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Anemia in Rural Teenage Girls in Indonesia: A Cross-Sectional Analysis of Prevalence and Risk Factors in Gowa, South Sulawesi, Indonesia

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ABSTRACT Teenage girls in Indonesia are disproportionately affected by anemia, a common dietary problem, especially if they live in rural areas. Anaemia affects 23.4% of teenage girls, according to a study. Additionally, those who live in rural areas are twice as likely to suffer from anaemia as people who live in metropolitan areas. Chi-Square analysis using a cross-sectional design is used in this work with questionnaire. By convenience sampling from two high schools that serve students in grades 10 and 11, as well as four junior high schools that serve students in grades 7-9, it was sent to a total of 242 participants by interview from different schools in Gowa, South Sulawesi. At a significant level of p=0.001, 41.3% of students with primarily positive aims are able to recognize their menstrual cycle properly. However, their knowledge of their menstrual cycle is largely lacking (50.3%). The intention and behavior variable with a p-value<0.05 showed that the student had paleness for an extended length of time in their face, eyelids, lips, skin, nails, and palms. By examining anaemia in women of reproductive age can assist in determining the intricate interactions between many factors that lead to anaemia. The inadequate understanding of teenage anaemia in the current study emphasizes the necessity for additional research by academic institutions and governmental. An investigation of the elements that motivate teenage girls to identify anaemia signs ought to be part of this. It can direct the creation of affordable anemic treatment strategies, which is crucial in low- and middle-income countries where anaemia prevalence is highest.

INDEX TERMS anaemia; menstrual cycle; student; teenagers

I. INTRODUCTION

A stage of life known as adolescence is marked by changes in one's body, mind, and emotions. It often lasts from the start of adolescence until the middle of your twenties. People experience major changes in a variety of domains at this time, including biology, cognition, and emotional development. The ability to restrain urges and postpone reward, together with heightened emotional sensitivity and risk-taking behaviors, characterize the adolescent stage. It is a period of transition from childhood to maturity, marked by many physiological, cognitive, and emotional changes, the development of personal values, the emotional separation from parents, and the growth of self-sufficiency [1].

The physiological changes experienced include an increase in height, changes in hormone levels, and the beginning of sexual development. Therefore, the stage of adolescence requires a higher consumption of vital nutrients. Adolescents require a sufficient intake of nutrients to support their growth and development [2]. Anaemia is a common dietary problem that is often observed during adolescence, particularly due to iron deficiency [3]. This condition is more prevalent in female adolescents due to chronic blood loss during menstruation [4]. Iron deficiency anaemia is a significant health concern during adolescence, as it can lead to a wide range of functional consequences across the life course, including reduced resistance to infection and poor cognitive performance. Adolescents may be at risk for anaemia due to factors such as poor dietary intake, low BMI, and socio-economic issues [5]. Adolescent anaemia must be prevented and treated in order to guarantee healthy growth

and development and to avoid detrimental effects on cognitive function and productivity at work. With a prevalence rate of more than 2,500 disability-adjusted life years (DALYs) per 100,000 people, anaemia is a significant factor in the burden of DALYs among teenagers [6]. Anaemia is estimated to affect half a billion women 15–49 years of age and 269 million children 6–59 months of age worldwide. In 2019, 30% (539 million) of non-pregnant women and 37% (32 million) of pregnant women aged 15–49 years were affected by anaemia [7].

In Indonesia, 25.3% (95%CI: 23.9-26.7) of Women of Reproductive Age (WRA) had anaemia. This number is derived from data from the 2018 Indonesia Basic Health Research (Riskesdas), which was carried out in 34 Indonesian provinces. The study examined information from 3,677 women, ages 15 to 49, including information from interviews, weight and height measurements, hemoglobin levels, and results of malaria testing. Anaemia among WRA in Indonesia is classified as a moderate public health concern based on this prevalence rate. Being under 20 years old and being underweight were revealed to be the most common risk factors for anaemia among WRA. Interventions for underweight and younger WRA patients should be prioritized in order to lower the incidence of anaemia in this population [8]

Globally, 32% of women of reproductive age had anaemia in 2015; by 2016, that number had risen to 32.8%. By 2025, the World Health Organization (WHO) wants to see a 50% decrease in the prevalence of anaemia among women who are able to bear children [9]. According to a 2013 Basic Health Research study (Riskesdas), 37.1% of Indonesian young women between the ages of 15 and 24 have anaemia. However, the incidence of anaemia increased significantly in 2018, with a 48.9% prevalence rate [10]

