and easy to do. When associated with the measurement of BW, these two parameters will provide important information about the nutritional status and physical growth of children. TB is an indicator that describes the growth process that takes place over a relatively long period of time, and is useful for detecting physical growth disorders in the past. This indicator has several advantages, including objective measurement, repeatability, self-made tools, cheapness and portability. On the other hand, this measurement also has several disadvantages, including relatively slow changes in TB and difficulty in measuring TB precisely (23).

Source : ministry of health, 2016

Figure 6. Standing child height measurement

TB measurements also require precise age and sex information like other anthropometric parameters. Furthermore, the measurement results are mapped onto a standard growth curve. To date, the Indonesian Pediatric Association (IDAI) recommends using the WHO 2006 and Centers for Disease Control (CDC) 2000 standard curves. The WHO 2006 growth curve is used for children less than 5 years old and the CDC 2000 curve for children more than 5 years old. The WHO 2006 graph was used for 0-5 years of age because it has methodological advantages over the CDC 2000. The subjects of the WHO 2006 study were from 5 continents and had a favorable environment for optimal growth. For ages above 5 years to 18 years, the CDC 2000 curve was used because the WHO 2007 curve does not have a BW chart and the data from WHO 2007 is a smoothing of NCHS 1981(24).

The diagnosis of stunting is made based on the TB classification by age. Based on this classification, stunting is a condition of TB < P3 based on the CDC 2000 curve or -2 SD based on the WHO 2006 curve applicable to age and sex and is associated with malnutrition and chronic

infections (24).

Concept of child development

Development is a complicated and complex concept. Therefore, to understand the concept of development, it is necessary to first understand several other concepts contained therein, including growth, maturity, and change. Growth is more biological in nature and is defined as an increase in the size of the body parts of the organism as a whole. Growth refers to quantitative changes, such as length, volume, or weight. Growth and development generally go hand in hand and at certain stages result in "maturity". Development is the result of the interaction of the maturity of the central nervous system with the organs it affects, such as the development of the neuromuscular system, emotions, socialization and speech. Development is the increase of more complex body structures and functions in fine motor skills, gross motor skills, language and speech as well as socialization and independence. All these functions play an important role in the life of a whole person (25).

Development involves the differentiation of body cells, organs and organ systems that develop in such a way that they can fulfill their functions, including cognitive, emotional, language, motor and behavioral development as a result of interaction with the environment. Development is a progressive, directed, and integrated change. Progressive means that the changes that occur have a certain direction and tend to go forward, not backward. Directed and integrated indicate that there is a definite relationship between the changes that occur at this time, before and after (25).

Characteristics, aspects and stages of child development

Development has interrelated characteristics. These characteristics include; (1) development causes changes; (2) growth and development in the early stages determine further development; (3) growth and development have different speeds; (4) development correlates with growth; (5) development has a fixed pattern; and (6) a child's developmental stages follow a regular and sequential pattern (26).

Development broadly has four aspects, including gross motor or gross motor, fine motor or fine motor, speech and language, and socialization of independence. Gross motor or gross motor is an aspect related to the child's ability to perform movements and postures involving large muscles such as sitting, standing, and so on. Fine motor is the aspect related to the child's ability to perform movements involving certain body parts and performed by small muscles, but requires careful coordination such as observing something, pinching, writing, and so on. Speech and language skills are aspects related to the ability to respond to sounds, speak, communicate, follow commands and so on. Socialization and independence are aspects related to the child's independent ability (eating alone, cleaning up toys after playing), separating from the mother/caregiver, socializing and interacting with their environment, and so on (26).

The stages of child development have their own characteristics in each child and at each stage or what is often referred to as "Milestone Development". The first stage of the developmental stage is the prenatal or intrauterine period. This period is divided into 3 periods, namely the mudigah or zygote, embryo, and fetus. The mudigah period starts from the time of conception until 2 weeks of gestation. The embryonic period, starting from 2 weeks of gestation to 8-12 weeks. The fetal period starts from 9-12 weeks of gestation until the end of pregnancy. The Janis period is divided into early fetal period (9th week to 2nd trimester) and late fetal period (2nd trimester to the end of pregnancy) (26).

