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THE ASSOCIATION BETWEEN PHYSICAL ACTIVITY, LEVEL OF STRESS, AND ECONOMIC STATUS WITH THE NUTRITIONAL STATUS AMONG ADOLESCENT FEMALES IN COASTAL REGIONS

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ABSTRACT

Introduction: Adolescent girls belong to a population that is particularly susceptible to dietary deficiencies. The nutritional issues experienced by adolescents significantly affect the well-being of both present and future generations, as well as the overall economic and health of the nation. Various factors have been found related to nutritional issues and have a significant impact on the well-being of adolescent girls by approximately 28.4%. **Aims:** The purpose of this study is to determine the relationship between physical activity status, levels of stress and economic status with the nutritional status of adolescent girls in coastal regions. **Methods:** This study employs an analytical observational research design using a cross-sectional method. The independent factors consist of physical activity, level of stress, and economic position, whereas the dependent variable pertains to nutritional status as measured by BMI. The study included a sample of 176 adolescent girls residing in the coastal region. The participants were chosen using the stratified random sampling method. **Results**: Research showed that 109 (61.9%) respondents had good nutritional status, 40 (22.7%) were undernourished and 27 (15.3%) were over nourished. Based on statistical tests, p-physical activity (p=0.000), level of stress (p=0.000), and economic status (p=0.000) were obtained. **Conclusions:** Physical activity, level of stress, and economic status have a relationship with the nutritional status of adolescent girls in the coastal regions.

Keywords: Economic status, level of stress, nutritional status, physical activity

INTRODUCTION

From the Latin verb “adolescere,” adolescence means growing to reach maturity. Adolescence is a transition period from child to adult, where this period is a very important period in human life (Aulianti & Puspitasari, 2021). During adolescence, individuals undergo significant physical, psychological, and intellectual growth and development (Supardi & Fitrianingsih, 2023). According to the World Health Organization (WHO) teenagers are individuals who are between the ages of 10 and 19 (Kamaruddin & Sari, 2019; WHO), 2023). Adolescents are often considered as potential saviors of the nation who will eventually hold leadership roles in the future. In addition, adolescents are referred to as an investment in improving the quality of life of the nation by creating a skilled workforce, encouraging sustainable economic growth, improving governance, and fostering a dynamic civil society to achieve the Sustainable Development Goals (SDGs) by 2030 (UNICEF, 2023b).

Nutrition is an integral component of the health sector, which serves as the foundation for both domestic and international socioeconomic progress. A healthy diet serves as the cornerstone of public health. Growth, development, intelligence, and productivity are all significantly influenced by nutrition (Kamaruddin & Sari, 2019). Promoting

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optimal health and development throughout all life stages is contingent upon a well-balanced and nutritious diet, which is particularly crucial for nutritionally vulnerable populations, including adolescent females. Additional care is necessary to ensure that this population receives sufficient nutrients in order to promote healthy development and growth (Bintanah, 2023).

Data obtained from WHO in 2021, reveal the number of teenagers in the world will reach more than 1.2 billion, of which there are more than 620 million young women or around 8% of the total world population (UNICEF, 2023a)**.** In the Southeast Asia region, the number of teenagers reaches 360 million people or around 20% of the population**.** In Indonesia alone there are more than 45 million teenagers or around 17% of the Indonesian population. Data obtained from the Central Statistics Agency in Southeast Sulawesi Province, show the number of young women amounted to 240,403 people or around 8.8% of the total population. Meanwhile, for the Kendari City area, the number of young women totaled 29,094 people or around 8.1% of the population (Statistik, 2022).

The global population has a prevalence of undernutrition at 14.9%, with Southeast Asia having the highest prevalence at 27.3% (Masyudi et al., 2019). The World Health Organisation reports that the occurrence of obesity in teenagers differs across different regions, but is currently at a rate of 10% in Southeast Asia (WHO, 2023). According to 2018 Basic Health Research (Riskesdas) data, 8.7% of 13–15-year-old adolescents and 8.1% of 16–18-year-old adolescents had a thin or very thin nutritional status, while 16.0% of 13–15-year-old adolescents and 13.5% of 16–18-year-old adolescents were overweight or obese with risk factors (Putri et al., 2024; Riskesdas), 2018).

