Association between Adolescent Pregnancy and Stunting Incidence: A Scoping Review

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ABSTRACT

Background: *Stunting is a developmental disorder that occurs in children caused by malnutrition, frequent infections, and poor psychosocial simulation. Stunting can be influenced by some factors such as infection, exclusive breastfeeding, early initiation of breastfeeding, and adolescent pregnancy. This study aims to review the association between adolescent pregnancy and stunting incidence.*
Method: *This scoping review used the PRISMA-ScR framework by searching for articles from relevant databases such as Pubmed, EBSCO, and Wiley. The article search obtained ten articles for further analysis. The article was analyzed based on the Joanna Briggs Institute (JBI). The keywords used were Teen Pregnancy* OR Adolescent Pregnancy* OR Teen Pregnancies* AND Nutritional Deficiency* OR Undernutrition* OR Growth Disorder* OR Stunting*. Besides, the researcher added a filter, namely articles published in the last five years (2018-2022), articles that are open access, and original research articles.*
Results: *Based on the results of reviewing the ten articles, it can be concluded that adolescent pregnancy is significantly associated with stunting incidence in adolescents with low education levels and poor economic conditions leading to poor health awareness and nutritional status. Future studies are expected to further evaluate the relationship between adolescent pregnancy and stunting incidence.*

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INTRODUCTION

Globally, the highest estimate of adolescent birth aged 5-19 years in 2021 is in the United States, namely 6,114,000 followed by Central Asia 68,000. Besides, adolescent births aged 10-14 years in the United States reached 332,000 and 22,000 in Southeast Asia (SEA).[1] Referring to the UNICEF data, 14% of adolescents were reported to give birth at the age of 18 years in 2021. About 10% of adolescent mothers in South Asia gave birth at the age of 18 years in 2015-2021. This figure reaches 25% in West Africa, Central Africa, East Africa, and South Africa.[2]

Adolescent pregnancy can lead to increased stunting prevalence. Children born to adolescent mothers have a higher stunting prevalence (44.4%) than those born to older mothers (35.6%). Children born to adolescent mothers are likely to experience stunting 13 times higher than those born to older mothers.[3]

The World Health Organization (WHO) defines stunting as a developmental disorder that occurs in children caused by poor eating habits, frequent infections, and poor psychosocial simulation.[4] Stunting is a condition where the child's height is not according to their age due to delayed growth caused by malnutrition and low birth weight. Stunting can be defined as a height below -2 standard deviations based on a growth curve.[5] Stunting is a consequence of chronic malnutrition and is frequently associated with poverty.[6]

The global prevalence of stunting in 2020 reached 22% or 149.2 million people. The highest global prevalence of stunting in 2019 was found in African countries (55%) and Asian countries (51%).[7] The 2021 Indonesian Nutrition Status Survey (SGBI) data indicate that the prevalence of stunting was 24.4% or 5 million more children under five out of 23 million children in Indonesia experiencing stunting.[8]

Stunting has short and long-term effects as well as direct and indirect effects on children. It disturbs cognitive development and academic performance as well as limits future life prospects as adults [9]. In other words, the short-term effects of stunting cause brain development disorders, intellectual disabilities, physical development disorders, and metabolic disorders. The adverse effects of long-term stunting can lead to decreased cognitive and academic performance, weak immunity, susceptibility to disease, obesity, and disability in old age.[10]

Stunting can be influenced by some factors such as infection, exclusive breastfeeding, early initiation of breastfeeding, and adolescent pregnancy.[11] Adolescent pregnancy harms the nutritional status of the fetus and baby. Children of adolescent mothers have a much higher risk of developing stunting. Mothers aged <20 years are a risk factor for low birth weight (LBW).[12] This scoping review aims to identify the latest scientific evidence regarding the association between adolescent pregnancy and stunting incidence.

METHOD

This study used a scoping review method with a systematic approach to map evidence and identify the concept, theory, source, and main knowledge.[13] This scoping review followed some steps below[14] (Figure 1).