Anaemia is predominantly caused by iron deficiency on a global scale. Furthermore, anaemia can be ascribed to several reasons, encompassing nutritional insufficiencies (such as folate, vitamin A, and vitamin B12), acute and chronic inflammation, parasite infestations, and congenital anomalies [11]. It is essential to educate teenagers about iron-rich foods and sources of iron, as well as encourage them to employ home-based food fortification strategies and regularly monitor their monthly bleeding. These approaches are critical in preventing anaemia [12]. Insufficient dietary practices are frequently linked to limited awareness and information. The 2017 Adolescent Demographic and Reproductive Health Survey conducted in Indonesia summarize by Utami et al, revealed a notable lack of knowledge among adolescents aged 15-19 regarding anaemia. More precisely, the survey indicates that just 13.2% of teenage females and 27.4% of teenage boys have a comprehension of the meaning of anaemia. Moreover, a significant segment of the surveyed populace, specifically 23.9% of teenage girls and 40.5% of teenage boys, demonstrate a lack of knowledge regarding the underlying factors contributing to anaemia [8].

An essential component of changing one's mindset and behavior to prevent anaemia is knowledge. The increasing prevalence of anaemia and stunting has been attributed, in part, to distal reasons such as limited knowledge access. Increased Knowledge, Attitude, and Practices (KAP) about nutrition in relation to anaemia have been shown to improve health behaviors that may help reduce the emergence of other health problems with similar risk factors, like teenage linear growth failure [12]. Knowing how KAP contributes to anaemia might help to clarify key points and dispel misconceptions about the benefits and drawbacks of taking iron supplements as directed. Although KAP's descriptive data on anaemia has been the subject of numerous studies [13][14]. Little is known about how it affects nutritional outcomes. Adolescent girls' KAP still has significant gaps that impact anaemia and linear growth failure. Thus, the purpose of this study was to gather data on teenage girls' KAP toward anaemia and examine its relationship to both anaemia and the outcome of linear development [15].

A study conducted in South Sulawesi province in 2014 found that 54.1% of participants had a low level of understanding, while 69% had unfavourable attitudes towards anaemia. Although there has been an increase in certain aspects of attitudes towards anaemia, the respondents' level of knowledge regarding anaemia is still inadequate, as evidenced by a percentage of 65.3% The search results indicate that there is a lack of understanding and knowledge of anaemia among adolescents in some areas of Indonesia, such as South Sulawesi. The study by Patimah et al. (2016) found that 46.5% of adolescent girls in Maros district, South Sulawesi, had a poor practice of balanced diet, which is a risk factor for anaemia. Additionally, 41% of the subjects had low knowledge about balanced diet, and more than half (55.5%) had negative attitudes toward balanced diet [16]. Similar results were noted in previous studies conducted in various regions. A research conducted in Talang Padang found that 53.1% of adolescent girls had insufficient knowledge about anaemia [17]. The relationship between nutritional status and anemia shows that the relationship between nutritional status and anemia is significant. This is because not all people who have poor nutritional status will be accompanied by a lack of iron in the body, this is because the iron reserves in the body are still sufficient. for the process of forming red blood cells in the body [18]. Meanwhile, the results of research by Zuraidah et al, 2020 show that there is no relationship between protein intake and adolescent Hb levels. This can be caused by a diet that is still not good and generally the fulfillment of protein comes from the same food sources purchased at school or food served outside school. Lack of knowledge remains one of the causes of the high number of teenagers who are unable to meet their protein needs. As for vitamin C and folic acid, which are nutrients that can increase iron absorption, they are generally still in the poor category. This situation is also caused by a lack of knowledge among young women regarding food sources and the importance of these compounds, so they do

not pay attention to them when choosing the food they will consume [19]

People living in rural areas have a double vulnerability to anaemia compared to those living in urban areas. There are several reasons why young women get anaemia, such as eating habits, menstrual cycle duration, and nutritional awareness. Consequently, increasing the efficacy of multisector integrated programs targeted at lowering anaemia in rural areas is imperative [20][21]. However, little is known about the knowledge, intentions, and actions of young women in South Sulawesi with relation to anaemia. The purpose of this study is to ascertain the level of knowledge, intentions, and behavior among teenage girls enrolled in junior high and high schools regarding anaemia and how to prevent it. In addition, this research aims to explore these participants' subjective experiences concerning the prevalent anaemia-related symptoms [22]

