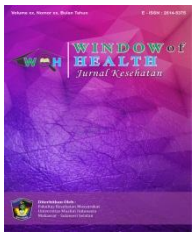
Window of Health Jurnal Kesehatan
journal homepage : www.jurnal.fkmumi.ac.id



ARTICLE RESEARCH

URL artikel: http://jurnal.fkmumi.ac.id/index.php/woh/article/view/woh8106

Exploration of Strategies to Overcome Dual-Triple Burden of Malnutrition in Adolescent Girls Based on Local Wisdom: A Qualitative Study

Sitti Patimah[1*], Masriadi[1], Hasriwiani Habo Abbas[1], Suchi Avnalurini Sharief[2]
[1]Departement of Public Health, Faculty of Public Health, University Muslim Indonesia
[2]Departement of Midwifery, Faculty of Public Health, University Muslim Indonesia
Email Corresponding Author: sitti.patimah@umi.ac.id
sitti.patimah@umi.ac.id[1], arimasriadi@gmail.com, hasriwianihabo.abbas@umi.ac.id, suchiavnalurini.shariff@umi.ac.id

ABSTRACT

The dual-triple burden of malnutrition among adolescent girls in Indonesia is a significant issue, particularly in West Sulawesi Province. Majene Regency has the second highest prevalence of malnutrition in the country, with alarming statistics showing that adolescent girls are affected by stunting (31.5%), anemia (17.9%), Chronic Energy Deficiency (KEK) (22.4%), and obesity (18.9%). This study explores strategies for preventing and managing malnutrition based on local wisdom and cultural practices. This study used qualitative-descriptive research through Focus Group Discussions (FGDs) and in-depth interviews with informants from four secondary schools in Majene District. Key informants include health service heads, nutrition officers, school principals, teachers, food vendors, parents, and female students. Their insights provide a comprehensive view of the challenges and potential solutions. The findings indicate several effective strategies: (1) changing mindsets about instant foods through education; (2) promoting healthy eating and local food consumption; (3) regular distribution of iron supplements in schools; (4) encouraging physical activity; (5) innovating healthy food services in school canteens; (6) revitalizing local government programs; and (7) securing funding through School Operational Assistance and Village funds to support these initiatives. In conclusion, several local wisdom-based strategies can be implemented to address malnutrition among adolescent girls. It is suggested that the results of this research can be a valuable reference for local governments, educators, and various stakeholders committed to improving adolescent girls' nutritional-health status.

Keyword: Strategy; control; stakeholders; malnutrition; adolescent girls

PUBLISHED BY :
Faculty of Public Health
Universitas Muslim Indonesia
Address :
Jl. Urip Sumohardjo Km. 5 (Campus II UMI)
Makassar, Sulawesi Selatan.
Email :
jurnalwoh.fkm@umi.ac.id
Phone :
+62 82188474722

Article history :
Received 3 January 2025
Received in revised form 31 January 2025
Accepted 1 February 2025
Available online 2 February 2025

licensed by Creative Commons Attribution-ShareAlike 4.0 International License.

INTRODUCTION

The global call to end all forms of malnutrition (stunting, wasting, overweight/obesity, anemia) by 2030 is expected to be set back by Covid-19, a global food and nutrition crisis that could worsen all forms of malnutrition worldwide (1,2). Adolescent girls as a "second window of opportunity" to break the cycle of malnutrition still less attention from policies and programs, even though the problem of dual-triple burden of malnutrition [coexistence of under-nutrition (stunting, wasting), micronutrient deficiencies (anemia) and over-nutrition] of adolescent girls is clearly visible throughout the world, as a consequence of epidemiological and dietary transitions that can have a negative impact on the health of the next generation (2,3). The adolescent dietary transition requires improving the food environment because it will influence adolescent food choices and must utilize adolescent values that are widely held outside of nutrition or health, such as social values (4).

As knowledge and priorities in the field of child health and nutrition advance, the conceptual framework of the causes of malnutrition developed by UNICEF requires revision with a strong emphasis on the distal and proximal environmental aspects as a comprehensive and multi-sector system of services and opportunities is needed in achieving the SDGs target (zero malnutrition) by 2030 (5,6). Mitigating the dual-triple burden of malnutrition requires significant changes to implement comprehensive, sustainable changes over decades, and scale up across the global food system (3). Investments in improving the nutritional status of adolescent girls have the potential to yield significant health and economic gains for future generations and should be prioritized, increasing access to nutritious foods and identifying gaps in nutrition knowledge through robust research (7). There is strong interest in addressing health and nutrition behaviors through integrated interventions, namely "double-duty actions" (8,9).

In Indonesia, based on the results of the 2023 Indonesian health survey, there was a change in the prevalence of multiple burden malnutrition in adolescent girls compared to the results of the 2018 basic health research, namely a decrease in stunting rates by 0.8% at the age of 13-15 years (24.9% vs 24.1%) and 5.5% (25% vs 19.5%) aged 16-18 years, as well as obesity also decreased by 0.5% (16% vs 15.5%) at the age of 13-15 years and 3.3% (15.9% vs 12.6%) in the 16-18 age group, while the prevalence of wasting remained in the 13-15 age group (5.4%) while the 16-18 age group increased by 0.8% (4.3% vs 5.1%) (10,11). This indicates that there is a variation in malnutrition problems based on the age group of adolescent girls. However, the prevalence rate of malnutrition is still considered a public health nutrition problem (12).