According to data from Southeast Sulawesi Province, 9.9% of 13- to 15-year-old adolescents were classified as underweight or very thin nutritionally, while 10.2% were overweight or obese. Concurrently, a study conducted in the Kendari City region unveiled that 11.58% of adolescents aged 13-15 years are overweight or obese, and 19% of those aged 13-15 years have a nutritional status of very thin (Riskesdas, 2018).

The prevalence of undernutrition (manifested as being underweight and extremely thin) and overnutrition (obesity) among teens has a substantial impact on the overall welfare of both current and future generations, as well as the economic and health status of the nation. Nutritional problems also have an impact on reproductive health which is closely related to pregnancy outcomes and the health and survival of mothers and children. Thus, if nutritional problems occur it will hamper progress in achieving development targets because it will affect nutritional status at the individual level, which includes low quality and quantity of food intake provided (UNICEF, 2021). The causes of nutritional problems include the social, economic and political context surrounding the structure and dynamics of society.

The nutritional status of adolescents is influenced by physical activity because it is related to the body's metabolic system. Adolescents who do physical activity will experience an increase in their body's metabolism. This increase will cause a decrease in calories that come from burning body fat so that teenagers who lack physical activity will become overweight (Widiastuti & Widiyaningsih, 2023).

Stress and adolescent nutritional status are interrelated. In stressful situations, teenagers tend to experience changes in appetite. Adolescents with more nutritional status tend to consume more foods that are high in calories and fat, causing excess nutrition. Meanwhile, teenagers with poor nutritional status tend to find it difficult to eat, causing teenagers

to experience malnutrition (Bitty et al., 2019).

Family economic status is also a factor that can influence a person's nutritional status. A family with a large income can influence food purchasing power which in turn will have an impact on the family's nutritional adequacy. Meanwhile, families with income below standard will have an impact on low food purchasing power, causing inadequate family nutrition (Wandani et al., 2021). The aim of this study is to determine the relationship between physical activity, stress levels, and economic status with the nutritional status of adolescent females living in the coastal region of Kendari City.

METHODS

This an observational analytical research design, specifically utilizing a cross-sectional technique. This research was conducted from 12 December 2023 to 19 December 2023. The sample for this research was in the coastal area and who were actively attending school at SMP Negeri 6 Kendari and SMP Negeri 11 Kendari. The number of samples were 176 respondents selected using the stratified random sampling technique by taking samples with representation in each class in two schools.

Inclusion criteria: Teenagers who are registered as active students at SMP Negeri 6 Kendari and SMP Negeri 11 Kendari; Residing in the coastal area of Kendari City; 12-15 years old. Exclusion criteria: Students who do not attend school; students who suffer from certain diseases that can hinder daily activities. The number of study samples was determined using the Slovin formula, which was employed to choose samples from the population that satisfied the inclusion requirements. The minimum sample size necessary for this research is 176.22, which should be rounded to 176 respondents.

The data were collected by interview method using PAQ-A and DASS-42 instruments. Anthropometric measurements using BMI for age are health examination procedures carried out to evaluate the size and composition of the human body. Anthropometry is used to evaluate the characteristics of adolescent nutritional status. Meanwhile, anthropometric data in the form of weight were obtained using a weight scale and anthropometric data in the form of height were obtained using a microtoice and stadiometer. BMI is measured in each adolescent aged 12-15 years through initial weight measurements using a scale placed on a flat surface, with the individual wearing light clothing. The Physical Activity Questionnaire Children (PAQ-A) is an instrument carried out in the previous seven days by filling out a questionnaire sheet that has been provided regarding activities during the week with the scores as mild (1– 2.3), medium-severe 2.4– 5. The stress level is the result of an assessment of the severity of stress experienced by a person which is assessed using the stress anxiety depression scale instrument 42 (DASS-42) (Al-amer et al., 2024; Naomi, 2020). Univariate data analysis was conducted on the general characteristics of respondents variable. Bivariate analysis using the Chi-square test was conducted on nutritional status, physical activity, stress levels, and economic status. Data collection began with initial data collection in October 2023 by recording the number of female students actively attending school at SMP Negeri 6 Kendari and SMP Negeri 11 Kendari in the 2023-2024 academic year. Subsequently, the research participants were identified based on the specified inclusion and exclusion criteria. Participants who expressed their willingness were subsequently requested to complete an informed consent form, signifying their agreement to take part in the study.