II. METHODS

This study utilises a cross-sectional design. The questionnaire specifically targets the participants' comprehension of the factors contributing to anaemia, their perspectives on anaemia, and their dietary practices in connection to the prevention of anaemia. The participants in this study were chosen through convenience sampling from two high schools that serve students in grades 10 and 11, as well as four junior high schools that serve students in grades 7-9, all situated in the Gowa region. The data collection period was from July 23, 2022, to August 10, 2022, with a total of 242 participants. As per the guidelines established by the Indonesian Ministry of Health in 2009 [22], the age group considered falls under the classification of adolescence, specifically encompassing those aged 11 to 17 years. According to the World Health Organisation (WHO), teenagers are those who fall between the ages of 10 and 19 years. Furthermore, the Minister of Health Regulation Number 25 of 2014 in the Republic of Indonesia likewise establishes the same age range for defining teenagers. Data collection is the systematic procedure of acquiring and documenting information for the goal of conducting research.

The dependent variable in this study refers to the overall symptoms of anaemia that participants experience, which are evaluated based on their responses to questionnaires regarding these symptoms. knowledge can be categorised as high if the respondent's rate of accurate responses is 80% or more. Conversely, it is deemed low if the rate of accurate responses falls below 80% [23].

The intention and behaviour variables are categorised into different groups based on their mean values, which act as a threshold for differentiating between positive and unfavourable. Afterwards, a statistical analysis was performed to investigate the factors related to the age and class level characteristics of the participants, followed by a chi-square test comparing two variables between the KAP to every anaemia general symptoms experienced by the respondents.

III. RESULTS

Based on TABLE 1 above, it shows that the dominant respondents came from the category of junior high school students, namely in class 7 a number of 73 people (30.2%), class 8 a number of 62 people (25.6%) and class 9 a number of 62 people (25.6%). Table 2 indicates that the majority of respondents, specifically 149 individuals (61.6%), had a poor degree of knowledge of anaemia. Conversely, only 93 individuals (38.4%) exhibit a high level of knowledge. In addition, the variable representing respondents' desire to prevent anaemia exhibited a similar frequency distribution. Specifically, 126 individuals (52.1%) had excellent intentions, while 116 individuals (47.9%) had unfavourable intentions. The study found that 131 respondents (54.1%) exhibited good behaviour in preventing teenage anaemia, while 111 respondents (45.9%) displayed bad behaviour.

TABLE 1.
Characteristics of Respondents (n=242)

Characteristics	n	%
7th Grade	73	30.2
8th Grade	62	25.6
9th Grade	59	24.4
10th Grade	13	5.4
11th Grade	35	14.5

TABLE 2.
Distribution of Adolescent Knowledge, Intentions and Behavior of Anaemia (n=242)

Characteristics	n	%
Knowledge		
Low	149	61.6
High	93	38.4
Intentions		
Bad	116	47.9
Good	126	52.1
Behavior		
Bad	111	45.9
Good	131	54.1
Total	242	100

TABLE 3.
Bivariate Analysis of General Symptoms of Anaemia Related to Menstrual Experience

Category	Symptom						p-value
	Have you had your period (menstruation)?						
	Never		Seldom		Always		
	n	%	N	%	n	%	
Knowledge							
Low	19	12.8	90	60.4	40	26.8	0.715
High	14	15.1	58	62.4	21	22.6	
Intention							
Bad	26	22.4	81	69.8	9	7.8	0.001
Good	7	5.6	67	53.2	52	41.3	
Behavior							
Bad	17	15.3	74	66.7	20	18.0	0.056
Good	16	12.2	74	56.5	41	31.1	

TABLE 3 demonstrates that 41.3% of students with predominantly positive intentions are able to accurately

identify their menstrual cycle with a significance level of p=0.001. Conversely, they predominantly have limited knowledge about their menstrual cycle. TABLE 4 shows that the student exhibited paleness in their face, eyelids, lips, skin, nails, and palms during a significant period, as indicated by the intention and behaviour variable with a p-value of less than 0.05. However, the data also indicates a low occurrence of students who consistently appear pale throughout their menstruation. Conversely, the majority of students in the "never" category have a pale appearance (TABLE 3)

