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Original Research Paper

The role of adolescents in stunting prevention: a qualitative study

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Abstract
Malnutrition among adolescents is a crucial public health problem and tends to cause serious problems in the next generation, one of which is commonly called stunting. Adolescents As agents of change and prospective parents, adolescents play an important role in stunting prevention. The involvement of adolescents can be one of the important factors in breaking the stunting cycle. This study aims to exxplore deeper into the role of adolescents in stunting prevention efforts. Qualitative research with a phenomenological approach is used in this study. The selection of informants uses purposive sampling. There were 8 adolescent girls as the main informants and one health center nutrition officer as a supporting informant. Data obtaining uses in-depth interviews with an average interview duration of 30-40 minutes. Data analysis uses thematic analysis. There are two themes with four sub-themes, namely the role of adolescents in stunting prevention efforts (three sub-themes: clean and healthy living behavior; adolescent compliance with consuming blood-boosting tablets; adolescent involvement in health activities) and obstacles in stunting prevention efforts (one sub-theme: lack of adolescent knowledge about stunting).Lack of knowledge about stunting among the adolescents in Adow Health Center causes adolescents reluctant to play an active role in preventing stunting issues. An interesting finding is that although adolescents lack knowledge about stunting, they are not interested in seeking information about stunting. Therefore, the development of digital educational content about stunting, especially through social media platforms, is expected to attract the interest of adolescents to increase their knowledge and role in stunting prevention. Further research needs to be carried out, especially on how adolescents use social media to share information and build awareness about stunting issues among their peers.

Keywords: qualitative studies; role of adolescents; stunting prevention

1. Introduction

Adolescence is a crucial period characterized by significant growth and development in physical, cognitive, social, and emotional domains. Adequate nutrition is essential for acheving optimal growth and development during this phase (Birru et al., 2018). Failure to meet nutritional needs during this time can lead to stunting in adolescents. Several previous research have reported a high rate of stunting among adolescent girls in countries such as Ethiopia (15%-33.1%) (Abate et al., 2020; Birru et al., 2018; Tamrat et al., 2020), India (27.2%-37.8%) (Kumar & Mohanty, 2023; Rengma et al., 2016), Pakistan (17.49%-32.31%) (Qaisar & Karim, 2022; Samo et al., 2022) and Indonesia (25%) (Maehara et al., 2019).

Stunting in adolescents, particularly adolescent girls, poses a serious threat to the future of a nation. Stunting in adolescent girls is associated with increased mortality and morbidity. Stunting not only causes impaired physical growth but also brain and neurocognitive development (de Onis & Branca, 2016; Miller et al., 2016). As a result, adolescent girls tend to experience lower productivity, learning difficulties, and academic underachievement. They are also at greater risk of developing various metabolic health problems in the future (Rengma et al., 2016; Wolde & Belachew, 2019). Stunted

adolescent pregnant women are at increased risk of preterm delivery, having babies with low birth weight, short birth length, poor neonatal conditions, and low immunity to infection. They are also more likely to experience postpartum haemorrhage and even neonatal death (Alemu et al., 2021; Fall et al., 2015; Ganchimeg et al., 2014; Norris et al., 2022; Gyimah et al., 2021). Stunting in adolescent girls also has the potential to create a cycle of intergenerational malnutrition (Christian & Smith, 2018; Das et al., 2018; Farah et al., 2019). Haque et al. (2022) reported that children born to adolescent mothers with stunting are 2.36 times more likely to experience stunting themselves.

The results of the Indonesian nutrition survey indicate that the prevalence of stunting in toddlers in South Bolaang Mongondow Regency (Bolsel) is 27.9%. This is higher than the stunting prevalence in North Sulawesi Province, which stands at 20.5%, making Bolsel the district with the second-highest stunting rate among the 16 districts and cities in North Sulawesi (Kementerian Kesehatan Republik Indonesia, 2023). Based on a preliminary study conducted by researchers at the Adow Community Health Center (Puskesmas), Central Pinolosian District, South Bolaang Mongondow Regency, it was found that the prevalence of stunting in the Adow service area reached 15%. The health center has implemented several efforts to prevent stunting, including providing additional food such as milk and biscuits for toddlers and pregnant women, conducting the implementation of scheduled posyandu sessions, distributing blood-boosting tablets to adolescent girls and pregnant women, offering training on child feeding, providing counselling for pregnant women and exclusive breastfeeding classes, offering stunting counselling for families in villages, promoting the cessation of open defecation, expanding the coverage of Community-Based Total increase the coverage of stopping open defecation, exincreasing the coverage of Community-Based Total Sanitation (STBM) villages, encouraging clean and healthy living behaviours, implementing Germas, and increasing immunization coverage.