Step 1: Identifying the review question or focus of the review

This study adopted a population framework, exposure, outcome, and study design (PEOS) with the population of stunting incidence, explore of adolescent pregnancy, outcome of knowing whether there is an association between adolescent pregnancy and stunting incidence, and study design of articles related to stunting. The article search used some databases, namely Pubmed, Ebsco, and Wiley online library. The keywords used were teen pregnancy* or adolescent pregnancy* or teen pregnancies* and nutritional deficiency* or undernutrition* or growth disorder* or stunting*. The researcher also added filters of articles published in the last five years (2018-2022), articles that are open access, and original research articles. The articles from the search results were downloaded and stored for reference.

Step 2: Identifying relevant studies

In identifying the relevant articles, the writer determines inclusion and exclusion criteria. The inclusion criteria were (1) articles on adolescent pregnancy and stunting incidence; (2) articles in English and Indonesian; and original research articles. Meanwhile, the exclusion criteria were articles published over the last five years (2018-2022) and those published in non-scientific journals. After obtaining articles that meet the inclusion and exclusion criteria, the articles were analyzed based on the Joanna Briggs Institute (JBI).

Step 3: Article selection

The article search from three databases found 2,006 articles consisting of 1,736 articles from PubMed, 243 articles from EBSCO, and 25 articles from Wiley. The initial screening was carried out using Mendeley in which the articles obtained were filtered by title and found 1,897 irrelevant articles and 109 duplicate articles. Then, 20 articles were filtered according to the inclusion criteria and obtained 10 relevant articles for this scoping review. The search results were documented in the following PRISMA flow diagram:

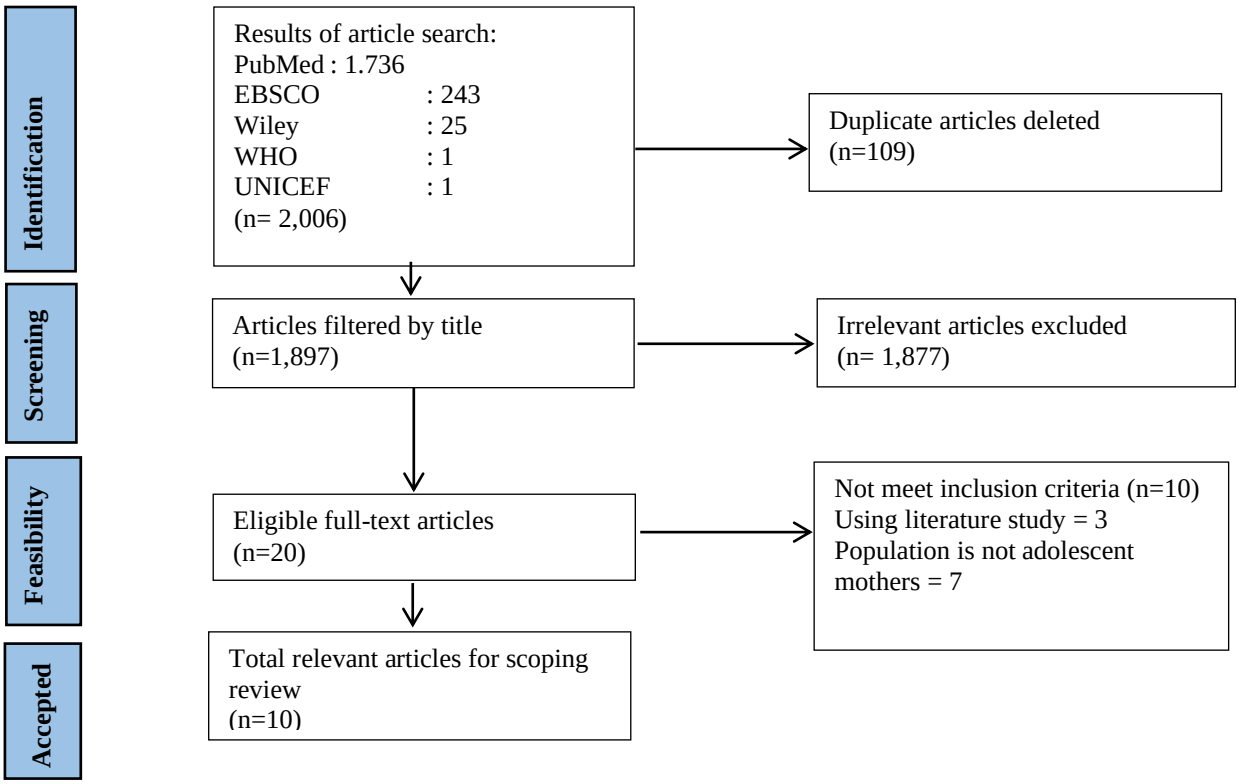

Figure 1. PRISMA-ScR Flow Diagram

Step 4: Data charting

The data were merged using data charting that adopts the Joanna Briggs Institute covering the author, title, year, country, data collection method, research type, participants/sample, and research results.[15] Data mapping was carried out by having a discussion with the second author and the results can be seen in Table 1 below.

Table 1. Data Charting

No	Author/ Year	Objective	Methods	Results
1	Nguyen *et al*. (2019)	Social, biological, and programmatic factors linking adolescent pregnancy and early childhood undernutrition : a path analysis of India's 2016 National Family and Health Survey	Population: pregnant women Sample: 60,096 pregnant women Research instruments: India's National Family Health Survey Data Design: cross-sectional	Children of adolescent mothers had lower Z scores for length or height by age (mean difference −0.53 SD), weight by age (–0.40 SD), and weight by length or height (– 0-16 SD) compared to children of adult mothers.
2	Wells *et al*. (2022)	Associations of maternal age at marriage and pregnancy with infant undernutrition: Evidence from first-time mothers in rural lowland Nepal	Population: pregnant women Sample: 24,682 pregnant women Research instrument: questionnaires Design: cross-sectional	Pregnancy <18 years predicts lower LAZ, and <19 years predicts lower WAZ and HCAZ. The results showed that early pregnancy and marriages at the age of 10-13 years can predict neonatal stunting. Early pregnancy is associated with lower LAZ and HCAZ in infants with a decreasing trend in WAZ for 10-13 year marriages. Early pregnancy predicts stunting.
3	Dewey et al.(2020)	Nutrient supplementation during the first 1000 days and growth of infants born to pregnant adolescents	Population: adolescent mothers Simple: 4,011 adolescent mothers Research instrument: Questionnaires Design: cross-sectional	Prenatal LNS in adolescents reduced neonatal stunting by 25% and small head size by 28% with a relatively significant effect on newborn weight loss than with IFA. It is important to target pregnant adolescents in similar settings including small numbers of LNS, especially for adolescents living in households with food insecurity.
4	Haque *et al*. (2022)	Stunting Status of Ever-Married Adolescent Mothers and Its Association with Childhood Stunting with a Comparison by Geographical Region in Bangladesh	Population: adolescent mothers Simple size: 7,326 adolescent mothers Research instruments: using demographic survey data Design: cross-sectional	The frequency of stunting among adolescent mothers is higher in Sylhet areas. Besides, children of stunted mothers had a 2.36 times higher risk of stunting.
5	Wemakor *et al.* (2018)	Young maternal age is a risk factor for child undernutrition in Tamale Metropolis, Ghana	Population: children aged 6-59 months Simple size: 300 pairs of mother and child Research instrument: Questionnaires Design: case-control	Children of adolescent mothers have 8 times higher risks of stunting than children of adult mothers.
6	Olodu *et al.* (2019)	Nutritional status of under-five children born to adolescent mothers in an urban setting, south-western Nigeria	Population: Adolescent mothers and children Simple Size: 300 pairs of mother and child Instrument Research: Structured Questionnaires Design: Cross-sectional	Early initiation of breastfeeding increased the likelihood of stunting (OR = 9.551, CI = 1.279–16.310) and underweight (OR = 6.674, CI = 3.159–14.097) by about 10 and 7 times respectively. Meanwhile, the odds of wasting (OR = 2.346, CI = 1.228–4.480) were 2 times higher with the duration of breastfeeding less than 6 months.
7	Akpinar & Teneler,	Adolescent Motherhood and Negative Birth Outcomes, Stunting and Social	Population: 15-49 years old pregnant women Simple size: 2,102	The proportion of adolescent mothers in the study group reached 6.8%. The low birth weight caused by negative births and stunting, as well as chronic

