



Screening Modifications in Risk Factors for Triple Burden of Malnutrition

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Abstract. The triple burden of malnutrition is a public health problem in every country that is increasing every year, especially among toddlers, adolescents, and women ahead of marriage. This research aims to determine the risk factors that cause the triple burden of malnutrition screened with modifications during a pandemic. This was observational analytical research with a cross-sectional approach. This study used purposive sampling with respondents of 53 adolescent girls. A modified screening method of 24-h individual recall observation sheets with Google Forms and video calls was made for one week. The instruments used in this study were a google checklist of a 24-h individual recall observation sheet modification form and a WhatsApp video. The data was analyzed using Explanatory Factor Analysis (AFE). Data from the study showed an incidence of the weight of less than 17%, normal weight of 37.7%, and tended obesity of 45.3% of the 53 respondents. The last H of KMO-MSA was 0.640, with the significance value of Bartlett's Test of Sphericity of $0.048 < \text{small than } 0.05$. Moreover, the risk factors are income, diet, parenting, menu preparation, type of snack consumed, and physical activity, but consumption of dietary supplements is not included as the risk factor. Screening for nutritional problems must be carried out. With the modification of the screening method, it will be easier to produce accurate data. Indonesia needs productive adolescents, which can only be achieved if the adolescents are healthy and have good nutritional status. However, the obesity risk will open up opportunities for cases of health.

Keywords: Screening · Risk Factors · Triple Burden of Malnutrition

1 Introduction

Malnutrition is a physical health problem characterized by the presence of energy and nutritional mismatches in child and adult physical conditions [1]. At the world level, nutritional health problems are part of the priority from 2016 to 2030, which emphasizes its development in various sectors, one of which is nutritional problems in micronutrient deficiencies and obesity [2]. The triple burden of malnutrition is a global nutritional problem and a public health problem in every country that is increasing every year, especially in toddlers, adolescents, and women ahead of marriage. The triple burden of malnutrition includes wasting and stunting, obesity, overnutrition, namely overweight and obesity and micronutrient deficiencies [3].

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Based on WHO data globally, approximately 1 million juvenile deaths in 2015 [2]. About 60% (588,000) of them are young people between the ages of 15 and 19. Leading causes of death include HIV/AIDS, intestinal and lower respiratory tract infections, diarrheal diseases, traffic accidents, and drowning. According to 2018 data from the Ministry of Health of the Republic of Indonesia, 25.7% of adolescents aged 13–15 and 26.9% aged 16–18 were undernourished and severely undernourished. In addition, 8.7% of adolescents aged 13–15 and 8.1% of adolescents aged 16–18 were underweight and very underweight. On the other hand, the prevalence of overweight and obesity was 16.0% among adolescents aged 13–15 and 13.5% among adolescents aged 16–18 [4]. This problem is an important factor that must be considered, especially the basic problem, namely nutrition which is also an indirect cause of the risk factor for adolescent death [5]. While in adults, the problem of malnutrition is a common thing that occurs and is part of the development of geriatric syndrome. The 2018 Basic Health Research (Riskesdas) showed that obesity, diabetes, and stroke have increased. In addition, the increase in malnutrition, wasting, and stunting is still high [6]. 25% or 1/4 of adolescents suffer from stunting or short bodies due to malnutrition. Meanwhile, the national stunting rate in 2019 was 27.67%, down 3.1% from 2018, which reached 30.8%, then 8.7% of adolescents aged 13–15 years and 8.1% of adolescents aged 16–18 years with thin and very thin conditions [7]. Malnutrition also reflects the existence of cases of weight loss caused by micronutrients that are often overlooked by the community, the impact of which triggers the emergence of acute and chronic diseases [8]. In developed countries, this case is of concern because it can develop into an acute and chronic disease at risk of high cases in adults with a higher ratio [6].

Nutritional problems in Indonesia include malnutrition and overnutrition problems. Problems of malnutrition that have received a great deal of attention are chronic malnutrition in the form of small or “underdeveloped” children and acute malnutrition in the form of lean or “running” children. Similarly, malnutrition, including malnutrition (stunting, underweight), inadequate vitamins and minerals, overweight, obesity, and consequent diet-related non-communicable diseases, affects people in all countries. It is a complicated issue. Obesity is increasingly associated with COVID-19 cases. Based on the results of the Association’s research, it is said that the prevalence of obesity cases is to have a statistical and independent relationship value of obesity on a global scale in the world [9].

The problem of the triple burden of malnutrition due to a very fast transition period in industrialization, political decentralization, urbanization, and the economy, causes a lot of income inequality that affects the occurrence of a community gap [10]. These nutritional problems can actually be determined based on the health and nutritional status of the mother [11]. The problem of a double nutritional burden in the household may occur due to age differences between family members which causes differences in physiological conditions and nutritional needs. This leads to potential differences in resource allocation within the household [4]. Poverty and low education are seen as the root causes of malnutrition. The problem of obesity associated with various non-communicable diseases (NCDs), such as heart disease, hypertension, diabetes, stroke, and lung cancer, are considered problems of developed and rich countries, not problems

of developing and poor countries. Reality shows that both nutritional problems are currently also occurring in developing countries. Developing and poor countries currently have a double burden due to these two nutritional problems [12]. Therefore, it is necessary to deepen and evaluate related factors that affect the triple burden in Indonesia and whether there have been changes that need to be modified, especially the current conditions of the pandemic, which have a major impact on food quality, socioeconomics, and environmental sanitation [13].