The high stunting rate at the Adow Health Center requires urgent attention and intervention. Preventing stunting must begin as early as possible, starting in adolescence. As agents of change and future parents, adolescents play a crucial role in stunting prevention. Adolescents' involvement is one of the main factors in breaking the cycle of stunting. Research on the role of adolescents in stunting prevention, including the challenges they may face, can provide valuable insights related to the preparation of sustainable programs that actively involve young people. Unfortunately, research on the involvement of adolescents in stunting prevention efforts remains still limited. Previous research on stunting involving adolescent participants has primarily focused on the prevalence of stunting in adolescents (Asebe et al., 2024; Engidaw & Gebremariam, 2019; Kebede et al., 2021) and nutrition education interventions to increase adolescent knowledge about stunting (Shapu et al., 2020; Sriwiyanti et al., 2022). All of these studies are quantitative in nature. Therefore, the researcher employs a qualitative research method that aims to explore deeper the role of adolescents in stunting prevention efforts in the Adow Health Center’s service area.

2. Research Methods

This study is qualitative research using a phenomenological approach. This research was conducted in the Adow Pukesmas Working service area, South Bolaang Mongondow Regency, North Sulawesi Province, Indonesia. Informants for this study were selected by using the purposive sampling technique. Creswell (2017) recommends a sample size of 5-25 participants for qualitative research by using phenomenological design. In this study, the main informants were eight adolescent girls aged 15-19 years, along with one supporting informant, a health center nutrition officer. The study included eight main informants, as data saturation was reached. The adolescents becoming informants in this study were recommended by health workers based on the inclusion and exclusion criteria submitted by the researcher. The inclusion and exclusion criteria for informants are presented in Table 1.

Table 1. Inclusion and Exclusion Criteria for Informants

Inclusion Criteria	Exclusive Criteria
Adolescent Girl	
Aged 15- 19 years	Married women adolescents
Living with family	Adolescents in mental disabilities, speech impairment
Willing to be an informant	and communication difficulties
Health Centre Officer (Nutritionist)	
Actively Serving at Health Centre Adow	Nutrition Officer on Leave
Minimum 2 years of work Experience	Not Willing to be Informant
Minimal Educational Qualifications diploma III	

Data collection used in this study was conducted through in-depth interviews, complemented by interview observations. The interviews took place in separate locations: the informant's house and the Health Center where the nutrition officer worked. This approach aimed to provide a sense of security and comfort for the informants when sharing information.

The average interview duration is 30 to 40 minutes. The stages of the interview that have been conducted are as follows:

a. The researcher contacted the informant who had been instructed by the nutrition officer to determine the time and place of the interview.
b. Before the interview, the researcher provided the informants with an informed consent form. The Informants who agreed to take a participation in this study signed the consent form in writung.
c. For adolescent informants under 17 years old, the informed consent form is signed by the informant's parents.
d. The researcher recorded the interview process using an audio recorder.
e. The researcher conducted additional interviews by telephone to clarify certain aspects of the data from the first interview and gather further information, ensuring the accuracy of the data collected.
f. The researcher documents points considered important during the interview process

The researcher emplys source triangulation and verifies the research data with the data providers to ensure its credibility. Data analysis, conducted using thematic analysis, follows the Collaizi framework and is supported by NVivo tools. The researcher ensures the confidentiality of the informant's identity by using the initials I.1-I.8 for the main informants and I.9 for the supporting informant. This research has received a letter of ethical feasibility from the Research Ethics Commission (KEP) of 'Aisyiyah University Yogyakarta. No. 3144/KEP-UNISA/VIII/2023.

