

Nutritional Status Profile of Grade XII Female Students at MA Muallimat NWDI Pancor

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Abstract: Adolescence is a period of growth and development that requires attention to nutritional status. Abnormal nutritional status, including both undernutrition and overnutrition, may affect adolescent health. Anthropometric measurements can be used to describe nutritional status in adolescent populations. This study aimed to determine the nutritional status profile of Grade XII female students at MA Muallimat NWDI Pancor based on anthropometric measurements. This was a descriptive observational study with a cross-sectional approach. The study population consisted of 200 Grade XII female students, and 100 students were selected as the sample using simple random sampling. The variables analyzed included age, body weight, height, body mass index (BMI), and mid-upper arm circumference (MUAC), followed by descriptive analysis using IBM SPSS 27. The mean age of the respondents was 17.04 ± 0.4911 years. The mean body weight was 48.20 ± 8.566 kg, height was 152.60 ± 5.718 cm, BMI was 20.70 ± 3.598 kg/m², and MUAC was 23.67 ± 3.277 cm. Based on nutritional status classification, 64 students (64.0%) were in the normal category, 25 students (25.0%) were underweight, 7 students (7.0%) were overweight, and 4 students (4.0%) were obese. Most of Grade XII female students at MA Muallimat NWDI Pancor had normal nutritional status. However, students with underweight, overweight, and obesity were still identified, indicating the need for continued nutritional status monitoring.

Keywords: nutritional status, female students, anthropometry, body mass index

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INTRODUCTION

Adolescence is a critical period of growth and development characterized by increased nutritional requirements. Nutritional status reflects the balance between nutrient intake, physiological needs, and the body's ability to utilize nutrients and is an important indicator of adolescent health and growth (Apriliyanti et al., 2025; Putri et al., 2022; Supariasa et al., 2004). Abnormal nutritional status, including undernutrition and overnutrition, may adversely affect health, with undernutrition increasing susceptibility to infection and overnutrition increasing the risk of chronic diseases (Irawati, 2026; Prasetyaningrum & Kadaryati, 2020).

Adolescent girls are an important population for nutritional assessment because rapid physical growth and physiological changes increase nutritional requirements.

Nutritional problems may occur in both directions; a study among adolescent girls in Jambi found that 51.9% had abnormal nutritional status (Fita et al., 2025). Adequate nutrition during adolescence supports physical growth, neurodevelopment, immune function, and overall health, while nutritional disturbances may have consequences beyond adolescence (Norris et al., 2022).

The nutritional challenges among adolescents are increasingly characterized by the coexistence of undernutrition and overnutrition. In Indonesia, Maehara et al. (2019) reported both thinness and overweight among adolescents, including populations from Klaten and West Lombok, indicating that multiple forms of malnutrition may coexist across geographically and socioeconomically diverse populations. This pattern highlights the importance of

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assessing the full distribution of nutritional status rather than focusing on a single nutritional problem.

Regular nutritional monitoring is therefore important for early detection and health promotion. Anthropometric measurements provide a practical approach for assessing nutritional status and include body weight, height, BMI, and MUAC (Djide et al., 2025; Sari et al., 2022; Susyanto & Fadhilah, 2023). For adolescents aged 5–19 years, the WHO recommends BMI-for-age to assess thinness, overweight, and obesity using age- and sex-specific growth references (World Health Organization [WHO], 2007). Nutritional assessment among adolescent girls is particularly important because nutritional conditions during adolescence may influence subsequent health and reproductive outcomes (Norris et al., 2022).

The coexistence of different nutritional status categories has also been reported among Indonesian adolescents. Rah et al. (2021) described the triple burden of malnutrition in Indonesia, while Alman (2026) reported the coexistence of normal nutritional status, underweight, overweight, and obesity among students in a boarding school. Similarly, Chahyanto and Susilo (2025) found that although good nutritional status predominated among high school/equivalent students aged 13–18 years in Sibolga, undernutrition, overnutrition, and obesity were also present. These findings reinforce the importance of school-based nutritional assessment to identify the distribution of nutritional problems and provide baseline information for health promotion (Muliani et al., 2023).

Although previous studies have described adolescent nutritional status in various school settings, nutritional profiles may differ according to population and local context. In Indonesia, nutritional status among adolescents aged 5–18 years can be assessed using the Child Anthropometric Standards, including BMI-for-age (BMI-for-age/IMT-U). However, the nutritional status profile of Grade XII female students at MA Muallimat NWDI Pancor has not been documented. Local assessment is therefore needed to provide baseline information on the distribution of nutritional status and support school-based nutritional monitoring and health promotion.

This study aimed to determine the nutritional status profile of Grade XII female students at MA Muallimat NWDI Pancor based on body weight, height, BMI, and MUAC measurements.