In today's digital era, almost everyone has smartphone facilities to connect with others and access information easily, so innovation is needed to overcome public health problems. It is possible to screen for nutritional problems that are easily accessible [14]. Screening services are carried out while still applying the principles of PPI, and physical distancing, modified using digital media is part of the solution to meet nutritional needs. This has been recommended by the Ministry of Health of the Republic of Indonesia when the COVID-19 period is ongoing [15].

2 Method

2.1 Research Design

This type of research is analytical observational research based on the aim of knowing the factors that influence the triple burden of malnutrition. Analytical observational research in this study uses a cross-sectional design where measurements of independent variables, intervening variables, and dependent variables were carried out at one time.

2.2 Study Participants

The sample of this study was taken by purposive sampling in adolescent girls aged 18–21 years in the environment of the Midwifery Study Program of the University of Muhammadiyah Ponorogo, which can be collected from a total of 53 people. This is due to the limitations of the COVID-19 pandemic.

2.3 Instrument and Data Collection

A modified screening method of 24-h individual recall observation sheets with google Forms and video calls was made for one week. The instruments used in this study were a google checklist of a 24-h individual recall observation sheet modification form and a WhatsApp video. The screening method was modified because when the research took place, there was the PPKM period (Restrictions on community activities) because of the red zone. The instrument was attached to the respondent's consent sheet, where an explanation of the procedural research was given without coercion.

2.4 Data Analysis

This factor analysis examined all existing variable relationships (interdependencies between variables) in a way that was used to group or accurately abstract many variables

into a few new variables or factors by choosing Explanatory Factor Analysis (AFE). To calculate the correlation matrix, the researchers used the Bartlett method test of sphericity as well as MSA (Measure of Sampling) measurement. Moreover, for the extraction process or factoring, the researchers used Principal Component Analysis (PCA). The researchers also determined the number of most influential factors and rotating factors to clarify the position of a variable using the varimax method. Then, the researchers interpreted the factors.

3 Results

From the results of online observations, the results of the study were obtained as follows (Fig. 1):

Based on the histogram, it can be seen that the incidence of BMI is less than 17%, normal BMI is 37.7%, and it tends to be obese 45.3% of the 53 respondents.

From the results of this BMI, there are factors measured by the data (Table 1).

Then based on the analysis of explanatory analysis factor data obtained the data below (Table 2):

In the calculation results, the KMO-MSA result is 0.616, meaning $0.616 > 0.5$, then the factor analysis process can continue. The next process is the Anti-image Matrix table to determine which variables are suitable for use in advanced analysis. In the table, there is a code “a” which means a sign for Measures of Sampling Adequacy (MSA). MSA values for each variable are 0.658 (P1), 0.670 (P2), 0.814 (P3), 0.788 (P4), 0.780 (P5), 0.715 (P6), and 0.424 (P7). So, the smallest variable that must be issued first is the smallest variable, whose MSA is 0.424 (P7), which is supplement consumption. The last result of KMO-MSA was 0.640, with the significance value of Bartlett’s Test of Sphericity being $0.048 < \text{small than } 0.05$. The values of the matrix components that are close to each other with component 1 are food preparation of 0.814 and family parenting of 0.715. The value of the matrix components adjacent to each other with component 2 is the family income of 0.658 with physical activity of 0.780. The value of

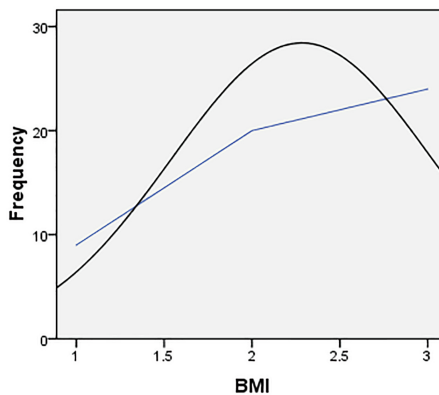


Fig. 1. Histogram data on Body Mass Index Measurement Results

Table 1. Triple Burden of Malnutrition Factor Screening Measurement Data

Criterion	Information	Percentage
Income	>1 million	7.5
	1 million - 3 million	49.1
	3 million - 4.5 million	35.8
	>5 million	7.5
Family Parenting	Mother only	7.5
	Dad alone	11.3
	Grandmothers, uncles, aunts	9.4
	Parents exist	71.7
Diet	Orderly	88.7
	Irregular	11.3
Food Menu Preparation	Unbalanced menu	22.6
	Balanced menu	77.4
Interlude food consumption	Instant Food	11.3
	Fast food	15.1
	Traditional Food	11.3
	Mix (All kinds of food)	62.3
Physical Activity	Never a sport	30.2
	Rarely exercise	47.2
	Frequent exercise	22.6
Take Supplements	Not	84.9
	Yes	15.1

Table 2. Explanatory Analysis Factor Data Analysis Results

	Components			
		1	2	3
Kaiser-Meyer-Olkin: Measure of Sampling Adequacy	.640			
Bartlett's Test of Sphericity	.048			
Income			.658	
Diet				.670
Food preparation		.814		
Interlude food consumption				.788
physical activity			.780	
Parenting		.715		

the matrix components adjacent to each other with component 3 is a diet of 0.670, with an intermittent food type of 0.788.