3. Results and Discussion

Based on the results of data analysis, two main themes with four sub-themes were identified in this study: the role of adolescents in stunting prevention efforts (three sub-themes: clean and healthy living behavior; adolescent compliance in consuming blood supplement tablets; adolescent involvement in health activities) and obstacles in stunting prevention efforts (one sub-theme: lack of adolescent knowledge about stunting). The Social Cognitive Theory (SCT) was applied by researcher in interpreting the results of this study. The researcher operates the lens of Social Cognitive Theory as the theoretical model developed by written by Bandura (1986) aligns with the findings of the study. The Social Cognitive Theory emphasizes the model that most human learning occurs in a social environment (Bandura, 1986). As articulated by Bandura (1986), human behaviour can be described through a dynamic, three-way reciprocal relationship, meaning that personal factors, environmental influences, and individual behaviour continuously interact and if a change in any of these factors will impact the other two.

The researcher modified the Social Cognitive Theory based on the findings of the study (Figure 1).

In this research, the researcher added indicators of healthy living behaviour, adolescent involvement in health activities, and adherence to taking blood-boosting tablets to the personal factors component, arguing that several individual factors also influence adolescent behaviour and their role in stunting prevention. In addition, the researcher included indicators of information sources, health programs and health education, suggesting that several environmental factors influence adolescent behavior. Finally, the researcher added an indicator of the role of adolescents in behavioral factors which means that the role of adolescents in stunting prevention efforts is influenced by both personal and environmental factors.

3.1.Theme 1: The Role of Adolescents in Stunting Prevention Efforts

3.1.1. Sub-theme 1: Clean and Healthy Living Behavior

Adolescents' role in the efforts of stunting prevention related to healthy living behaviors, is assessed based on the lifestyle they applied daily. The majority of informants explained that they maintain a clean and healthy lifestyle, as illustrated in the following interview excerpt:

"What I do is eat nutritious food, maintain personal hygiene, maintain cleanliness, namely I take a shower 2 times a day." ***(I.2)***
"I maintain self-hygiene, eat nutritious food, drink milk at night, and take a bath twice a day" ***(I.5)***
"Get enough rest at night, and besides that, I also eat nutritious food." ***(I.4)***

Based on the informant's statement above, the researcher concluded that clean and healthy living behaviours are being practised by adolescents. However, they may not fully realize that consuming nutritious food, maintaining personal hygiene, and getting enough rest are important steps to stunting prevention. Querol et al. (2021) found that age, tobacco use, sedentary behaviours, social support, and hygiene behaviours are among the factors associated with stunting in adolescents.

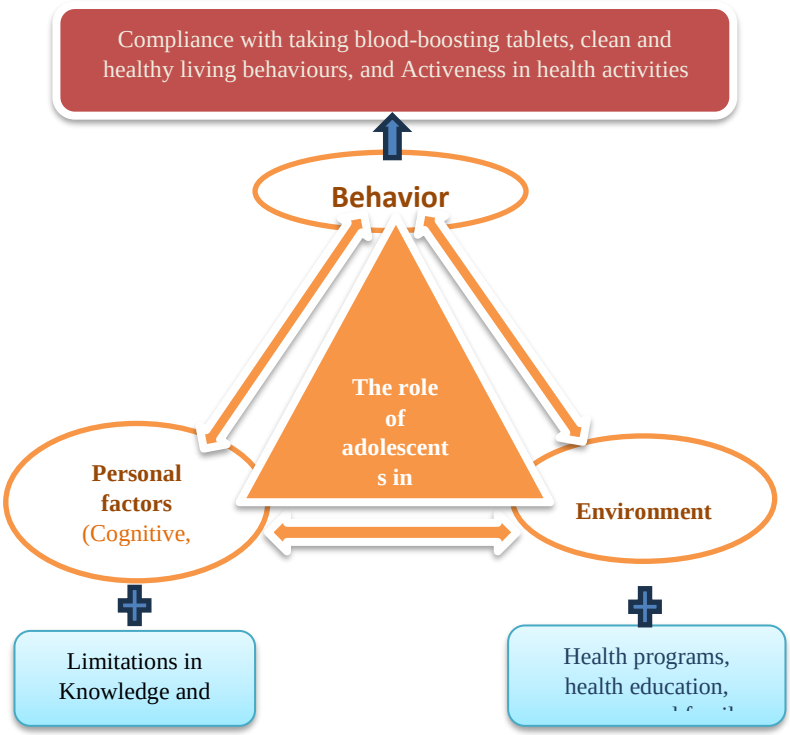

Figure 1. Modification of the Social Cognitive Theory (SCT) - The Role of Adolescents in Stunting Prevention Efforts (Bandura, 1986):