IV. DISCUSSION

An important finding in this study is that there is no significant link between knowledge variables and the various symptoms of anaemia encountered by young women in Gowa Regency. This is especially fascinating given the existing data, which presents the frequency of these symptoms in Table 2 together with the corresponding level of knowledge. Among adolescent girls in Gowa Regency, anaemia is more commonly observed in the low group, affecting 149 respondents (61.6%), while a lesser proportion of individuals, particularly 93 persons (38.4%), possess knowledge in the high category. The field of anaemia research covers multiple areas, including understanding anaemia in female students, identifying risk factors and causes, investigating the mechanisms behind its development, examining the manifestation of signs and symptoms, and developing strategies for prevention and treatment. Acquiring this knowledge might be seen as a proactive step to prevent anaemia among adolescents. A study has indicated that the presence of anaemia in female students has a notable effect on their capacity to focus, leading to symptoms such as fatigue, easy exhaustion, lack of energy, and dizziness [23].

TABLE 4.
Bivariate Analysis of Common Anaemia Related Symptoms when the Face, Eyelids, Lips, Skin, Nails and Palms Look Pale

Category	Symptom: Almost all the time my face, eyelids, lips, skin, nails and palms look pale						p-value
	Never		Seldom		Always		
	n	%	n	%	n	%	
Knowledge							
Low	75	50.3	62	41.6	12	8.1	0.057
High	60	64.5	30	32.3	3	3.2	
Intention							
Bad	80	69	31	26.7	5	4.3	0.001
Good	55	43.7	61	48.4	10	7.9	
Behavior							
Bad	73	65.8	32	28.8	6	5.4	0.014
Good	62	47.3	60	45.8	9	6.9	

A previous study conducted has revealed that young women who regularly consume vegetables and fruits in their daily diet are more likely to meet their nutritional needs for vital vitamins and iron, the acknowledgement of the necessity to consume vegetables and fruits can be related to the realisation that as individuals grow older, their iron needs tend to increase [24].

Young women who have proactive objectives to reduce the incidence of anaemia can successfully decrease the likelihood of developing anaemia and experiencing its related symptoms. Adolescent females may suffer signs of anaemia when the severity of their condition is substantial [25]. Woman with anaemia may have symptoms such as weakness, lethargy, tiredness, exhaustion, and weakness therefore they almost all the time my face, eyelids, lips, skin, nails and palms look pale. A notable observation is that a substantial percentage (88.2%) of adolescents who have a strong inclination to prevent anaemia consistently report experiencing symptoms such as weakness, lethargy, and fatigue.

Anaemia's symptoms, which include weakness, exhaustion, headaches, lightheadedness, dyspnea, and pale skin, might have a variety of effects on reproductive-age women's intentions and actions. Severe fatigue from anaemia might make it difficult to be motivated or have the stamina to complete everyday chores and activities. This may lead to a decrease in the desire to lead a healthy lifestyle or participate in physical activity. Because anaemia causes physical weakness, people may become more aware of their bodies and be less inclined to participate in activities that could worsen their symptoms. People with anaemia may be more self-conscious of their looks due to their pale skin, which may decrease their desire to participate in activities that could aggravate their skin [26][27].

Dizziness or fainting can make people feel unsteady, which may affect their ability to perform tasks that require balance or coordination and further reduce their intention to engage in activities. The purpose of the current study was to determine the prevalence of anaemia among women in reproductive age in a rural area of Tabas, central Iran. Additionally, the study aimed to identify various potential factors, like socio-cultural, economic, demographic, nutritional, reproductive, and other correlates of anaemia in this region [28].

Teenage girls' desire to lower the incidence of anaemia is significantly correlated with this goal. Positive attitudes among adolescents are associated with better health outcomes, including increased awareness of potential anaemia signs [29]. Examining the subjects revealed that they had pale skin in various areas of their bodies, including the face, lips, eyelids, skin, nails, and palms (TABLE 4).

It's crucial to recognize that not every participant who exhibits a cheerful attitude has the best of intentions when it comes to preventing anaemia. The present issue is young girls' ignorance about anaemia's warning signals, symptoms, and preventative actions. Knowledgeable people might not always be able to effectively apply and convert their knowledge into observable behaviors [30].

Preventive measures against anaemia should be implemented from a young age, especially for young women, as this will help them better prepare for the physical demands of pregnancy and childbirth. According to the idea of planned behavior, a person's intentions are shaped by their attitudes, subjective norms, and sense of behavioral control, all of which have an impact on how much a person engages in particular behaviors [31].