The next stage of the developmental stage is the infant period from 0 to 12 months. This period begins when the child's activities are very dependent on the parents. Activities such as language development, symbolic thinking, sensorimotor coordination and social learning are just beginning at this time. This period is divided into two periods: neonatal and post neonatal. The neonatal period is a period of adjustment to the environment outside the mother's womb which is divided into two periods,

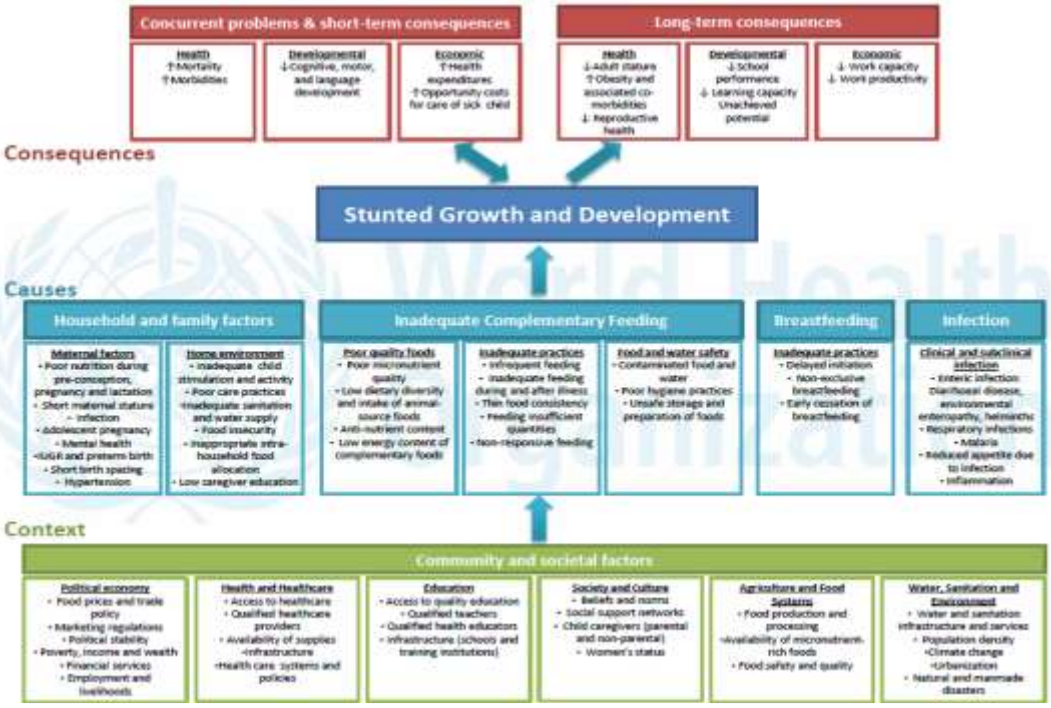
namely the early neonatal period (age 0-7 days) and the late neonatal period (age 8-28 days). The post-neonatal period (29 days-12 months) is a period of accelerated development, so that more attention is needed in caring for such as exclusive breastfeeding for 6 months, introducing complementary feeding (complementary feeding), given immunizations on schedule, and approaches with parents (26).

The next stage of development is the 1-3 year old stage. This stage is in the range from when children begin to walk on their own until they walk and run easily, which is close to the age of 12 to 36 months. This stage is when a child begins to learn to determine the direction of his or her development, which is a phase that underlies the degree of health, emotional development, degree of education, self-confidence, socialization skills, and future abilities of a child. Growth rates begin to decline but motor development accelerates. In the first three years of life, the growth and development of language, creativity, social awareness, emotional and intelligence skills is rapid and influences subsequent development. This is a very important period to achieve optimal intellectual growth and development (26).