Next, respondents were interviewed directly to obtain research questionnaire data which included basic identity (name, address and telephone number) and characteristic data (date of birth, age and income). Data analysis was carried out to explain the data obtained so that it is easier to understand and conclusions can be drawn. Data analysis was carried out computerized using Statistical Product and Service Solutions (SPSS) software version 23.0. Univariate analysis was used to determine the analytical picture of each variable using frequency distribution tables and narratives. This analysis was carried out through a computerized process using analytical analysis.

The data analysis method used is the Chi-square statistical test with a 95% confidence level. A p-value below 0.05 shows that the statistical calculations provide significant findings, suggesting a significant link between the independent and dependent variables. Conversely, if the value of p is greater than 0.05, it indicates that there is no statistically significant relationship between the independent and dependent variables. This research has received ethical approval from Halu Oleo University Research Ethics Committee with reference number: 065/UN29.17.3/ETIK/2023.

RESULT

Table 1 displays the breakdown of respondent characteristics according to their age. The majority of respondents, 65 (36.9%), were 13 years old. Based on the characteristics data, it shows that the majority of respondents are class VIII showing the highest percentage with 65 respondents (36.9%) followed by class IX with 61 respondents (34.7%), and the least is class VII with 50 (28.4%).) respondents.

Based on mother's occupation, it shows that the majority do not work/housewife with a total of 119 respondents (67.6%), followed by other jobs (teacher, trader, tailor, farmer) with 26 (14.8%) respondents, private sector 19 (10, 8%) respondents and civil servants were 12 (6.8%) respondents. Based on father's occupation, it shows that the majority work in private jobs, 69 respondents (39.2%), followed by fishing jobs, 53 respondents (30.1%), other jobs (police, farmers, traders, motorbike taxi, mining) with 42 respondents. (23.9%) and civil servants 12 respondents (6.8%). Based on Table 2, of the 176 respondents there were 64 respondents with light physical activity, of which 11 (6.2%) respondents had poor nutritional status, 33 (18.8%) respondents had good nutritional status and 33 (18.8%) respondents had good nutritional status. Of the 176 respondents, there were 20 people (11.4%) who were overweight 112 respondents with moderate to heavy physical activity, of which 29 (16.5%) respondents had underweight status, 76 (43.2%) respondents had undernourished status. good, and 76 (43.2%) and respondents who had poor nutritional status were more than seven (3.9%).

Table 1. General characteristics of respondents

Characteristics	n (%)
Age	
12 years	53 (30.1)
13 years	65 (36.9)
14 years	48 (27.3)
15 years	10 (5.7)
Class n (%)	
VII	50 (28.4)
VIII	65 (36.9)

Characteristics	n (%)
IX	61 (34.7)
Living address n (%)	
Sambuli	39 (22.4)
Nambo	22 (12.5)
Petoaha	4 (2.3)
Tondonggeu	9 (5.1)
Kendari Caddi	49 (27.8)
Kessilampe	12 (6.8)
Mata	5 (2.8)
Mangga Dua	36 (20.5)
Occupation mother n (%)	
Nor work/IRT	119 (67.6)
Civil servants	12 (6.8)
Private	19 (10.8)
Others	26 (14.8)
Occupation father, n (%)	
Fisher	53 (30.1)
Civil servants	12 (6.8)
Private	69 (39.2)
Others	42 (23.9)

(Resource: Primary data, 2023)