The results of this study are expected to provide an overview of the nutritional status of Grade XII female students and serve as a basis for identifying nutritional problems. The findings may also support the development of appropriate health education and nutritional interventions to promote better health among adolescent girls.

MATERIAL AND METHODS

This descriptive observational study used a cross-sectional design to describe the nutritional status profile of Grade XII female students at MA Muallimat NWDI Pancor,

East Lombok, West Nusa Tenggara, in August 2026. The population comprised 200 Grade XII female students, from whom 100 students were selected using simple random sampling, giving each student an equal opportunity to participate (Sugiyono, 2010).

Data collected included age, body weight, height, BMI, and MUAC. Body weight was measured in kilograms and height in centimeters using standard anthropometric equipment. BMI was calculated as body weight (kg) divided by height squared (m^2). MUAC was measured in centimeters using a MUAC tape as a supplementary anthropometric parameter. Nutritional status was primarily determined using BMI-for-age (BMI-for-age) according to the Indonesian Ministry of Health Child Anthropometric Standards for children aged 5–18 years. Nutritional status was classified as thinness (<-2 SD), normal (-2 SD to $+1$ SD), overweight ($>+1$ SD to $+2$ SD), and obesity ($>+2$ SD) (Ministry of Health of the Republic of Indonesia, 2020).

Data were analyzed descriptively using IBM SPSS Statistics version 27. Numerical variables (age, body weight, height, BMI, and MUAC) were presented as mean, standard deviation, minimum, and maximum values, while nutritional status was presented as frequency and percentage.

The descriptive analysis was conducted to provide an overall picture of the participants' anthropometric characteristics and nutritional status. The findings were summarized to identify the distribution and general characteristics of nutritional status among the Grade XII female students.

RESULTS

The study involved 100 Grade XII female students at MA Muallimat NWDI Pancor. The respondents' ages ranged from 16 to 18 years, with a mean age of 17.04 ± 0.491 years. The mean body weight was 48.20 ± 8.566 kg, with a range of 33–75 kg. The mean height was 152.60 ± 5.718 cm, with a range of 139–167 cm. BMI had a mean of 20.70 ± 3.598 kg/m^2 , with a minimum value of 16 kg/m^2 and a maximum of 36 kg/m^2 . Meanwhile, the mean MUAC was 23.67 ± 3.277 cm, with a range of 19–36 cm.

Table 1. Anthropometric Characteristics of Grade XII Female Students at MA Muallimat NWDI Pancor

Variable	N	Minimum	Maximum	Mean
Age (years)	100	16	18	17.04
Body weight (kg)	100	33	75	48.20
Height (cm)	100	139	167	152.60
BMI (kg/m^2)	100	16	36	20.70
MUAC (cm)	100	19	36	23.67

Based on the analysis, most students had normal nutritional status, comprising 64 students (64.0%). There were

25 respondents (25.0%) in the underweight category, 7 respondents (7.0%) in the overweight category, and 4 respondents (4.0%) with obesity.

Table 2. Distribution of Nutritional Status of Grade XII Students of MA Muallimat NWDI Pancor

Nutritional status	Frequency (n)	Percentage (%)
Underweight	25	25.0
Normal	64	64.0
Overweight	7	7.0
Obesity	4	4.0
Total	100	100.0

These results indicate that the normal category was the most common nutritional status among the respondents. A total of 25.0% of respondents were underweight, while 11.0% were classified as overweight or obese.

DISCUSSION

The results showed that most Grade XII female students at MA Muallimat NWDI Pancor had normal nutritional status, with 64 students (64.0%). The mean BMI of all respondents was $20.70 \pm 3.598 \text{ kg/m}^2$, with values ranging from 16 to 36 kg/m^2 . These findings indicate that normal nutritional status predominated among the respondents, although considerable variation in nutritional status was observed within the study population. In adolescents, nutritional status should be interpreted according to age- and sex-specific BMI-for-age references because body composition and growth patterns continue to change during adolescence (World Health Organization [WHO], 2007).

The predominance of normal nutritional status in this study is consistent with the findings of Chahyanto and Susilo (2025) among high school/equivalent students aged 13–18 years in Sibolga City. Their study reported that 74.57% of respondents had good nutritional status, while 5.40% had undernutrition, 15.11% had overnutrition, and 3.95% had obesity. The higher proportion of normal nutritional status in their study compared with the present study may reflect differences in population characteristics, age distribution, socioeconomic conditions, dietary patterns, and local context. Nevertheless, both studies demonstrate that although normal or good nutritional status may predominate, nutritional problems in the form of undernutrition and overnutrition may coexist within the same adolescent population.

