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Factors Contributing to Catch-Up Growth of Child with Stunting: A Literature Review

Ayuni Rizka Utami*, Nani Nurhaeni
Universitas Indonesia, Depok, Indonesia
** Correspondent Author: ayuniutami5@gmail.com*

ABSTRACT
Stunting is a condition in which children fail to thrive caused by long-term malnutrition and is one of the main problems for children under five in Indonesia today, children who are already stunted can have catch-up growth or catch up with growth to minimize the impact of stunting. This literature study aims to look at the factors that contribute to catch-up growth in children with stunting. Literature search was carried out systematically through several online databases with the keyword "Factors AND Stunting Catch-up Growth AND Child *". The selected articles were articles published in 2016-2020 in English and used a sample of children with stunting. The results of the literature study found 555 articles and 9 articles that met the inclusion and exclusion criteria. There are several major factors that contribute to the catch-up growth of children with stunting, namely the level of education and height of the mother, economic status, socio-culture, nutritional supplements and community based intervention. Some of the contributing factors above can be used as considerations in providing interventions to support catch-up growth in children with stunting so as to reduce the impact of stunting.

Keywords: Child, Stunting, Catch-Up Growth

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BACKGROUND

Stunting is a result of long-term malnutrition, category of stunted child if the measurement results of height or length of body for age <-2SD are based on established child growth standards (WHO, 2012). Stunting can result in developmental delays and decreased intellectual capacity in children (MA Gillentine, 2017; Nshimyiryo et al., 2019). The prevalence of children with stunting in the age of under five in the world in 2019 is as many as 144 million children, equivalent to 21.3% of the world's children, this figure has decreased compared to 2018 with a prevalence of 21.9% or equivalent to 149 million children (UNICEF et al., 2020). Based on WHO data (2019) more than half of children under five in Asia are stunted. The decline in stunting rates in the world was also followed by a decrease in the stunting rate in Indonesia, based on the results of the integration of SSGBI and SSN in 2019, number of children with stunting in Indonesia was 27.67% and decreased by 3.1% when compared to Riskesdas data in 2018, as much as 30.8% (Izwardy, 2020; Riskesdas, 2018). The prevalence of 27.67% is still much higher when compared to global data and based on the WHO category, the prevalence of> 20% is still in the high category. With the high rate of stunting, more children are at risk for failure to thrive and have less cognitive abilities (Woldehanna, 2018).

Children with stunting have lags in terms of growth compared to normal children, but this disadvantage has a great chance of being caught up to 2 years of age (Sudfeld et al., 2015). The term often used is catch-up growth or catching up growth in stunted children, which is an effort to increase height based on age on the z-score (Desmond & Casale, 2017a). until the age of 2 years is a very optimal time to catch up with growth in children to prevent long-term impacts, this is because the age of 2 years is a critical time, especially in terms of growth and development of the child's brain (Jee, 2014; Thurow, 2016). If catch-up growth is not carried out, there will be short-term and long-term impacts in the form of developmental delays, lack of cognitive abilities, small growth in adulthood and adult obsession so that catch-up growth is very important in children with stunting (Haridy, 2018). To achieve the success of catch-up growth in children with stunting, it is necessary to know the influencing factors so that the implementation of catch-up growth can be done optimally so that in this case the researcher is interested in examining the related factors that affect the catch-up growth of children with stunting. through literature review.

METHODS

Identification of article about contributing factors to catch-up growth of child with stunting is done through electronic databased by 555 articles (Clinical Key,n=69; Scopus,n=22; PubMed,n=63; Scince Direct,n=138; Sage Publication,n=105). The keywords used in the article were: Factors AND *Stunting* Catch-up Growth AND Child*. Inclusion criteria for this literature are full text, article in English, publish in 2016-2020, use sample of children with stunting problems 0-59 months of age. Exclusion criteria are catch-up growth not related with stunting.

RESULTS

The results from the research database are 555 articles, as many as 13 articles have in common or similarities with the title, 459 articles are not relevant. After using inclusion and exclusion criteria, 6 articles were found that are suitable for this literature.