No	Author/ Year	Objective	Methods	Results
	(2022)	Determinants : Secondary Analysis of Turkish National Data 2018	women Research instrument: Questionnaires Design: cross-sectional	malnutrition is significantly higher in children of adolescent mothers than those of non-adolescent mothers ($p < 0.05$).
8	Mtongwa et al. (2021)	Comparative analysis of determinants of low birth weight and stunting among children under-five of adolescent and non-adolescent mothers using the 2015/16 Tanzania Demographic and Health Survey (TDHS)	Population: adolescent mothers and older mothers Sample size: 8,852 women with children under five years Instruments: demographic and health survey data Design: cross-sectional	Stunting children are not related to the mother's age. High maternal socioeconomic status and obese or overweight mothers are negatively related to stunting.
9	Maravilla et al. (2020)	Stunting of children under two from repeated pregnancy among young mothers	Population: adolescent mothers Sample size: 3,327 adolescent mothers Instrument: Cebu Longitudinal and Nutrition Survey (CLHNS) Design: cross-sectional	Recurrent pregnancies were analyzed with an ordinal approach using the number of past pregnancies of young mothers at childbearing. A similar cohort of infants indicated an increased risk of persistent stunting from 12 to 24 months with a risk ratio of 1.51. Mediation tests revealed that low birth weight is a causal pathway between recurrent young mothers and stunting.
10	Nguyen et al. (2021)	Adolescent birth and child undernutrition: an Analysis of demographic and health surveys in Bangladesh, 1996-2017	Population: mothers with the first child (primipara) Sample size: 12,006 women Instrument: Questionnaires Design: cross-sectional	Children born to adolescent mothers have a high Z-score of -0.29 SD for young adolescents and -0.10 SD for adult adolescents.

RESULTS AND DISCUSSION

After data charting, the authors assessed the quality of the journal with critical judgment. The systems review involves assessing the potential for methodological bias or systematic error in the included studies so that the reviewer can consider research findings based on the bias.[25] The ten articles were assessed using the JBI which is freely available to investigate the methodological limitations of primary studies.[26]

Descriptive Characteristics of the Study

Based on the assessment, each method has a different Critical Appraisal checklist. The results of the selected articles are in accordance with good quality, namely 7 articles with grade A, 2 articles with grade B, and 1 article with grade C (Figure 2).

The search in three databases used the PEOS framework keyword. The screening was carried out using Mendeley. Then, the screening was described in Prisma Flow Diagram in which 10 articles met the inclusion and exclusion criteria for Critical Appraisal using The Joanna Briggs Institute (JBI).

The articles used in this scoping review have some characteristics. One of the characteristics is the analysis by country and type of study (Figure 3). The diagram above shows that the articles come from some developing countries, namely 1 article from India, 1 article from Nepal, 1 article from Ghana, 1 article from Nigeria, 1 article from Turkey, 1 article from Tanzania, 1 article from the Philippines, and 3 articles from Bangladesh. Based on Figure 4, there are 9 articles used a cross-sectional design and 1 article used a case-control design.