In West Sulawesi as the second highest province of malnutrition in Indonesia (10), it was found that there are still many types of malnutrition problems in adolescents based on their age group, according to the results of the 2023 Indonesian health survey, the prevalence rate of wasting was higher in the 16-18 age group (9.5%) compared to the 13-15 age group (7.6%), likewise the stunting rate was also higher in the 16-18 age group compared to the 13-15 age group (41.7% vs 29.9%), while obese adolescents were higher at the age of 13-15 years (15%) compared to the age of 16-18 years (10.2%)

(11). The results of our study in Majene Regency found dual-triple burden malnutrition problems in adolescent girls, namely stunting (31.7%), obesity (16.4%), anemia (17.8%), and KEK (32.3%) (13) and had inadequate micronutrient intake for people with obesity and stunting (14,15).

Addressing the problem of malnutrition requires the presence of regional innovation that utilizes local wisdom and adapts to various characteristics of the local area is important, because often the implementation of the program cannot be the same for all areas or regions, in addition, consideration of broader contextual factors in the development of interventions involving multi-sectors/components is still limited, and perception of the problem of double-triple burden malnutrition is an input in the development of interventions is significant. So, the implementation of formative research is important to develop intervention strategies and implementation strategies based on evidence. The high prevalence of dual-triple burden malnutrition in adolescent girls in Majene Regency and the absence of research results related to how local wisdom-based intervention strategies for the prevention and managing of dual-triple burden malnutrition in adolescent girls through the school platform, this research is important to do. The school system is a promising platform to address all forms of malnutrition in adolescent girls (16). Therefore, this study aims to explore strategies and intervention instruments for the prevention and handling of dual-triple burden malnutrition in adolescent girls based on local wisdom.

METHOD

This study used a quasi-qualitative-deductive research type that has been conducted in 4 high schools in Majene Regency located in 2 different sub-districts as areas with a fairly high prevalence of malnutrition problems, namely Pamboang District 42.92% (Public Junior High School 1 and Public Junior High School 1) as rural areas and East Banggai District 22.59% (Public Junior High School 2 and Public Senior High School 2) as urban areas in September 2024. This study uses three types of informants as a form of source triangulation, namely key informants (head of the health office), supporting informants (nutrition officers at the health center), main informants (principals, teachers, food vendors in the school canteen, and parents and female students/teenage girls). The selection of informants was carried out purposively according to the context of this study, with the inclusion criteria are interest to participate without any pressure; the head of the health office and nutrition officers at the health center have been on duty for at least 6 months; teachers are science teachers of grade XI, physical education teachers, food vendors in the school canteen for at least 1 month. Exclusion criteria are being unable to attend during data collection and being represented by someone else. The research instrument is the researcher as the main instrument, supported by a recording device and a camera to take pictures during the research process, as well as interview guidelines to guide data collection or the interview process with informants, small notebooks, and stationery.

Data were collected through an in-depth interview process with informants (head of health services, and nutrition officers at 2 health centers in 2 sub-districts (Pamboang and East Banggai), in addition, focus group discussions were conducted with 3 groups, namely teachers and principals,

community groups (parents of students and food vendors in the school canteen), groups of teenage girls, and also using a documentation process in the form of photos of activities, videos, and recordings that cover all activities during the research process. The data obtained were analyzed in terms of content and thematically through six stages, namely observing data, creating initial codes, searching for themes, reviewing themes, defining and naming themes, and making reports (17). This research was carried out since obtaining ethical permission from the research ethics commission of the Muslim University of Indonesia with number: 448 / A.1 / KEP-UMI / IX / 2024.

RESULTS

Sample characteristics

There were 33 informants who were successfully interviewed during the research, consisting of 1 head of the Health Service as a key informant, 2 supporting informants from nutrition officers at health centers in two sub-districts representing urban (Banggae Timur sub-district) and rural (Pamboang sub-district), and 30 main informants consisting of 7 students (1 person was absent from the 8 people appointed by the school because there was an activity to collect documentation of the healthy school movement at the school that required them to participate), 6 teachers (2 people were absent from the 8 people entrusted by the school because there was an important activity at school that the teacher had to attend), 7 parents (1 person was absent from the 8 people assigned by the school because there was another activity that had to be done); and 8 food vendors were all present as assigned by the school.

The characteristics of each informant (Table 1) show that the main informants consisting of female adolescents (Student) have an age range of 13-16 years who come from junior high and senior high school education units, their parents are between 36-54 years old, with all levels of education at the bachelor's level (DIV-S1), and work as honorary and civil servants, with a work period of 13-20 years, while food vendors are aged between 20-50 years with educational backgrounds, ranging from elementary school till under-graduate, and working in the school canteen between 6 months to 5 years. As for teachers including the principal, all are civil servants with a work period of between 6 months to 26 years, have a under-graduate – post-graduate education, and have an age range of 34-53 years. Another informant category is a key informant who serves as the head of the health service with a S1 education level and is 59 years old and has worked as a civil servant for 22 years and as the head of the Service for approximately 8 years. Meanwhile, the supporting informants who came from the health center's nutrition implementation staff were 2 people with a D3-S1 educational background and both had 18 years of service as civil servants (Table 1).