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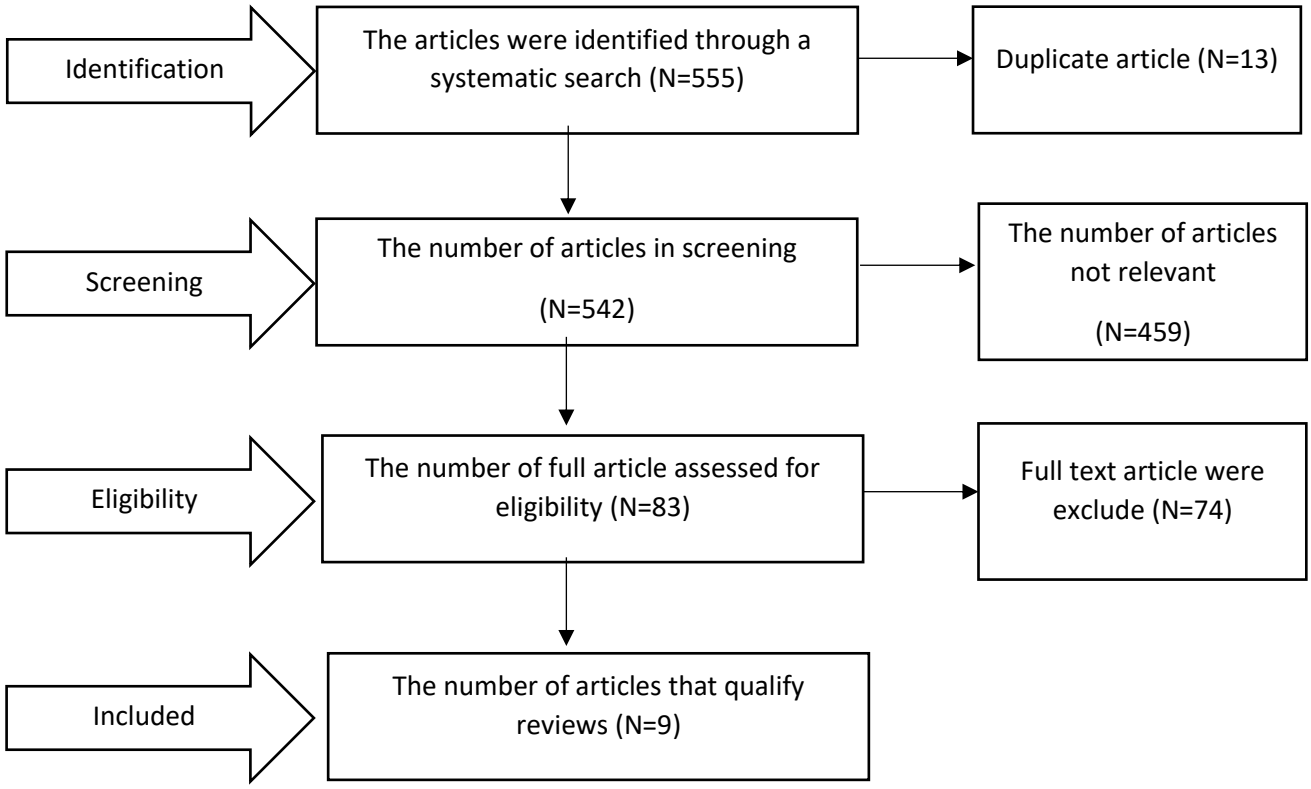