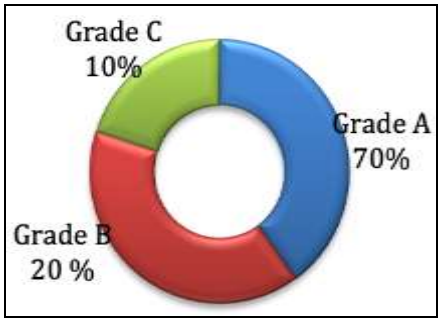

Figure 2. Analysis by Article Grade

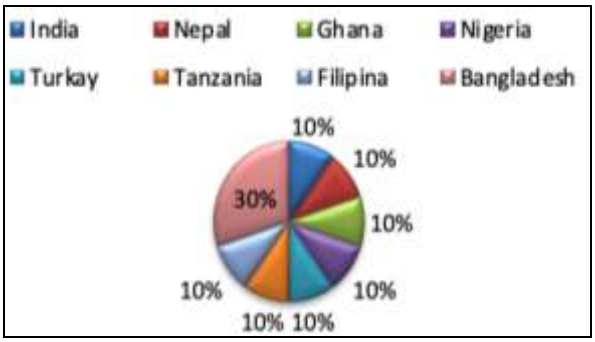

Figure 3. Analysis by Country

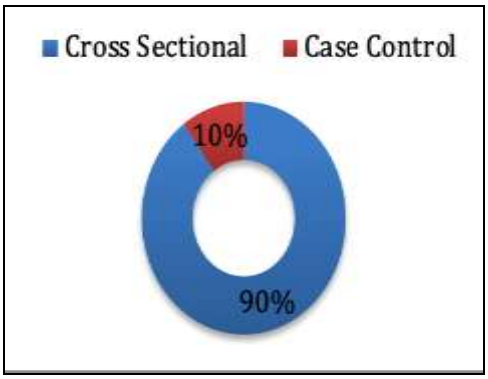

Figure 4. Analysis by Type of Study

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Table 2. Mapping/theme grouping

Theme	Sub-Theme	Article
Socio-demographic aspects	1. Education	4,7 & 8
	2. Economic status	7 & 8
	3. Environment	1
	4. Poor access to health services	10
Impacts of adolescent pregnancy	1. Pregnancy complication	1
	2. Increased maternal and infant mortality	1
	3. Low birth weight (LBW)	3, 7 & 8
	4. Premature birth	3 & 7
	5. Stunting	2, 4,5,6 & 8

Based on Table 2, the articles were grouped by theme:

1. Geographical features
   The systematic search obtained ten articles published in 2018-2022. The articles come from developing countries such as India, Nepal, Bangladesh, Ghana, Nigeria, Turkey, Tanzania, and the Philippines.
2. Topics
   The review generated some topics that fit the focus of the review, namely: socio-demographic aspects and impacts of adolescent pregnancy.

Based on the results of the review of 10 articles, some articles discuss themes that can affect stunting incidence in adolescent pregnancy:

1. Socio-demographic aspect

Giving birth to children during adolescence has a lot of risks. Adolescent mothers often have low resources, low education, and less independence in either high, medium, or low-income countries. Educated women are likely to make independent decisions, have more access to resources for fulfilling nutrition needs, practice exclusive breastfeeding, and provide complete immunization for their children which can help reduce the prevalence of stunting in children.[19] A study obtained a p-value of 0.15 which indicates a relationship between education and stunting incidence.[27]

Adolescent mothers tend to have a low education level which leads to low health awareness and low nutrition resulting in a high stunting prevalence in children.[21] Other studies show that school administration can cause dropout in adolescents and nutritional status[19] and nutritional status.[28] The level of education of mothers in terms of empowerment is an important factor in reducing stunting.[29]

Basic Research Health reports that stunning incidence is mostly influenced by low mothers' education.[30] This finding is in line with a previous study[5] that mothers with a low education level are 1.7 times to have stunted children than those with a higher education levels. Working mothers with elementary school education level are 2.5 times more likely to have stunted toodler than those with a higher education level.[31] The higher the education level of a person, the easier to accept the information and knowledge. A lower education level can inhibit the development of the person's attitude toward the acceptance of new information and values.[32]

Poor economic solid status, low maternal education, and poor food intake can be associated with stunting incidence.[22] The disbelief of the family in managing finance can lead to poor nutritious intake which can cause malnutrition in children.[33] However, in other studies, socioeconomic conditions become a social-cultural aspect affecting health, especially nutritional problems.[34] The low economic status of the adolescent mother causes low health awareness and low nutritional status causes the risk of stunting 2.22 times higher.[21]