It is imperative that preventive measures against anaemia be implemented as early as possible, particularly for young women, as this will better prepare them to handle the physical demands of pregnancy and childbirth. According to the Theory of Planned Behavior (TPB), a person's attitudes, subjective norms, and perceived behavioral control all play a crucial role in defining their intentions, which in turn affect the behavior they exhibit. In the TPB, the term "base rate" denotes an individual's propensity to act in ways that are frequently noticed by others, and vice versa [32]. In addition, a variety of life contexts, such as environmental elements, personal abilities, and the availability of health programs, have a significant influence on the expression of both positive and poor health behaviors [33].

Based on the current research, in the adolescent stage such as experienced menstruation periode on their life. it can be assumed that the activity patterns of young women who suffer exhaustion during menstruation may have an impact on the prevalence of anaemia, as demonstrated in table 3. Young women should be conscious of their actions and dietary decisions to prevent and control anaemia if they experience lethargy during menstruation. The female participants in this study displayed mainly sedentary behaviour, primarily focusing on academic endeavours and rarely engaging in exercise, which was primarily for pleasure purposes. Furthermore, it is important to mention that a substantial majority of young females depend on vehicular transportation for travelling to educational institutions. As a result, the dependence on cars leads to a decrease in total levels of physical activity. As a result, one noticeable sign of anaemia in young women is a higher likelihood of feeling tired easily due to a lack of physical activity [34].

Therefore, it is crucial for young women experiencing increased fatigue during menstruation to prioritise their intake of iron and take preventive actions to avoid developing anaemia. This may need increasing their consumption of foods that are high in iron and adding blood-boosting supplements to their diet. This is because there is a connection between the activity levels of these persons and the occurrence of anaemia. Several studies have shown that there is a direct relationship between the tendency to feel exhausted during menstruation and a higher chance of developing anaemia in adolescent females [35][36][37][38]. Moreover, when comparing urban environments, it is frequently noted that urban areas have better access to information and education [39]. The level of awareness and knowledge about anaemia in adolescent girls can be influenced by multiple factors, such as cultural beliefs and practices in rural areas. The cultural beliefs can either hinder or support efforts to increase awareness and avoid anaemia [40]. Meanwhile, anaemia is a multifactorial condition, and the causes and contributing factors can vary widely among different populations and geographic regions. This makes it challenging to develop and implement effective interventions to reduce the prevalence of anaemia, including the importance of providing education to improve the knowledge of teenage girls, especially in rural areas where resources and infrastructure may be limited. Therefore, the implication by investigating anaemia in reproductive-age women can help identify the complex interplay of factors that contribute to anaemia, such as dietary diversity, food insecurity, access to clean water, and genetic and environmental factors. This information can be used to develop more effective interventions to address anaemia. However, the study did not measure the haemoglobin levels of the subjects. The findings from these investigations can help guide the development of cost-effective solutions to address anaemia, which is particularly important in low- and middle-income countries where the prevalence of anaemia is highest.

V. CONCLUSION

Individuals in regards to the prevailing symptoms linked to anaemia. the level of knowledge, attitudes, and dietary habits related to anaemia and its prevention among adolescent females in junior high and high schools it may be inferred that the aforementioned points support the notion that the limited understanding of adolescent anaemia in the present study necessitates additional examination by educational institutions and governmental bodies, with an exploration of the motivations of adolescent girls in recognising the symptoms of anaemia. students with predominantly positive intentions are able to accurately identify their menstrual cycle with a significance level exhibited paleness in their face, eyelids, lips, skin, nails, and palms during a significant period, as indicated by the intention and behaviour variable.

Adolescent females who possess a genuine goal to mitigate the occurrence of anaemia can contribute to the reduction of anaemia risk and enhance their ability to detect potential symptoms. In addition to addressing consumption behaviour as a means of preventing anaemia, it is imperative to consider the various factors that influence it, such as experiencing heightened fatigue following physical exertion. Therefore, the prevalence of anaemia can be decreased by educating women and the people in their communities about the causes and effects of anaemia, the value of a healthy diet, and the necessity of taking frequent IFA supplements. Governments, non-governmental organizations, and international organizations can work together to better coordinate and carry out these initiatives on a broader scale, especially in low-income countries where anaemia is most common.

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