Figure 1. PRISMA Diagram of Article Search

Table 1: Characteristics of articles reviewed

Researcher/Year	Title	Objective	Research Methods	Sample	Result
Rajeev et al., (2019)	The catch-up growth in stunted children: Analysis of first and second India human development survey data	Comparing the prevalence of stunting in children as they grow and contributing factors	Prospective cohort study.	411 stunted child aged 0-4 year	There was a decrease in the stunting rate when the child was growing at the age of 7-11 years with the contributing factors being economic and socio-demographic factors (P <0.05)
Faye et al., (2019)	Factors associated with recovery from stunting among under-five children inin two Nairobi informal settlements	Analyze changes in linear growth and associated factors in children with stunting	Longitudinal study	1816 stunted child aged 0-23 months	There are several things that contribute to the growth of children with stunting, namely ethnicity, mother's education level, mother's married status, poverty level, number of family members with results (P <0.001).
Pham et al., (2019)	Effect of Oral Nutritional Supplementation on Growth in Vietnamese Children with Stunting	Evaluating the effect of nutritional supplementations (ONS) on the growth of children with stunting	Prospective study	121 stunted child aged 24-48 months	There was a significant reduction in the prevalence of stunting during the 6 months of the intervention, as many as 40% of children were declared stunting-free based on the height-for-age z-score (HAZ) (P <0.0001).
Desmond et al., (2017)	Catch-up growth in stunted children: Definitions and predictors	Analyze the definitions and predict the factors that affect the catch-up growth of children with stunting	Cohort study	304 stunted child aged 2 year	There are several factors that are predicted to be associated with catch-up growth in children with stunting, namely the height of the mother, the age at which she was declared stunting, the level of mother's education and continuous childbirth. (P <0.001).
Roberts et al., (2017)	The Impact of Nutritional Interventions beyond the First 2 Years of Life on Linear Growth: A Systematic Review and Meta-Analysis	Evaluating the effectiveness of iron, zinc, calcium, iodine, vitamin A in linear child growth	Meta analysis	69 child who experience growth failure aged 2 years or older	Zinc and vitamin A are effective and have a positive impact on height growth on children's age / height-for-age z score (HAZ) with (P <0.001)

Zhang et al., (2016)	Catch-up growth and growth deficits: Nine-year annual panel child growth for native Amazonians in Bolivia	Predicts the growth rate of children with stunting	Descriptive statistics and random-effect regression	353 stunted child aged 2-7 years	Achieving catch-up growth when the child reaches the age of 11 years with a positive height-for-age z score (HAZ) with a contributing factor is public health interventions (P <0.001)
Aguayo et al., (2016)	Determinants of stunting and poor linear growth in children under 2 years of age in India: an in-depth analysis of Maharashtra's comprehensive nutrition survey	Determine the factors that contribute to the growth liner of the child with stunting	Descriptive analytical study	2561 stunted child aged 0-23 months	Several factors that contributed to the linear growth of children with stunting were birth weight, number and time of feeding, egg consumption, maternal height and sanitation (p <0.05).
Reifsnider et al.,	How Did They Grow: An Intervention to Reduce Stunted Growth in Low-Income Mexican-American Children	To identify the effect of community based intervention on reducing undernutrition in children	prospective, longitudinal, quasi-experimental design	174 undernutrition child aged 12-24 months	Children who received community based intervention (nutrition education, child behavior, parenting, and community resources) had a faster growth than children who were not given the community based intervention (P = 0.003)
Casale et al., (2020)	Recovery from stunting in early childhood and subsequent schooling outcomes: Evidence from NIDS Waves 1–5	Analyze the relationship between catch-up growth and children's school achievement	Cohort study	840 stunted child aged 0-24 months	Children who were stunted at the age of 0-24 months had lower cognitive abilities than children who were not stunted at that age. The supporting factor was parental knowledge which had an impact on children's nutrition and achievement. (P value 0.026) at stage 3 or identification at 4-5 years old

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DISCUSSION

Mother factors (level of education and height of the mother)

The level of education or knowledge of the mother is one of the things that most influences the nutritional status of the child (Abuya et al., 2012). The results of the analysis of the 3 journals above state that children who are cared for by mothers with higher education will have a higher potential for catch-up growth, this is closely related to appropriate child feeding and the speed of receiving information (Casale, 2020; Desmond & Casale, 2017b; Faye, 2019). Research conducted by Aguree (2020) on the nutritional status of children whose parents received training in feeding practices was better in the group of mothers with higher education. The quality and quantity of child growth is influenced by genetic factors (Najahah et al., 2013).