The analysis resulted in a p-value of 0.000, which is smaller than the significance level α of 0.05. There is a correlation between the level of physical activity and the nutritional status of adolescent girls living in coastal areas. Regarding Table 3, of the 176 participants, 136 individuals were classified in the no stress - mild stress category. Out of the total responses, 24 individuals (13.6%) had a low nutritional status, 103 individuals (58.6%) had a satisfactory nutritional status, and nine individuals (5.1%) had an exceptionally high nutritional status. Among the 176 participants, 40 individuals were classified as experiencing moderate to severe stress. Out of the total responders, 16 individuals (9.1%) had low nutritional status, whereas six individuals (3.4%) had high nutritional status. Additionally, another six individuals (3.4%) also had good nutritional status. There were 18 cases of malnutrition, which represented 10.2% of the population. The analysis resulted in a p-value of 0.000, which is smaller than the significance level α of 0.05. Hence, there exists a link between the nutritional well-being of adolescent females residing in coastal regions and their levels of stress.

Table 2. Relationship between physical activity and nutritional status of adolescent girls in the coastal area of Kendari City

Physical Activity	Nutritional Status						Total		*p-value*
	Less		Good		Over				
	n	%	n	%	n	%	N	%	
Mild	11	6.2	33	18.8	20	11.4	64	36.4	0.000
Medium-Severe	29	16.5	76	43.2	7	3.9	112	63.6	

Total	40	22.7	109	62.0	27	15.3	176	100

(Resource: Primary Data, 2023)

Table 3. The Relationship between levels of stress and nutritional status of adolescent girls in the coastal area of Kendari City

Level of Stress	**Nutritional Status**						**Total**		***p-value***
	Less		**Good**		**Over**				
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	
Normal-Mild	24	13.6	103	58.6	9	5.1	136	77.3	
Moderate-Severe	16	9.1	6	3.4	18	10.2	40	22.7	0.000
Total	40	22.7	109	62.0	27	15.3	176	100	

(Resource: Primary Data, 2023)

Regarding Table 4, among 176 participants, 115 had a low socioeconomic status. Out of these, 36 individuals (20.4%) had poor nutritional status, while 64 individuals (36.4%) had good nutritional status, and another 64 individuals (36.4%) also had high nutritional status. The prevalence of overnutrition was 11 (6.2%). Out of the 176 participants, 61 had a high economic level. Among these, four (2.3%) had poor nutritional status, 45 (25.6%) had good nutritional status, and 45 (25.6%) had better nutritional status. The number is up to 16, representing 9.1% of the total. The analysis resulted in a p-value of 0.000, which is smaller than the significance level α of 0.05. Hence, there exists a correlation between the economic state and the nutritional welfare of adolescent females living in coastal areas

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Table 4. Relationship between economic status and nutritional status of adolescent girls in the coastal area of Kendari City

Economic Status	**Nutritional Status**						**Total**		***p-value***
	Less		**Good**		**Over**				
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	
Mild	36	20.4	64	36.4	11	6.2	115	65.3	
High	4	2.3	45	25.6	16	9.1	61	34.7	0.000
Total	40	22.7	109	62.0	27	15.3	176	100	

(Resource: Primary Data, 2023)

DISCUSSION

General Characteristics of Respondents

Adolescent females are the demographic most prone to malnutrition and are particularly vulnerable to nutritional deficiencies (Taklual et al., 2020). The maternal employment status is a significant determinant that can impact a child's nutritional status (Jakaria et al., 2022). The predominant occupation of mothers in this survey was that of homemakers who did not engage in paid employment. Housewives typically have a greater amount of available time to engage in interactions and fulfil parental responsibilities toward their children. This study aligns with the research conducted by Oktarindasarira (2020) and how mothers engage with their children, hence making it highly plausible that food consumption is similarly regulated. Employed mothers have a reduced amount of time available to dedicate to their children compared to mothers who do not work. Consequently, this will have an impact on the standard of child care provided and subsequently influence the

nutritional well-being of the child. Mothers who work long hours from dawn to evening have limited time to devote to their children's dietary and nutritional requirements.

The employment status of the respondents' fathers in this study worked in different types of work. Some scholars also found the same results (Wijaya-Erhardt, 2019). The work carried out by the respondent's father will later become a source of income to meet the family's food and clothing needs. The study conducted by Dungga et al. (2022) established a significant association between a father's work and the nutritional status of their children.