In this study, 25 students (25.0%) were classified as underweight, making this the second-largest group after normal nutritional status. This proportion was higher than the prevalence of undernutrition reported by Chahyanto and Susilo (2025), which was 5.40% among high school/equivalent students aged 13–18 years in Sibolga City. A similar spectrum of nutritional problems has been reported in Indonesian adolescents. Maehara et al. (2019), in a study of 2,160 adolescents aged 12–18 years in Klaten and West

Lombok, found that approximately 5% of girls and 11% of boys were thin, while overweight was also present in both sexes. Their findings demonstrate that undernutrition and overnutrition may coexist within Indonesian adolescent populations, including populations in areas geographically closer to the present study.

The relatively high proportion of underweight students in the present study indicates that low nutritional status remained an important finding within this school population. However, the difference between studies should be interpreted cautiously because nutritional status may be influenced by age, sex, socioeconomic conditions, dietary intake, physical activity, and other environmental factors. Maehara et al. (2019) identified socioeconomic characteristics, household wealth, maternal education, and adolescent age as factors associated with different nutritional outcomes among Indonesian adolescents. Because the present study was descriptive and did not assess dietary intake, physical activity, socioeconomic conditions, or other determinants, factors associated with the observed proportion of underweight students could not be established from the present data.

In addition to underweight, this study identified 7 students (7.0%) who were overweight and 4 students (4.0%) who had obesity. Thus, 11 students (11.0%) were classified as overweight or obese. These findings demonstrate that nutritional problems occurred in both directions within the study population, with underweight coexisting with excessive nutritional status. This pattern is consistent with the broader nutritional challenges reported among Indonesian adolescents. Rah et al. (2021) described Indonesia as experiencing a triple burden of malnutrition, in which undernutrition, overweight and obesity, and micronutrient deficiencies coexist. They further emphasized that adolescents are an important population affected by this nutritional burden.

Similar findings have been reported in other school-based adolescent populations in Indonesia. A cross-sectional study of 510 students at an Islamic boarding school in Banda Aceh found that underweight affected 36.67% of students, while overweight and obesity affected 21.96%. The study demonstrated that multiple forms of malnutrition could occur simultaneously within the same school population (Yusni et al., 2019). Although the prevalence estimates differed from those observed in the present study, the overall pattern supports the importance of assessing both insufficient and excessive nutritional status among adolescents.

A similar coexistence of nutritional status categories has also been reported in a school-based adolescent population. Alman et al. (2026) found that normal nutritional status was the most common category among students in a boarding school, but underweight was also prevalent, while overweight and obesity were identified in smaller proportions. Although the characteristics of the population and setting differed from those of the present study, the findings similarly demonstrate that different nutritional status categories may occur within the same educational environment. This comparison supports the importance of school-based

nutritional assessment to identify students with both insufficient and excessive nutritional status.

Anthropometric measurements showed that respondents had a mean body weight of 48.20 ± 8.566 kg and a mean height of 152.60 ± 5.718 cm. Variation was observed in body weight, ranging from 33–75 kg, and height, ranging from 139–167 cm. This variation reflects differences in body size among the respondents and provides additional context for interpreting their 'nutritional status. Anthropometric assessment using body weight, height, and BMI is widely used to evaluate growth and nutritional status among school-aged children and adolescents. The WHO 2007 growth reference provides BMI-for-age references for individuals aged 5–19 years and is intended for monitoring growth and identifying thinness, overweight, and obesity (WHO, 2007).

Age at menarche is an important marker of pubertal timing and may provide additional context for interpreting nutritional status among adolescent girls. Earlier menarche has been associated with higher BMI and greater adiposity later in life. A systematic review and meta-analysis reported that earlier pubertal timing was associated with higher adult BMI, while an Indonesian study using data from the Indonesian Family Life Survey similarly found that earlier age at menarche was associated with higher adult body weight and BMI (Prentice & Viner, 2013; Asrullah et al., 2022). Furthermore, an umbrella review found that early menarche was associated with several adverse long-term health outcomes, including obesity, type 2 diabetes, hypertension, metabolic syndrome, and certain cancers (Lee et al., 2022). These findings suggest that age at menarche may be useful as an additional indicator when interpreting nutritional status and long-term health among adolescent girls.

Conversely, underweight during adolescence also warrants attention because it may reflect inadequate energy and nutrient availability during a critical period of growth and reproductive development. Chronic energy deficiency can affect the hypothalamic–pituitary–gonadal axis and contribute to menstrual disturbances, anovulation, and impaired reproductive function in women (Mantzoukos et al., 2020). Inadequate adolescent nutrition may also increase vulnerability to micronutrient deficiencies and anemia, which are particularly important among girls because of rapid growth and menstrual blood loss. Nutritional interventions during adolescence have been shown to improve hemoglobin status, emphasizing the importance of addressing nutritional deficiencies before pregnancy (Christian & Smith, 2018).