Table 1: Informant Characteristics

No	Name	Age (yo)	Education	Occipation	Working Time (yo)_	Note
1	RM	59	Bachelor	Civil Servant	22	Head of health service
2	HB	45	Diploma	Civil Servant	18	Health center nutrition implementer Banggae II
3	AS	44	Bachelor	Civil Servant	18	Health center nutrition implementer Pamboang
4	ML	20	SHS	food vendor	0,5	Canteen PSHS 1 Pamboang
5	DW	37	YHS	food vendor	3	Canteen PSHS 1 Pamboang
6	HT	36	Bachelor	honorary	16	Parents of students PSHS 1 Pamboang
7	AF	39	Bachelor	Civil Servant	14	Parents of studPents PSHS 1 Pamboang
8	NM	47	Vocational	food vendor	30	Canteen PJHS Pamboang
9	AP	45	Bachelor	Civil Servant	18	Parents of students PJHS 1 Pamboang
10	HR	37	Diploma	Civil Servant	13	Parents of students PJHS 1 Pamboang
11	WD	47	Bachelor	Civil Servant	22	Biology Teacher PJHS 2 Majene
12	AA	34	Bachelor	Civil Servant	1	Phisical Educ.Teacher PJHS 2 Majene
13	MA	53	Master	Civil Servant	26	vice principal PSHS 2 Majene
14	NL	53	Bachelor	Civil Servant	20	Biology Teacher PSHS 2 Majene
15	AM	35	Master	Civil Servant	0,5	Phisical Educ.Teacher PSHS 2 Majen
16	MS	40	Bachelor	Civil Servant	14	Biology Teacher PSHS 1 Pamboang
17	AD	42	Bachelor	Civil Servant	18	Phisical Educ.Teacher PSHS 1 Pamboang
18	DR	53	Bachelor	Civil Servant	17	Principal of PYHS 1 Pamboang
19	AN	40	Diploma	Temporary employees	19	Parents of students PSHS 2 Majene
20	HW	45	Bachelor	Temporary employees	32	Parents of students PSHS 2 Majene
21	SK	36	Bachelor	food vendor	5	Canteen of PSHS 2 Majene
22	SY	40	YHS	food vendor	5	Canteen of PSHS 2 Majene
23	HS	34	SHS	food vendor	0,5	Canteen of PSHS 2 Majene
24	ET	54	Bachelor	Civil Servant	20	Parents of students PJHS 2 Majne
25	AL	50	Elementary	food vendor	2	Canteen of PSHS 2 Majene
26	KM	36	SHS	food vendor	2	Canteen of PSHS 2 Majene
27	NZ	16				Student of PSHS 1 Pamboang
27	AR	15				Student of PSHS 1 Pamboang
29	IR	14				Stident of PJHS 1 Pamboang
30	NT	13				Stident of PJHS 2 Majene
31	AI	13				Stident of PJHS 2 Majene
32	MR	15				Student of PSHS 2 Majene
33	NA	16				Student of PSHS 2 Majene

PJHS + Public Junior High School **PSHS = public senior high school**

Prevention and managing strategies for dual-triple burden malnutrition based on local wisdom.

From the perspective of female students, strategies to prevent and overcome the problem of multiple malnutrition in adolescent girls are to consume healthy and nutritious foods (fish, meat, spinach, fruits and nuts) and drink iron supplement, eat together at school by bringing healthy food supplies from home, maintain sleep patterns. If fat, reduce consumption of heavy foods such as oil and chocolate and consume vegetables, do not consume alcoholic beverages, exercise diligently. The following is a quote from the informant:

women who experience all of that malnutrition should consume healthy foods like nutritious foods such as fruits, vegetables, meat,... then exercise regularly, do not consume alcoholic drinks.. for obesity, in daily lives they should be active, not lazy...on, fridays usually have a Clean Friday, told to students to bring healthy food, so they eat together (MR, Student, PSHS 2 Majene)

If someone is fat, exercise regularly, reduce heavy foods such as oil, chocolate or eat vegetables.. if someone has anemia, often take iron tablets and maintain a diet, eat nutritious food (AR, Student, PSHS 1 Pamboang)

To prevent anemia, we must maintain our lifestyle and we must also consume a lot of things like fish, spinach, vegetables and so on, and we must also do a lot of exercise to be healthy (AI, Student, PJHS 2 Majene)

Those who experience stunting, anemia and obesity are diligent in exercising and consuming nutritious foods such as fruits and vegetables (IR, Student, PSHS 1 Pamboang)

There are several local foods that according to the students can be used to prevent and overcome malnutrition in adolescent girls such as “bau peapi” (cooked fish), “ambu” fish cooked in coconut milk,

"jepa" (made from mashed cassava mixed with young coconut), and several snacks such as "paranggi" cake (made from brown sugar mixed with flour), "pisang epe" (grilled banana mixed with brown sugar), "jalangkote" (pastel), "sambusa" (based on flour, fish & vegetables), "lesung pipi" cake, and "lapis" cake, but not all adolescent girls like these local foods such as "jepa". The following are excerpts from interviews with several students:

Local food is like "ambu" fish (fish with coconut milk), I like it and many girls also like it). There is also "paranggi" cake but it is not sold at school, and many students like it (AR, Student, PSHS 1 Pamboang)

Types of local food that are liked or favored by many female students --- maybe jalang kote (pastel), sambusa, lesung pipi cake, lapis cake, like sweet things, but not too much. then the "bau peapi: and jepa" (NZ, Student, PSHS 1 Pamboang)

I don't like jepa because it's not tasty,.. I just like cooked fish (bau peapi)... there's also like" banana epe" which is given brown sugar, if it's sold at school the school wants to buy it (AI, Student, PJHS 2 Majene)

The mother of the students said that the government should pay high attention to controlling the sale of instant snacks and drinks to control the healthy eating patterns of teenage girls, the canteen is expected to reduce the sale of drinks that use synthetic dyes and sugars that can cause obesity, mothers need to provide snacks at home so that children do not buy snacks carelessly outside the home, the snacks they prepare are wafers, biscuits and bread (instant snacks), and fried bananas. In addition, iron tablet supplements are also provided for teenage girls at school as a government program. The following is an excerpt from an interview with them:

Basically, we know which foods are healthy, but from the government side, even though we are half-hearted in regulating healthy eating patterns, but this is an unhealthy snack drink while it's still around, automatically we and children will definitely be influenced to buy it,, so it is also difficult to live a healthy life… (ET, Parent, PJHS2 Majene)

food vendors in the canteen can reduce the sale of drinks that use coloring agents.. brings meal, so she doesn't buy snacks at school... if girl is fat, control her eating patterns, reduce consumption of sweets… eat vegetables (HW,Parent, PSHS 2 Majene)

Provision of iron tablet, can be one of the solutions to the problem of adolescent nutrition (HR, Parent, PJHS 1 Pambong Student)

I usually provide food at home, snacks are also like wafers, biscuits... fried bananas, potatoes.. sometimes white bread (HT,Parent, PSHS 1 Pamboang)

Food vendors in the school canteen also said that if stunting occurs in adolescent girls, they need to gain weight, if anemia occurs, they need to take iron tablets, consume fish and eggs to prevent anemia, while adolescent girls who are obese are advised to reduce their consumption of foods, snacks, and foods/drinks that are sweet and contain preservatives. As food vendors in the canteen, they sell yellow rice, fried rice with fish and egg side dishes, chicken meatballs, instant noodles, fried foods (bakwan, fried tofu, nuggets, balado crackers), which they consider to be nutritious/healthy foods), and also sell drinks such as milk and mineral water. However, there are local foods that have shifted from being given since ancient times by their predecessors, namely sweet potatoes, bananas and rice which are used as breakfast before going to school, which are no longer given by parents, due to limited time to prepare breakfast for children at home. Here is a quote from the informant:

I sell yellow rice with fish and eggs to add vitamins to children so they don't become anemic. If they are stunted, they increase their weight... give blood-boosting vitamins to prevent anemia. If fat, reduce the diet, snacks, .do sports (KM, Food Vendor, PJHS 2 Majene)

At school, only allowed to sell milk like Milo, and drinks with lots of sweeteners are prohibited.. reduce sweet drinks to prevent obesity., (SY, Food Vendor, PSHS 2 Majene)

In the canteen provides three white rice dishes for the buffet (fish side dishes, noodles, etc.), yellow rice with fried rice, I think it's nutritious and the cleanliness (SK, Food Vendor, PSHS 2 Majene)

In the past, when our parents were in the morning, we were given rice, bananas, or sweet potatoes to eat before we went to school, but now it's different, children don't have breakfast before going to school, when they arrive at the canteen they immediately consume instant noodles and snacks... BPOM prohibits selling snacks that have a lot of flavorings such as crackers that use Balado seasoning..so I only sell yellow rice and snacks (biscuits, chocolate, wafers and bread) (NM, Food Vendors, PJHS 1 Pamboang)

Meanwhile, the teacher stated that the mindset of teenage girls must be changed regarding fast food and drinks that are considered healthy food, and must reduce consumption of these things slowly which will eventually stop, teenage girls must have breakfast before going to school and bring supplies (healthy food & drinking water stored in a tumbler) to school to reduce consumption of snacks at school, and the public senior high school 2 Majene has made and implemented regulations on healthy food services for students by supervising the availability of fast food/instant food in the school canteen, in addition there is a special schedule for joint TTD consumption by female students every week. Another view expressed is that there is a needs to be socialization from health workers about healthy canteens, especially regarding food that needs to be served at school, in addition socialization is also needed for students, teachers, parents and the community about nutrition and healthy food, and the school must not give up on educating students, so that they understand and can practice healthy food. In addition, teenagers must exercise regularly, and there are school leaders who say that their school is a healthy school (5 healthy indicators, namely healthy nutrition, healthy physical/bodily, healthy soul, healthy environment, and healthy immunization), then there is a joint exercise program, a joint walk that will involve the community, and also a joint eating program will be carried out once a week, it is planned with healthy food brought from home without any ready-to-eat/instant food/drinks and bringing your own drinks from home using tumblers to avoid plastic waste, Here are excerpts from interviews with teachers and school leaders:

It would be better to supervise the availability of ready-to-eat/instant food in the school canteen, there is regulation that are applied referring to Children's Health, namely regulations on healthy food services for students…taking iron tablets together, and providing health education (MT, Deputy Principal, PSHS 2 Majene)

Maybe parents should provide milk or sweet tea for children to drink every morning and bring water in a tumbler so that they don't buy drinks containing sugar....in the morning they are given fruit before leaving, such as papaya or oranges, which can increase their nutrition, regular exercise so that their energy can be released (WD, Teacher, PYHS 2 Majene)

Canteen food is indeed filling but does not make healthy, so children have to change their mindset (NL, Teacher, PSHS 2 Majene)

Need to be socialization of a healthy canteen from Health officer involves children, parents and the community... bring lunch to school... plan to eat together once a week with healthy food brought from home without instant food/drinks... overcoming obesity requires limiting fatty foods and exercising (gymnastics, walking together with the community (DR, Principal of PYHS 1 Majene)

The involvement of parents in efforts to improve the nutrition of adolescent girls, in schools there is a "school committee" whose members include one representative of the parents, and they are given information related to the use of school operational assistance funds for follow-up health checks to assess the effects of providing iron supplement, training for new school health unit administrators,

recruitment of new members, health socialization activities from the Pamboang Health Center, purchase of Hemoglobin examination equipment, which will be used by the Health Center for the student health check program. The following is a quote from the informant:

Parental involvement ..., there is a school committee ... there are representatives from parents .. One of the things conveyed in the school committee regarding the use of school operational assistance funds .., a program for providing iron tablets, follow-up health checks three times a month or once every 6 months, training for new health school unit administrators, then we asked for socialization from the Health Department that is close to us, purchase of Hemoglobin examination equipment (MS, Biology Teacher, PSHS 1 Pamboang)

For the government (health office) they plan to have healthy exercise with the community (including teenage girls) once a week, and to reactivate the fish eating movement which is not just a ceremony, but is more focused on children and teenagers in schools to support the growth and nutritional status of teenagers, optimizing the consumption of iron supplement tablets in schools, but for teenagers who have dropped out of school have not received attention and services so this is a big challenge that requires innovation, although there are already several adolescent health posts in the village but the coverage for the adolescent nutrition improvement program is zero, because the health posts are not active. However, with the integration program of primary services at health posts and health centers that cover all age groups, efforts will be made to optimize adolescent nutrition-health services. This year, the health office will hold cadre training for teenagers (1 male teenager and 1 female teenager) and school health Unit teachers from each school in 25 schools throughout Majene Regency this year using special allocation fund, and it is hoped that after the training it can be implemented because there are school operational assistance funds called “BOS” in schools. In addition, an evaluation of the ongoing program will be carried out such as the provision of Iron Tablet because the MoU already exists between the health office, education office and the ministry of religion, but strong leadership is needed to coordinate and encourage all stakeholders in the program to improve the nutrition and health of adolescent girls, so that awareness grows towards the formation of superior human resources and not view it as something ordinary, so that cross-sector work must be carried out, because sometimes there are recommendations that need to be implemented but there are obstacles in the field beyond the control of the health office such as nutrition officers, midwives who double as several programs including financial affairs so that the implementation of the program is not optimal, in addition there is also a 10% health budget in village funds that has not been optimally utilized which requires communication and coordination; the head of the health office also realized that his leadership pattern was also rather slow, so it needed reinforcement from superiors such as the regent, deputy regent and regional secretary and they went directly to the field to monitor the implementation of the program. Here is a quote from an informant:

There is a program to provide iron tablets and already an MOU with the education office and the ministry of religion, so that the provision of iron tablets once a week can be sustainable in schools... Need a leadership, I also realize that maybe my leadership pattern is slow, sometimes it wants to be done but there are obstacles that may also come from me, actually the problem is very broad, it does require cross-sector work, .. I see this program reaching the village level, for example, health has a budget there is 10%, maybe its utilization is not maximized ... the movement to eat fish can be maximized again, we can intensify innovations such as moving healthy exercise on car free day, healthy exercise once a week .. there are youth posyandu in every village and only a few are active ... now there is a posyandu integrating primary services at the posyandu

level to the health center according to the life cycle ... It needs to be evaluated what is already running .., Maybe later after the training , they will be able to do because there are limited manpower, and they also have school operational assistance funds (RM, Head of Health Office)

The nutrition implementation staff of the health center suggested that due to their limitations as officers, there should be collaboration with the education office in terms of reporting & evaluation, where the school reports to the relevant office the scope of iron tablet consumption by school children (adolescent girls) and the results of the Hemoglobin examination, so that the education office can evaluate the effectiveness of the iron supplement program in school children (adolescent girls) and there is feedback between them. In addition, to prevent anemia and stunting, it should start with a nutrition improvement program in 1000 first day of life through the provision and compliance of iron tablet consumption and consumption of balanced nutritious food accompanied by counseling/education in collaboration with health promotion officers at the Health Center. Efforts to optimize iron tablet consumption in adolescents who drop out of school, nutrition implementing staff has also conveyed to cadres to convey to the community who have adolescent girls are encouraged to consume iron supplement. Here is an excerpt from an interview with the nutrition implementing staff health center:

It might be more successful if the school sends a report to the Education Office on the number of teenage girls and who consume and do not the iron tablet, so that, it can be evaluated through the Education Office, so we only monitor the provision of iron tablet and check the Hb of all teenagers … adolescent girls who suffer from anemia and stunting, nutritional improvement can be started from 1000 first day of life, nutritional improvement is done by complying with consume iron tablet and paying attention to nutritional intake by consuming balanced nutritious food accompanied by education and counseling. (HB, Nutrition Implementer, Banggae Timur Health Center)

We conveyed to the cadres and mothers, to encouraged adolescent girls to continue consume iron supplement, ,.. we also provide counseling on the problem of iron tablet, the meaning of iron tablet, the purpose of providing iron tablet, the impact if she does not drink iron tablet .. it is also necessary to pay attention to the problem of balanced nutrition (AS, Nutrition Implementer Pamboang Health Center)

Regarding healthy snacks at school, health center nutrition implementer (called TPG = Tenaga Pelaksana Gizi Puskesmas) stated that health centers may be able to determine which snacks are allowed to be sold at school, schools and canteens can also innovate to provide healthy snacks such as fruit, and there needs to be education for parents about food processing with various recipes, such as not only cooked fish (bau peapi) so that teenagers do not get bored, including innovations in local food processing such as: (1)“jepa” (grated cassava mixed with coconut) filled with fish floss, penja fish and mairo; (2) “sokkol lame ayu”: made from grated cassava (source of carbohydrate), young coconut (source of fat), and green beans (source of vegetable protein), it consumed with dried fish; (3) “loka pere” (pere banana) as a local fruit rich in vitamins and minerals. Here is an excerpt from an interview with a nutritionist at the health center:

In the future, the health center can determine snacks at school (HB, Nutrition Implementer,Banggae Timur Health Center)

Preventing and overcoming obesity... school can innovate together with the canteen to provide healthy snacks like fruit snacks,., educate the mother about the types of fish processing, including jepa is made from cassava which is usually processed by mixing with young coconut, it can be varied with other foods, for example jepa is filled with fish floss or peja or mairo fish... jepa can also be modified to be formed into a sokkol lameayu, contain cassava, green beans are source of vegetable protein, and coconut as a source of fat,. eaten together with dried fish.. there is a local food called loka pere (banana) which can be cooked or fried (AS, Nutrition Implementer Pamboang Health Center)

DISCUSSION

From the above strategies, there is something unique in adolescent girls namely fish and vegetables are considered nutritious and healthy foods but they do not want to consume it, because the taste bad, do not like, not interested, and cause bad breath. This indicates a potential gap in awareness or preference for certain nutritious food sources among adolescents. Therefore, a coordinated and goal-oriented approach with multi-sector stakeholders is essential to further improve nutritional literacy and overall nutritional outcomes for adolescents and the community.

This study is in line with research results in Telangana India, revealed that adolescents consider protein-rich food groups important, but they do not actually consume them, which is reflected in their nutritional outcomes (stunting), adolescents have the perception that meat, fish, and offal and eggs are considered healthy foods; fruits and vegetables rich in vitamin A are not considered the most important foods among adolescents; adolescent girls seem to have a fair idea of the importance of food groups such as dark green leafy vegetables, carrots, meat, and eggs that are rich in nutrients but cannot determine their nutrition or function, this may be due to a lack of awareness of nutrition (18). The results of the narrative essay showed that the factors that determine adolescent food choices are food palatability, family eating habits, cost and availability of food (19). Several qualitative study results showed that the food environment does not support healthy food choices for adolescents, then adolescents choose food based on their personal preferences related to social acceptance among their peers, choosing cheap, affordable and available fast food at school (20), preference for sweet food tastes, inadequate knowledge about diet are the main factors influencing unhealthy food choices for adolescent girls (21), in addition to social influences such as peers and the macro environment related to food provision (22). Adolescents are vulnerable to the structures, influences, and offerings of obesogenic food environments. Home, school, retail, and online environments play a significant role, each providing opportunities for intervention. Communities must safeguard adolescent health by providing healthy food choices. Appropriate policies are needed to change these environments and encourage healthy behaviors. In addition, education and public campaigns can increase adolescent awareness of good food choices. Especially for at-risk girls, interventions to improve iron status are critical to protect their health and future (23). Furthermore, evidence-based obesity prevention continues to emerge, with promising interventions/policies that have the potential to prevent obesity including (1) fiscal policies such as taxation and subsidies; (2) regulatory policies on marketing and advertising (including direct marketing to children in schools); (3) food systems approaches, including the many modern food sales and out-of-home food service options—some formal and many informal; (4) education sector policies that impact areas such as school cafeterias, marketing and sales of unhealthy foods in and around schools, and physical activity in schools; (5) Transportation and urban design interventions such as public transportation, city and building design; and (6) early childhood nutrition programs to address malnutrition (24).