Relationship between Physical Activity and Nutritional Status

The results of this study found that there was a relationship between physical activity and nutritional status. This research aligns with the investigation carried out by Coelho et al. (2012) and Widiastuti and Widiyaningsih (2023). The analysis uncovered a substantial correlation between the level of physical activity and the nutritional status of teenagers. Baja and Rismayanthi (2019) did additional research that provides more evidence of a strong link between variables associated with physical activity and nutritional status. According to this research, there is a clear connection between less physical activity and an increased probability of having inadequate nutritional status (Słowik et al., 2019). Conversely, individuals who engage in moderate to high levels of physical exercise are more prone to having a positive nutritional status.

Amin et al. (2019) conducted research that challenges the idea of a significant association between physical activity and the nutritional health of teenage females in class VIII of SMP Negeri 20 Surabaya. The statistical analysis resulted in a p-value of 0.68, which exceeds the significance level of 0.05. Agisna et al. (2022) conducted a study that found no significant link between physical activity and nutritional status. This conclusion is supported by a p-value of 0.398, which is above the threshold of 0.05. This phenomenon can arise because an individual's nutritional status is not just driven by their physical activity, but is also influenced by factors such as food intake and the existence of infectious diseases.

According to the findings from the PAQ-A interviews, the majority of respondents reported engaging in sedentary activities such as sitting, reading, chatting, and doing assignments during break periods. However, they were frequently active during sports physical education and health (PJOK) lessons and participated in sports multiple times over the weekend (Yudisthira et al., 2023). This could be attributed to the significant proportion of youths engaging in physical activity at a moderate level. Nevertheless, a significant number of teenagers engage in minimal physical activity, which can be attributed to various factors including illness, lack of motivation, menstruation in young women, and fatigue. Consequently, the lack of physical activity heightens the risk of poor nutritional status among teenagers.

Teenagers tend to have intense physical activity but it does not involve muscle movements that require energy expenditure. Adolescents should participate in at least 60 minutes of physical activity every day, which should be of moderate to high intensity (Mak et al., 2011; Nader et al., 2008). Therefore, the role of schools in this case is very important to support the physical activity of their students. There are several things that the school might be able to do to increase the physical activity of its students, such as organizing extracurricular activities in the fields of sports and arts in the form of extracurricular football, badminton, basketball, volleyball or dancing. Not only that, the school should also provide facilities that support these activities such as sports fields, sports equipment and green open spaces. The school must also provide a good

understanding to its students about the importance of physical activity for their health, especially the importance of physical activity in improving nutritional status because a person's nutritional status depends on the physical activity carried out and the intake of nutrients consumed. The combination of insufficient physical activity and high energy intake will have an impact on nutritional problems (Khoerunisa & Istianah, 2021).

The Relationship between Levels of Stress and Nutritional Status of Adolescent Girls

This study indicated a significant correlation between stress levels and the nutritional status of young women in the coastal area of Kendari City. The results of this study are consistent with the investigation carried out by Aulianti and Puspitasari (2021) and Mardiyah et al. (2024). The analytical findings demonstrate a significant association between stress levels and nutritional status among teenagers found by Fitriyani (2023) who conducted additional research that uncovered a substantial correlation between stress levels and the nutritional status of students in their last year. According to this research, it can be deduced that an individual's level of stress influences their eating patterns such as a potential risk factor for binge eating tendencies in young people (Hsu & Raposa, 2021; Lim et al., 2021). Likewise, the portrayal of an unpredictable emotional state causes a reduction in hunger, ultimately resulting in appetite loss (Kitagawa et al., 2017; Witte et al., 2023).

This is especially evident in difficult life situations. Novitasari and Kumala (2022) conducted a study that challenged the idea of a significant association between stress levels and nutritional status among Tarumanegara students. Their analysis yielded a p-value of 0.185, surpassing the usual threshold of 0.05. In 2021, Muzdalifah (2021) revealed no noteworthy association between stress, nutritional status, and a p-value of 0.452, which exceeds the threshold of 0.05. Factors that influence an individual's nutritional health encompass not only stressors, but also the amount of nutritional consumption and physical exertion. These risk factors play a key role in the development of abnormal nutritional status.