The next stage of child development is the pre-school and school period. Pre-school period is the age of 5-6 years. This period is a period of child development more on independence and socialization. Motor, language, creativity, social, moral and emotional development begin to form and tend to remain until adulthood. The School Period is the period at the age of 6-18 or 20 years, and is divided into two periods, namely the pre-adolescent period, namely the age of 6-10 years and adolescence. Adolescence consists of early adolescence and late adolescence. Early adolescence for women aged 8-13 years and men 10-15 years, while late adolescence for women aged 13-18 years and men 15-20 years (26).

Effect of stunting on child development

Stunting affects child development. WHO has created a conceptual framework on stunting adapted from UNICEF's framework on the causes of malnutrition. The framework consists of the determinants, causes and effects of stunting.20 The conceptual framework is presented in Figure 2.7.



Source: Stewart, 2016

Figure 7. WHO concept of the determinants, causes and impacts of stunting

The WHO concept states that the impact of stunting can be short-term and long-term. The short-term impact of stunting consists of impacts on health, development, and the economy. Short-term impacts on development include decreased cognitive, motor and language development. On the other hand, the long-term impacts of stunting include impacts on health, development, and the economy. The long-term impacts of stunting on development include decreased performance in school performance, capacity to learn, and difficulty reaching their potential (27).

The impact of stunting on cognitive ability has been mentioned in several studies. The results of the Miller et.al. study stated that children who were severely stunted with a Z-score <-3SD had a negative impact on child development based on the Early Childhood Development Index (ECDI) (OR=0.75; 95% CI=0.67-0.83). The results of the study by Ekholuenetale et al. stated that children who were stunted experienced a 7% decrease in cognitive development compared to children who were not stunted. The results of another study by Pantaleon et al. stated that stunted children are more likely to experience delays in conginitive development (28).The effect of stunting on cognitive development is known to be through several mechanisms, including; (1) lack of nutrition in stunted children causes damage and delays in brain development; (2) stunting causes children to lack energy to interact with their peers, thus affecting the learning process; and (3) stunted children receive less stimulation, thus affecting learning process and cognitive development (27).

Stunting also has an impact on motor development. A study states that there is a significant difference in fine motor performance between children under 5 years old who are stunted and those who are not stunted. The results of research in Jamaica also show that stunting affects changes in certain brain areas responsible for fine motor function (8). Stunting can also have an impact on gross motor development. The results of Setianingsih et al. stated that there was a

significant relationship between stunting and gross motor development. The results of this study are also reinforced by the results of Suwandi et al. who stated that stunted children have a greater chance of experiencing delays in gross motor development than normal children. Pantaleon et al. stated that stunted children are 11.98 times more likely to experience gross motor delays. Stunting can cause less than optimal development of muscle tissue, thus affecting gross motor development. Stunting can also cause a reduction in the number, function, and structure of nerve cells, and inhibit the role of neurotransmitters in gross motor. Stunting can also cause damage and inhibition of cerebellum development which is the center of motor movement (28).

Stunting can also cause disruption in social and independence aspects. Research by Meylia et al. states that stunted children have a 7 times greater risk of experiencing delays in social aspects of independence than normal children. This is also reinforced by the results of other studies which found that stunted children have lower social-emotional scores. This impairment in the social aspect of independence is thought to be due to the anxiety, depressive symptoms, and low self-esteem that are commonly found in stunted children, leading to poor psychosocial functioning. Stunted children may also have several psychological problems, including problems with self-satisfaction, the tendency to be treated easier than their age, bullied and teased. This can further affect self-efficacy and interactions with peers that continue into adolescence (10).