The 2 journals above state that the mother's height affects birth height and the condition of stunting of children up to the age of 1 year, stunting children with mothers who have the appropriate height will see faster catch-up growth up to the age of 5 years compared to mothers who have height less than standard agency (Desmond & Casale, 2017b; Roberts & Stein, 2017).

Mothers with height <150 cm have three times the risk of giving birth to children with low birth bodies until they are less than 5 years old (Miglioli et al., 2015). Stunted mothers are at high risk of giving birth to children with stunting or a cycle of intergenerational malnutrition (Georgiadis et al., 2017; Schott, 2013).

Economic status

Based on the 2 studies above, children with family economic status above the minimum standard will achieve 7 times better nutrition or catch-up growth compared to children with low economic families after the age of 5 years (Faye et al., 2019; Rajeev & Kannan, 2019). Family income affects the availability of food for children which has an impact on the quantity and quality of the food given (Ahmad et al., 2020). Families with low economic status tend to ignore the fulfillment of micronutrients in children so that it affects the catch-up of growth in children with stunting (Setyawati et al., 2018). Family income has an effect on family food security which has a direct impact on food availability (Alam et al., 2016)

Socio-cultural

Different socio-cultural parents determine the type of food choices given to children that support catch-up growth after 5 years of age. This is supported by 2 articles that analyzed stating that consumption of protein or other types of nutrients and feeding time have a close relationship with the culture adopted (Aguayo et al., 2016; Rajeev & Kannan, 2019). Achievement of catch-up growth for children after 5 years of age will be different based on ethnicity, this is because each tribe has different food choices (Faye et al., 2019). Different socio-culture, different patterns and choices of types of food (Abdullah et al., 2016). In Indonesia, the consumption of animal protein is very low when compared to the 12 types of food recommended for stunting children and the prevention of stunting, this causes the child's nutrition is not fulfilled properly (Mahmudiono, 2017). This difference also occurs in Hispanic and non-Hispanic ethnicities, Hispanic children have a higher intake of potassium and fiber and consume lots of nuts (Zimmer et al., 2019).

Nutritional supplementations

Most of the stunted children were stated to have improved in terms of height based on age after being given micronutrient supplementation in 2 studies conducted (Pham, 2019;

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Roberts & Stein, 2017). The most important type of supplementation that is given when children under five are Vitamin A, a deficiency of vitamin A will affect the protein centesis process so that it will affect cell growth (Meilani et al., 2018). This is in accordance with the research conducted Roberts & Stein (2017) that the provision of micronutrients in the form of vitamin A, zinc and several other types of vitamins and minerals has a positive impact on children's growth after 2 years of age. Lack of multi micronutrient supplementation will have a direct effect on the child's growth and result in a decrease in the child's immune system (Mejia et al., 2019).

Community based intervention

Parents with stunted children who receive community-based intervention tend to have better growth, this is supported by the 2 studies that have been analyzed above (Reifsnider et al., 2016; Zhang et al., 2016). There are several community interventions carried out, namely education related to nutrition, children's behavior, parenting and community resources which play an important role in changing the nutritional status of children with stunting (Reifsnider et al., 2016). Based on research conducted by Pavithra (2019) Increasing knowledge of mothers or families after receiving community intervention related to nutrition will increase awareness and change behavior in providing food components such as increasing protein and calorie intake which can increase growth in children. Community-based interventions related to children's nutritional status can provide changes both in terms of knowledge and in terms of feeding behavior (Martinez et al., 2018). This can be analyze in the research conducted by Pavithra et al., (2019) that after the community-based intervention there was an increase in protein and calorie intake as well as better growth in the intervention group.

CONCLUSION

Factors that need to be considered in intervening with the aim of catch-up growth in stunted children are maternal factors (mother's education level and mother's height), economic status, socio-culture, nutritional supplementation and community based intervention (community-based intervention). These 5 things can be taken into consideration in intervening in stunting children in order to achieve catch-up growth. This study has described most of the countries with low middle income that have high stunting rates so that they have characteristics that are not much different from Indonesia.

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