According to the findings of the DASS-42 survey, it was observed that young women frequently experience anger in response to minor or insignificant matters. They tend to feel easily offended and occasionally overreact to situations, which could explain the relatively high prevalence of moderate stress among young women. Teenagers are vulnerable to stress and various forms of stressors can trigger stress in the form of stressors from the family and school environment. Therefore, the role of schools in this case is very important to reduce stress levels among teenagers. There are several things that the school might be able to do, such as improving counseling services for students who experience mental health problems, creating a comfortable and conducive learning environment (McKenzie et al., 2011; Mojtabai & Olfson, 2020).

Apart from the school, parents also have a very important role in reducing stress levels. What can be done is to be closer and open to children, such as providing emotional support for children's problems, listening to children's complaints and paying attention to their feelings. So by creating a comfortable and supportive family and school environment, it is hoped that it can reduce stress levels among teenagers because if someone experiences stress there will be changes in their appetite which will later affect nutritional status.

Relationship between Economic Status and Nutritional Status of Adolescent Girls

The results of this study are consistent with the investigation conducted by Lalusu et al. (2020). The analytical findings suggest a significant association

between the economic status and the incidence of malnutrition. A study conducted by Aziz (2022) revealed a robust association between socioeconomic status and nutritional status, as seen by the analytical findings. This supports the concept that suggests a connection between income level and family economic status and how they affect an individual's health. These traits function as risk indicators for abnormal growth and development, as disadvantaged socioeconomic circumstances impede the satisfaction of necessary and discretionary needs.

In contrast to previous studies Sampouw (2021) conducted a study which determined that there is no substantial association between the socioeconomic status and nutritional status of young children. According to research conducted by Rumende et al. (2018), there is no relationship between the socioeconomic level and the nutritional status of children under the age of five in North Central Timor Regency. The conclusion is substantiated by a p-value of 0.38, which exceeds the significance level of 0.05. According to the research findings described before, it may be deduced that children with a poor socioeconomic level have a higher nutritional status. This can be due to parents' conscientious consideration of the nutritional needs of each family member, with a specific focus on fulfilling the dietary requirements of children, particularly those who are younger than five years old.

According to the interview findings, a significant number of respondents had fathers employed in the private sector as fishermen, whereas the majority of respondents' mothers were either unemployed or worked as housewives. This situation likely contributed to a considerable proportion of respondents experiencing a poor economic status. It is widely recognized that a sufficient family income is crucial for promoting a child's growth and development. A substantial household income greatly facilitates an individual or family in leading a more prosperous existence and can contribute to enhancing an individual's nutritional well-being.

Adolescent nutrition problems are often found in society. However, there are many things that can be done by various parties to overcome this. This includes the community health center by improving services at youth posbindu activities, socializing balanced nutrition and PHBS in the community so that people can prevent and overcome health problems and improve the quality of life (Kusnan & Susanty, 2022). The role of the family, in this case parents, is no less important in efforts to improve the nutritional status of adolescents. Things that can be done include looking for information about affordable and highly nutritious nutrition, utilizing local resources and choosing economical but nutritious food ingredients**.** Adolescent nutrition problems are often found in society. However, there are many things that can be done by various parties to overcome this. This includes the Community Health Center by improving services at youth posbindu activities and promoting balanced nutrition to both parents and teenagers themselves.

CONCLUSIONS

The research findings indicate an association between physical activity, stress levels, economic status and the nutritional status of young women in the coastal area of Kendari City. We aim to enhance this research by incorporating various variables or adopting alternative methodologies, such as case-control or cohort studies, to establish a more precise causal relationship between the independent and dependent variables. Additionally, we plan to employ diverse statistical analysis tests to determine the direction of the relationship between the variables. The parental participation is equally crucial in endeavors to enhance the nutritional well-being of teenagers. Parents can seek knowledge on cost-effective and

highly nourishing nutrition, make use of local resources, and select budget-friendly yet healthy food products. Further interventions such as quasi experiment are needed to improve the nutritional well-being of adolescents with psychological problems.

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