The results of previous studies identified several stunting risk factors related to clean and healthy living behaviors in adolescents, including: lack of food diversity (AOR 2.87-8.07) (Getahun et al., 2023; Mersha et al., 2021); infrequent eating (AOR 4.6) (Demilew & Emiru, 2018; Kebede & Ayele, 2021); lack of access to hygienic latrines (AOR 1.44-5.51) (Abate et al., 2020; Demilew & Emiru, 2018; Hadush et al., 2021; Kebede & Ayele, 2021); lack of access to clean water (AOR 3.17) (Abate et al., 2020); unsafe water consumption (AOR 2.8) (Kebede & Ayele, 2021); lack of handwashing hands with soap before eating and after using the toilet (AOR 3.6-3.9) (Demilew & Emiru, 2018); and food-insecure households (AOR 2.5-2.88) (Getahun et al., 2023; Hadush et al., 2021; Wolde et al., 2015). The results of these studies clearly suggest that eating behaviour and food diversity are the highest risk factors for stunting in adolescents. Adolescent students with a food diversity score of <4 have a 2.61 times higher chance of stunting compared to adolescent students with a food diversity score of ≥4 (Kebede & Ayele, 2021). This is because adolescents who consume a diet with higher diversity are more likely to obtain the energy and essential nutrients necessary for their growth and development.

One of the efforts to improve PHBS behavior in order to prevent stunting is to improve adolescents' knowledge about nutritious food. Brown et al. (2021) found that adolescents still lack knowledge about food and nutrition. Agedew et al. (2023) reported that adolescents' lack of knowledge about nutritious foods increases the risk of stunting by up to 2.83 times. Adolescent knowledge about nutritious food is crucial for effective stunting prevention, as it helps them make informed choices and maintain a healthy diet (Colatruglio & Slater, 2016; Seabrook et al., 2019; Vaitkeviciute et al., 2015). In addition to nutrition, improving adolescents' personal hygiene and their environmental conditions is also essential in the efforts of stunting prevention.

3.1.2. Sub-theme 2: Adolescent Compliance with Consuming Blood-Boosting Tablets

To determine the role of adolescents in stunting prevention, one of them is to look at adolescents' compliance in consuming blood supplement tablets. Consuming blood-boosting tablets is a form of early prevention to reduce the prevalence of stunting. Some informants admitted that they often forgot to take blood supplement tablets, as stated in the following interview excerpt:

*"I take blood tablets, but rarely, because I often forget, I can't remember the last time I took them, and I haven't finished even one strip "**(I. 1)***

*"I drink them, but not often because they don't taste good, I've forgotten the last time I had them " **(I. 4)***

*"I sometimes drink them, but not regularly because I don't like them. I don't like taking medicine, and I forget the last time I took them.." **(I. 8)***

Informant 9, the nutrition officer of the Health Center corroborated the adolescent informant's statement regarding compliance with consuming blood supplement tablets. Informant 9 explained that forgetfulness and nausea were the main adolescents fail to take the blood supplement tablets.