Household wealth affects the need for nutrition and the practice of feeding to reduce malnutrition which can cause stunting in children.[35] This finding is in line with a previous study[27] that obtains a p-value of 0,00 which indicates a relationship between income and stunting incidence in children.[27]

Environment is one of the most important indicators of family health, sanitation, and personal hygiene which plays an important role in stunting incidence. Some parents do not highly consider environmental hygiene which can make children susceptible to diseases such as infections and diarrhea.[36] Therefore, it is important to consider environmental hygiene including washing hands with soap[37] Moreover, a lower education and economic status can affect stunting incidence in children.[22] Parent's residences such as living in a surrounding water source also influence sanitation, hygiene, and stunting incidence.[22] This is in line with a study about menstrual hygiene that sanitary facilities, stunning incidence, and living in areas without water for sanitation can cause a higher risk of stunting, namely 31.875 times.[38]

Adolescents are more likely to have a lower ability to make decisions, have worse feeding practices, and are less likely to access nutritional health services which can lead to stunting in children.[16] Children born to adolescents have a lower HAZ and WAZ, a higher prevalence of stunting and lower birth weight than those born to older mothers ($p < 0.05$).[24]

2. Impacts of adolescent pregnancy

Adolescence is considered a decent life stage for strategic health investment as it is a critical period of physical and neuro-material development. Adolescent girls face some health difficulties and the most serious one is adolescent pregnancy due to its negative effects on the health of the mother and baby.[17] Adolescent girls have not reached physical, psychological, and social maturity so adolescent pregnancy becomes an important issue in most countries due to its impacts on both mother and baby's health.[21]

Adolescent pregnancy can cause risk pregnancy, low birth weight (LWB), and bleeding during labor, which can increase deaths in mothers and babies. Low social status and education level can result in a low health awareness and nutritional status leading to a high risk of low birth weight (LWB) and most births of low birth weight infants occur in low and medium-income households.[21] Adolescent mothers have a higher likelihood of giving birth to low birth weight babies and will likely have stunted children with $p < 0.05$.[21-22] Unplanned pregnancy, biological imposition, and bad nutritional status during pregnancy influence low birth weight (LWB) in adolescent mothers. This is strengthened by a previous study[16] that giving birth at a young age can lead to low birth weight (LWB).[39]

Early pregnancy or adolescent pregnancy can lead to intrauterine growth disorder, low birth weight, premature birth, neonatal death, and stunting in children.[3] A study found that repeated pregnancy in adolescence can also result in premature births, maternal complications, and low birth weight which lead to a high-risk factor for stunting.[21] Stunting is a developmental disorder caused by poor nutrition, recurring infections, and inadequate psychosocial stimulation. The most important chronic energy deficiency indicator in children is stunting. Stunting can be defined as a height below -2 standard deviations based on a growth curve.[40] Children with low birth weight are 2.4 times more likely to experience stunting than those with normal birth weight.[22] Moreover, adolescent mothers tend to have a low birth weight baby.[18]

Children born to adolescent mothers are more likely to suffer from stunting 8 times higher than those born to older mothers with a p-value of <0.05.[3] Another study showed that the prevalence of stunting in children born to adolescent mothers is higher than those born to non-adolescent mothers with a p-value of <0.05.[17-21-23] Children born to adolescents mothers have a lower Z score by length or height (average difference -0 - 53 SD), weight by age (-0 - 40 sd), and weight by length or height (-0 - 16 SD) than children born to older mothers ($p < 0.0001$).[39] Besides, adolescent pregnancy is related to stunting incidence.[24] This is in line with a previous study that married women aged younger than 20 years are likely to have stunting children 1.7 times higher than those who are married aged 20 years and older.[40]

CONCLUSION

Adolescent pregnancy is closely related to stunting incidence. Most adolescent mothers have a low education and economic level which can lead to low health awareness and nutritional status resulting in a high stunting prevalence. Adolescent pregnancy can cause risk pregnancy, low birth weight, and bleeding during labor which can increase both maternal and neonatal death. Adolescent mothers have a higher possibility of having a low birth weight baby which can lead to stunting.

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