Stunting can cause developmental disorders in the language aspect. The results of research by Setianingsih et al. show that stunting is closely related to children's language development ($p = 0.000$) (28). The results of this study are also in line with the results of Hanum and Khomsan's research which showed significant differences in the achievement of language and cognitive development scores based on toddler age in the normal and stunted toddler groups. Stunted toddlers are only able to achieve simple language development tasks and find it difficult to fulfill more complex language development tasks according to their age stages due to their lower cognitive abilities. The results also show that there is a difference in vocabulary that can be achieved by 50.0% in normal toddlers and only 20% can be achieved by stunted toddlers. Stunting shows the manifestation of malnutrition and infection problems experienced since or even before the birth of the child. Nutrient deficiencies before birth and during the first year of life can affect brain development. A child's brain development occurs rapidly during the prenatal period and continues after birth into early childhood. Research shows that a newborn baby has about one hundred billion brain cells. The maturation process and the formation of nervous system connections occur progressively after birth until early childhood.

Stunting can cause developmental disorders in the language aspect. The results of research by Setianingsih et al. show that stunting is closely related to children's language development ($p=0.000$) (28). The results of this study are also in line with the results of Hanum and Khomsan's research which showed a significant difference in the achievement of language and cognitive development scores based on toddler age in the normal and stunted toddler groups. Stunted toddlers are only able to achieve simple language development tasks and find it difficult to fulfill more complex language development tasks according to their age stages due to lower cognitive abilities. The results also show that there is a difference in vocabulary that can be achieved by 50% in normal toddlers and only 20% can be achieved by stunted toddlers. Stunting shows the manifestation of malnutrition and infection problems experienced since or even before the child is born. Nutritional deficiencies before birth and during the first year of life can affect brain development. A child's brain development occurs rapidly during the prenatal period and continues after birth into childhood. Research shows that a newborn baby has about one hundred billion brain cells. The process of maturation and formation of nervous system connections occurs progressively after birth until childhood. Malnutrition from the prenatal period to early childhood can cause neurological disorders and impaired brain development that affect cognitive and

language skills, so children with a history of stunting in early childhood have limited vocabulary and low intelligence levels.

Stunting can also cause long-term impacts. Long-term impacts include decreased performance in school performance, learning capacity, and difficulty reaching their potential (25). The results of Haywood and Pienaar's research state that stunting has a negative influence on performance in language, math, and the average value of primary school-age children that lasts for 7 years. The results of this study are also reinforced by the results of research by Kar et al. which states that poor and inadequate nutritional intake during early childhood has a direct influence on brain development which plays an important role in the development of cognitive function. The results of the study also state that inadequate nutrition over a long period of time can cause permanent brain damage as seen from limited cognitive development (29).

Stunting can be overcome with various program interventions. The stunting management program is carried out through Specific Interventions and Sensitive Interventions targeting the first 1,000 days of a child's life until 6 years old. Presidential Regulation No. 42 of 2013 states that the 1000 HPK Movement consists of specific nutrition interventions and sensitive nutrition interventions. Specific interventions are actions or activities that are specifically planned for the 1000 HPK group. While sensitive interventions are various development activities outside the health sector. The target is the general public, not specifically for 1000 HPK (30). In addition, other programs can be carried out by providing and empowering cadres. cadres who have been educated will empower and re-educate their knowledge to mothers who have potential stunting toddlers, then transfer education by cadres and monitor toddler height (stunting status) through monthly monitoring at posbindu (31). Education can stimulate nutritional status both directly and indirectly through the influence of awareness and cultural preferences that can shape food consumption habits. Ultimately, a good diet will result in good nutritional status. Education also affects hygiene and sanitation including drinking water sources, drainage systems, and housing conditions. Good hygiene and sanitation practices will improve health by reducing case infections (32).

CONCLUSION

Stunting is a state of chronic malnutrition characterized by children who are shorter than their peers. Stunting can affect children's development. The impact on this development is short-term and long-term. The short-term impacts of stunting include delays in aspects of personal social development and independence, fine motor, gross motor, cognitive and language skills. On the other hand, stunting can have a long-term impact on child development. It is characterized by poor performance at school, lack of capacity to learn, and difficulty reaching their potential.

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