*"There are indeed some students who say they never take the blood booster tablets we give them, citing forgetfulness as the reason. However, it's also possible that they don't like them due to the nausea they experience after taking them." **(I.9)**.*

Adolescent girls are particularly susceptible to anemia and its adverse effects (Balcı et al., 2012; Chandrakumari et al., 2019). Teenage pregnant women are at an increased risk of complications, including bleeding, low birth weight, stillbirth, or premature birth (Uzunov et al., 2022; Yılmaz et al., 2018). The results of the study explain that the high prevalence of anemia in adolescent girls exceeds 50% (Chandrakumari et al., 2019; Selvaraj et al., 2017; Tandoh et al., 2021). The World Health Organization (WHO) recommends a weekly iron and folic acid supplementation program to prevent

and manage anemia in adolescent girls (UNICEF, 2017). In line with these recommendations, the Government of Indonesia has implemented specific interventions as an effort to prevent anemia in adolescent girls (12-18 years old). These efforts include providing supplementation of iron-folic acid tablet every week for 52 weeks through educational institutions (junior high schools, high schools and equivalent (Kementerian Kesehatan Republik Indonesia, 2018).

Weekly iron and folic acid supplementation programs have been proved to be effective in reducing the prevalence of anemia in adolescents (Handiso et al., 2021; Shah et al., 2016). However, our study found that adolescent adherence to taking blood-boosting tablets remains low. This finding is consistent with previous research (Apriningsih et al., 2020; Dubik et al., 2019; Haile et al., 2024; Silitonga et al., 2023). Dubik et al. (2019) reported that adherence to consuming blood-boosting tablets among adolescent girls was as low as 26.2%. Apriningsih et al. (2020) suggested that low compliance may be due to perception of the tablets as unimportant, as well as the onset of side effects. Additionally, the lack of knowledge of adolescent girls about the benefits of blood enhancer tablets allows adolescents them to underestimate their importance, resulting in frequent forgetfullness in taking the tablets.

Adolescent compliance with taking blood supplement tablets is influenced by both behavioral and personal factors, which are key components of Social Cognitive Theory. Compliance in this context reflects an aspect of adolescent's personility, which is manifested in their behaviour. The low compliance observed in adolescents should be a subject for collective evaluation. Improving adherence to blood supplement tablets requires collaboration among various stakeholders, including health centers, schools, parents, and of course, the adolescents themselves. Educating adolescents about anemia and the importance of blood supplement tablets is crucial to raising awareness of this health issue. Furthermomre, the involvement os schools and parents in reminding, monitoring and ensuring that adolescents take their tablets is vital for the success of the program.

3.1.3. Adolescent Involvement in Health Activities

The involvement adolescents in health activities plays a significant role in stunting prevention. Engaging in such activities can positively influence adolescents' personalities and behaviors. Adolescents who are aware of stunting will manifest with behaviors related to stunting prevention. The involvement of adolescents in health activities in this study refers to the involvement of adolescents in participating in health-related socialization. The results of this study show the lack of participation of adolescents in health activities, informants feel not interested in participating in these activities. This can be seen in the excerpt of the interview submitted by the following informant:

"There are socialization at school, but I sometimes follow them, so far I have joined twice" (I.6)
"There are health activities at school, but I rarely participate, I am not interested, when the activity takes place, I just play" (I.1)

Supporting informants mentioned that even though health socialization activities have been carried out, there are still some teenagers reluctant to participate.

"In every activity we do at school, many students participate in the classroom, because they are all students are required to join. However some students are unwilling to participate. For example, even though, we are already in the classroom, but there are still those who are playing outside, there are also those who are allowed to go out while we are explaining" (I.9)

Health activities (socialization) carried out by Puskesmas (helath centre) officers are part of stunting prevention efforts aimed at involving adolescents and increasing their knowledge about stunting. However, the results of this study show that adolescents' participation in increasing knowledge

about stunting is still limited. Many adolescents reported a lack of interest in participating in these activities. Therefore, socialization about stunting should be made as engaging as possible to attract adolescents interest. One of the effective approaches that could be online stunting socialization, particularly through social media. As we already know, teenagers and social media are one thing that cannot be separated. Vogels et al. (2022) reported that 95% of adolescents aged 13-17 use social media, with 46% of them using it almost constantly.

The easy access to various sources of information and learning provided by by social media platforms should be leveraged to increase adolescents' knowledge and awareness about health, especially stunting. Several studies have shown the effectiveness of social media as a platform for adolescent health education (Kulandaivelu et al., 2023; Marlinawati et al., 2023; Muhlisa et al., 2023). Marlinawati et al. (2023) reported that using video about stunting on social media increased adolescents' knowledge about stunting by 25.7% (from 50.9% to 76.6%). This increase in knowledge expected to raise adolescents' awareness of stunting and influence behaviors related to its stunting prevention.