In this study it was found that the intervention strategy to improve the food environment for adolescents at school is through regulations on healthy food services for students who supervise school canteens for the sale of instant food/drinks, but it has not been optimal in providing a significant impact on changes in food/drink instant patterns in adolescents, because food vendors complained that their sales turnover had decreased because adolescents preferred to buy instant food/drinks outside school. So this requires a strong commitment from school leaders and teachers to optimize these regulations in supporting the nutrition and health of adolescent girls. The results of this study are in line with the results of a qualitative study that evaluated the implementation of school-based interventions to promote healthier eating habits among adolescents involving students, teachers, principals, canteen operators and convenience stores in schools, a number of initiatives and changes were obtained from stakeholders to switch to a healthy school canteen program that pays attention to student food preferences, healthy food subsidies that can encourage healthy eating patterns, but obstacles were found in the implementation of healthy schools, namely students' perceptions of healthy food and students' eating habits that affect the profits from food sales if a healthy canteen is to be implemented (25). Monitoring and supervision of school canteens are still very limited, where unhealthy food and drinks are still available in large quantities and cheaply in school canteens, which can influence students' preferences in choosing food (26).

Schools play an important role in supporting adolescent health and can help prevent obesity. Good health and nutrition are the foundation for learning. Investing in the health and nutrition of school-aged children and adolescents provides immediate and lifelong benefits for individuals, as well as significant development benefits. The School Nutrition-Health Program contributes to the Sustainable Development Goals (SDGs) in education, health, and gender equality, as well as those related to poverty, hunger, water and sanitation, economic growth and strong institutions, and plays an important role in realizing the rights to education, health, and food (27). In addition, schools play an important role in shaping students' behavior by providing knowledge, attitudes, values, and skills for healthy living. By creating a supportive environment, schools help students develop sustainable healthy habits. This environment also influences the attitudes of staff, families, and the surrounding community. Investing in school health helps children and adolescents grow up healthy. Schools can improve student health by: a) creating a positive environment that supports achievement, and b) teaching health literacy and competencies so that students can make good decisions. By implementing these strategies, schools can reduce the risk of disease, support mental health and prevent infectious diseases, providing long-term benefits. Schools are located throughout in the communities, can reach populations that are difficult to access by health services. To achieve this, there needs to be collaboration between the health and education sectors, and linking school health services to national health systems to achieve universal health coverage (28).

A study in Irish secondary schools showed a difference in views between staff and students on how to eat healthily. Teachers focused more on education, while students saw the problem as an

unsupportive food environment. Students called on schools to create healthy food spaces and implement policies that support their wellbeing. In addition to teaching nutritional literacy, it is also important to change the wider food environment that influences adolescents' food choices. The design and offering of food in stores and online strongly influences adolescents' food decisions (29). No single intervention can solve the double burden of malnutrition, and efforts must be sustained over decades to realize their full benefits (3).

CONCLUSIONS AND RECOMMENDATIONS

Based on the objective of this study to explore the strategies and intervention instruments to address malnutrition among adolescent girls based on local wisdom, it was found that there are several strategies and instruments for education in school that can be implemented to address malnutrition among adolescent girls. So, the result of this study can be a valuable reference for local governments, educators, and various stakeholders who are committed to improving the nutritional-health status of adolescent girls. Strong leadership from the highest level of leadership in Majene district is recommended as well as a strong commitment and intensity of coordination from all stakeholders for the implementation of cross-programs in a sustainable manner by utilizing the available budget across sectors, as well as monitoring and evaluation of programs that are coordinated with other stakeholders to improve nutrition for adolescent girls.

ACKNOWLEDGEMENT

We would like to express their deepest gratitude to the Chancellor of Universitas Muslim Indonesia who has provided research funding support, and all informants involved in this research until completion, including the principal and teachers who were the intermediary between us and the informants of this research.

REFERENCES

1. Wrottesley S V., Mates E, Brennan E, Bijalwan V, Menezes R, Ray S, et al. Nutritional status of school-age children and adolescents in low- and middle-income countries across seven global regions: a synthesis of scoping reviews. Public Health Nutr. 2022;26(1):63–95.

2. Shinde S, Harling G, Assefa N, Bärnighausen T, Bukenya J, Chukwu A, et al. Counting adolescents in: the development of an adolescent health indicator framework for population-based settings. eClinicalMedicine [Internet]. 2023;61(July):1–14. Available from: https://doi.org/10.1016/j.eclinm.2023.102067

3. Wells JC, Sawaya AL, Wibaek R, Mwangome M, Poullas MS, Yajnik CS, et al. The double burden of malnutrition: aetiological pathways and consequences for health. Lancet. 2020;395(10217):75–88.

4. Neufeld LM, Andrade EB, Ballonoff Suleiman A, Barker M, Beal T, Blum LS, et al. Food choice in transition: adolescent autonomy, agency, and the food environment. Lancet. 2022;399(10320):185–97.