4 Discussion

This method of modifying the screening of nutritional problems is considered very effective and efficient during this pandemic based on the results of screening data that can be well covered about the picture of factors that arises when this malnutrition problem occurs. Based on research data, it is known that the results of calculating the Body Mass Index dominate the results are obesity. Based on the calculation of the formula, the Body Mass Index is calculated based on the weight in KG divided by height in meters squared (kg/m^2). Subjects were stratified according to BMI levels <22.5 , $22.5\text{--}24.9$, $25.0\text{--}29.9$, $30.0\text{--}34.9$, and ≥ 35.0 kg/m^2 . To study the relationship between BMI and PNI, the following BMI strata were built <25 , $25\text{--}30$, >30 and <25 , $25\text{--}29.9$, $30\text{--}35$, and >35 kg/m^2 [16]. The 2018 Basic Health Research reported that the prevalence of overweight in girls (11.2%) was higher than that of boys (10.4%) [7]. Women are identical by liking snacks with an unmeasured food capacity by preferring to try various types of food that are not considered to have an impact on health.

In 2016, the conference that houses the Clinical Nutrition Associations in the world (ESPEN, ASPEN, FELANPE, and PENSA) developed malnutrition criteria that can be used in all clinical settings on a global scale [17]. One of the causes of malnutrition is inconsistency with nutritional needs and nutritional intake [12]. In body activity, metabolism occurs an increase in energy expenditure and muscle catabolism but is not balanced with appropriate intake for the body's energy [18]. Based on the factor analysis in this study, several factors causing malnutrition problems are caused by the capacity of the family's income. The income factor is very close to the physical activity factor. This is supported by the results of a study from the Preventive Medicine journal in which the researchers looked at the results of accelerometer data used to analyze the physical activity and sedentary behavior of the respondents, which had something to do with the family income level of 5206 adults in the United States, where respondents with an annual income of 75 thousand dollars or more had more activity of 4.6 min daily with moderate to strong intensity compared to whose annual income of 20 thousand dollars measured by activity monitors [15]. Social and economic factors have a degree of urgency in the prevalence and incidence of malnutrition. Poverty, education, gender, and poor sanitary environment have a large role in determining health capacity in developing and underdeveloped countries.

The incidence of overweight in adolescents is influenced by factors of upbringing patterns or parenting patterns applied in the family [6]. This parenting pattern has an impact on how the pattern of feeding food intake to children, the application of hygiene to maintain children's health, as well as the behavior of parents when talking to children. Regarding the pattern of food intake, parents are expected to pay attention to the type of food and the amount of food given [17]. The type of food and the amount of food, if it does not match the needs of adolescents, will cause disruptions that have a long impact on the health of adolescents, related to the hormone system, especially reproduction, and have an impact on the health of other adolescents.

Insufficient food intake during the early days of life processes can affect metabolic processes that can reduce the use of fat as energy intake ingredients that can trigger in the body an increase in the incidence of obesity [13]. Food stability problems have an impact on adults and children that cause metabolic diseases and obesity. This is due to

limited nutritional intake and poor diet quality [19]. The results of Lowe's survey in 2021 found that many certain age groups have unhealthy habits by not taking into account the quality of food and measuring the amount eaten [12]. In women of reproductive age, there is a problem of obesity that develops due to the habit of consuming excessively low-quality food. The research of Puspitasari and Farapti (2017) on students proves that more than 50% of respondents had a nutritional status of less or more [20]. Diet can be interpreted as a habit of settling in relation to the consumption of food, namely based on the type of food ingredients and based on frequency: daily, weekly, ever, and never at all [21].

The nutritional status of each individual is greatly influenced by the intake of nutrients by his body and from a good diet and use [22]. The existence of an imbalance between diet, intake, and use of these nutrients can cause a condition called malnutrition. The rate of food consumption is determined by the quality and quantity of food [23]. The goodness of the family's diet can be shown by the presence of all the nutrients needed by the body in the arrangement of dishes. Whether or not the complete arrangement of family food depends a lot on the family's ability to arrange food, the ability to get food ingredients, customs, and knowledge in compiling the food [24]. Screening for nutritional problems must be carried out. With the modification of the screening method, it will be easier to produce accurate data on this pandemic. Indonesia needs productive adolescents, which can only be achieved if the adolescents are healthy and have good nutritional status, but based on the results of the study, the majority are obese and are influenced by environmental factors and self-factors which, if left alone, will open up opportunities for cases health [25].

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