3.2.Obstacles in Stunting Prevention Efforts

3.2.1. Sub-theme: Lack of Knowledge Among Adolescents

The results of this study indicate that the lack of knowledge about stunting among adolescents is a significant obstacle, impacting their behavior in stunting prevention efforts. The primary informant in this study stated that until now, they had never heard and known about stunting. The following are the results of the excerpts conveyed by several informants:

"hmhm what is it, sis, I've never heard or known about stunting" ***(I.2)***
"hehehe I don't know I haven't heard of it either…" ***(I.6)***
"I don't know, I've never heard it " ***(I.8)***

The above statement is supported by an informant, a nutrition officer of Puskesmas (health centre), who mentioned that adolescent knowledge about stunting remains insufficient, even though there has been socialization from the Puskesmas. However, the adolescents show little interest in seeking information about stunting. This lack of interest poses an obstacle for health workers in delivering effective stunting prevention services. The following is an excerpt from the interview with I.9:

"The lack of knowledge about stunting among adolescents, couppled with thier lack of desire and interest in learning about it, remains a challenge , even though the health centre has provided socialization efforts". ***(I.9)***

The results of this study indicate that adolescents lack knowledge about stunting and are not motivated or interested in seeking information on the topic. Knowledge about stunting is closely linked to behaviors that help prevent stunting (Erfiana et al., 2021). Adolescents' understanding of stunting plays a significant role in early prevention efforts. According to Agustina (2019), knowledge among adolescent serves as a crucial indicator in shaping attitudes and behaviors that contribute to stunting prevention.

In the previous chapter, the lack of adolescent compliance with consuming blood supplement tablets was discussed, which may stem from a lack of knowledge about anemia, especially regarding the importance of these tablets in preventin anemia and stunting. As a result, adolescents often neglect to consume the tablets, sometimes due to forgetfulness. Alfi et al (2021) reported that more than three-quarters of adolescents are unaware that anemia can increase the risk of stunting. Anemia and stunting are closely related. Previous studies have shown that anemia contributes to stunting (Gaston et al.,

2022). Stunted individuals tend to have lower hemoglobin levels than those who are not stunted (Losong & Adriani, 2017). Mutumba et al. (2023) reported that 65% of stunted individuals also suffer from anemia. Additionally, pregnant women with anemia are at greater risk of giving birth to babies with low birth weight and length, which can contribute to stunting (Halli et al., 2022; Nadhiroh et al., 2023).

Adolescents are not only agents of change but also future parents. Adolescents girls, in particular are the mothers-to-be who will shape the nation's future. Their journey begins with preparing for a healthy pregnancy, adopting good parenting practice, and establishing healthy nutrinional habits for their children. The nutrition knowledge and health practices learned during adolescence can have a lasting impact on their children's health, especially during the first 1,000 days which is considered the most critical period for growth and development (Sumual & Soputan, 2023).

Beyond being future parents, adolescents can also serve as agents of change within their families and communities. When equipped with the right knowledge about stunting, they can share information with peers and family members, promoting healthy living standards that help prevent stunting. Stunting is a complex issue linked to education, social factors, and the economy. Efforts to prevent stunting require a comprehensive approach that involves adolescents from diverse educational and social backgrounds. Therefore adolescents not only need to be informed but must also be capable of actively contributing to solving this problem.

4. Conclusion

Adolescents in the neighborhood around the Adow Health Centre have not actively participated in stunting prevention efforts due to a lack of knowledge about stunting. This lack of awareness influences their behavior, particularly in relation to their role in stunting prevention. This is evident in their non-compliance with consuming blood-boosting tablets, limited participation in health activities and absence of efforts to adopt clean and healthy living behaviors. Interestingly, although adolescents lack knowledge about stunting, they show little interest in seeking information about the topic. Therefore, developing digital educational content about stunting, especially through social media platforms, is expected to engage adolescents and increase both their knowledge and their role in stunting prevention.

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