5. Black MM, Lutter CK, Trude ACB. All children surviving and thriving: re-envisioning UNICEF's conceptual framework of malnutrition. Lancet Glob Heal [Internet]. 2020;8(6):e766–7. Available from: http://dx.doi.org/10.1016/S2214-109X(20)30122-4

6. Maehara M, Rah JH, Roshita A, Suryantan J, Rachmadewi A, Izwardy D. Patterns and risk factors of double burden of malnutrition among adolescent girls and boys in Indonesia. PLoS One. 2019;14(8):15–8.

7. Krebs N, Bagby S, Bhutta ZA, Dewey K, Fall C, Gregory F, et al. International summit on the nutrition of adolescent girls and young women: consensus statement. Ann N Y Acad Sci. 2017;1400(1):3–7.

8. WHO. The double burden of malnutrition (Policy Brief). 2017;

9. Dietz WH. Double-duty solutions for the double burden of malnutrition. Lancet [Internet]. 2017;390(10113):2607–8. Available from: http://dx.doi.org/10.1016/S0140-6736(17)32479-0

10. Kemenkes. RISKESDAS. 2018.

11. Kemenkes. Survei Kesehatan Indonesia. Kemenkes. 2023.

12. WHO. Interpretation Guide 2nd Edition [Internet]. Nutrition landscape information system (NLIS) Country Profile. 2019. Available from: www.who.int/nutrition

13. Patimah S. Strategi Pencegahan Anak Stunting Sejak Remaja Putri [Internet]. Deepublish Publisher : Yogyakarta. 2021. Available from: https://www.google.co.id/books/edition/Strategi_Pencegahan_Anak_Stunting_Sejak/Kn9OEAAAQBAJ?hl=id&gbpv=1&dq=strategi+pencegahan+anak+stunting+sejak+remaja+putri&pg=PA17&printsec=frontcover

14. Patimah S, Septiyanti, Sundari, Arundhana AI. Magnesium Intake and Stunting were Associated with Obesity among Adolescent Girls. Urban Health [Internet]. 2021;3(1):1–8. Available from: http://journal.poltekkes-mks.ac.id/ojs2/index.php/Prosiding/article/view/2478

15. Patimah S, AI A, Sundari, Septiyanti. Iodine Intake Deficiency As a Key Predictor of Stunting Among Adolescent Girls in Coastal Area, Majene District. Proc Int Conf Food, Nutr Heal Lifestyle. 2022;1(1):1–9.

16. Shinde S, Wang D, Moulton GE, Fawzi WW. School-based health and nutrition interventions addressing double burden of malnutrition and educational outcomes of adolescents in low- and middle-income countries: A systematic review. Matern Child Nutr. 2022;(September):1–36.

17. Nowell LS, Norris JM, White DE, Moules NJ. Thematic Analysis: Striving to Meet the Trustworthiness Criteria. Int J Qual Methods. 2017;16(1):1–13.

18. Ravula P, Kasala K, Pramanik S, Selvaraj A. Stunting and Underweight among Adolescent Girls of Indigenous Communities in Telangana, India: A Cross-Sectional Study. Nutrients. 2024;16(5):1–18.

19. Sobngwi-Tambekou JL, Guewo-Fokeng M, Katte JC, Ekwoge DD, Kamdem L, Fezeu L, et al. Development and implementation of a nutrition education programme for school-going adolescents in the context of double burden of malnutrition: a narrative essay. Pan Afr Med J. 2024;47(40):1–16.

20. Mukanu MM, Thow AM, Delobelle P, McHiza ZJR. School Food Environment in Urban Zambia: A Qualitative Analysis of Drivers of Adolescent Food Choices and Their Policy Implications. Int J Environ Res Public Health. 2022;19(7460):1–18.

21. Mama Chabi S, Fanou-Fogny N, Nago Koukoubou E, Deforche B, Van Lippevelde W. Factors Explaining Adolescent Girls' Eating Habits in Urban Benin: A Qualitative Study. Adolescents. 2022;2(2):205–19.

22. Devine LD, Gallagher AM, Briggs S, Hill AJ. Factors that influence food choices in secondary school canteens: a qualitative study of pupil and staff perspectives. Front Public Heal. 2023;11(July):1–14.

23. Moore Heslin A, McNulty B. Adolescent nutrition and health: Characteristics, risk factors, and opportunities of an overlooked life stage. Proc Nutr Soc. 2023;82:142–56.

24. Shekar M, Popkin B. Obesity: Health and Economic Consequences of an Impending Global Challenge. 2019.

25. Azizan NA, Papadaki A, Su TT, Jalaludin MY, Mohammadi S, Dahlui M, et al. Facilitators and Barriers to Implementing Healthy School Canteen Intervention among Malaysian Adolescents: A Qualitative Study. Nutrients. 2021;13(3078):1–14.

26. Rachmadewi A, Soekarjo D, Maehara M, Alwi B, Mulati E, Rah JH. School Canteens in Selected Areas in Indonesia: A Situation Analysis. Food Nutr Bull. 2021;42(2):225–46.

27. UNESCO. School health and nutrition around the world. Ready to Learn and Thrive. 2023.

28. WHO. Regional Framework on Nurturing Resilient and Healthy Future Generations in the Western Pacific. 2022.

29. Browne S, Barron C, Staines A, Sweeney MR. We know what we should eat but we don't a qualitative study in Irish secondary schools. Health Promot Int. 2019;1–10.