The implications of adolescent undernutrition may extend into the reproductive period. Maternal preconception underweight has been associated with an increased risk of adverse pregnancy outcomes, including preterm birth, while inadequate maternal nutritional status may also contribute to an intergenerational cycle of malnutrition (Dean et al., 2014; Welch et al., 2024). Therefore, the identification of underweight among 25% of students in the present study should not be viewed solely as a current anthropometric finding. It may indicate a need for continued nutritional monitoring, assessment of dietary adequacy and menstrual

health, and appropriate health education before these adolescents enter the reproductive period. However, because the present study was descriptive and cross-sectional, no causal relationship between nutritional status, age at menarche, and future reproductive or health outcomes can be established.

This study also recorded MUAC values, with a mean of 23.67 ± 3.277 cm and a range of 19–36 cm. MUAC was collected as one of the anthropometric variables to provide additional information on the physical characteristics of the respondents. However, because the primary nutritional status classification in this study was based on BMI categories, MUAC was not used as the primary basis for determining respondents' nutritional status. Therefore, the MUAC findings should be interpreted as a supplementary anthropometric characteristic rather than as a separate classification of nutritional status. Recent research among adolescent girls aged 15–19 years has examined the potential use of MUAC in relation to BMI and suggests that MUAC may provide additional anthropometric information, although appropriate age- and population-specific thresholds are needed before it can be used as an independent classification tool (Fibrila et al., 2025).

The findings have implications for nutritional monitoring among female students in school settings. Although the majority of respondents had normal nutritional status, the presence of underweight in 25.0% of students and overweight or obesity in 11.0% indicates that nutritional problems remain relevant within the study population. School-based nutritional monitoring may therefore be useful for identifying students who require further assessment and for supporting health promotion related to balanced nutrition and healthy lifestyle practices. The coexistence of different nutritional problems in Indonesian adolescents reinforces the need for a comprehensive approach that does not focus exclusively on undernutrition or overweight and obesity (Maehara et al., 2019; Rah et al., 2021).

However, the present findings should be interpreted as a descriptive profile and should not be used to infer specific causes or causal relationships. The cross-sectional and descriptive nature of the study limits interpretation of factors that may explain the observed nutritional status. Future studies should consider dietary intake, physical activity, socioeconomic characteristics, family factors, and other behavioral or environmental variables to better understand the determinants of nutritional status among female adolescents.

Overall, the findings indicate that normal nutritional status predominated among Grade XII female students at MA Muallimat NWDI Pancor, but nutritional problems were present in both directions. The relatively substantial proportion of underweight students, together with the presence of overweight and obesity, demonstrates variation in nutritional status within the same adolescent school population. These findings are consistent with evidence that Indonesian adolescents experience a complex nutritional burden involving both undernutrition and excessive nutritional status (Maehara et al., 2019; Rah et al., 2021). Continued

nutritional assessment and monitoring among female students are therefore warranted, while further research is needed to explore dietary, behavioral, socioeconomic, and other factors that may contribute to the observed nutritional profile.

CONCLUSION

Based on the results from 100 Grade XII female students at MA Muallimat NWDI Pancor, normal nutritional status was the most common category (64.0%). However, 25.0% of students were underweight, while 7.0% were overweight and 4.0% were obese. Thus, although most students had normal nutritional status, variations in nutritional status remain and warrant attention in student health monitoring. The nutritional status profile of Grade XII female students was dominated by the normal category, while underweight, overweight, and obesity were also identified among the respondents.

STRENGTHS AND LIMITATIONS

This study provides a nutritional status profile based on anthropometric measurements in 100 Grade XII female students and includes several anthropometric indicators, namely body weight, height, BMI, and MUAC. Limitations: The study was conducted among Grade XII female students at a single institution; therefore, generalization of the findings to broader populations of female students should be made with caution.

The limitations of this study is that it used a descriptive cross-sectional design, which provides a snapshot of respondent's nutritional status at the time of data collection and cannot describe changes in nutritional status over time. The study was conducted only among Grade XII female students at MA Muallimat NWDI Pancor; therefore, the findings cannot be generalized to all female students in other regions. Nutritional status assessment in this study focused on BMI-based classification, while other factors that may be associated with nutritional status, such as dietary patterns, physical activity, nutritional knowledge, and socioeconomic conditions, were not analyzed.

CONFLICT OF INTEREST

The author declares that there is no conflict of interest in the conduct of this study and the preparation of this manuscript.

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ETHICAL APPROVAL

This study did not obtain formal ethical approval from an institutional ethics committee. Ethical considerations were

addressed through obtaining permission from MA Mu'allimat NWDI Pancor and written informed consent from all participants prior to data collection. The participants were informed about the purpose and procedures of the study, and their participation was voluntary.

DECLARATION OF USING AI

The authors affirm that artificial intelligence (AI) tools were used to assist in the writing process solely for language enhancement purposes, such as grammar checking, paraphrasing, and improving clarity. No AI tools were employed to generate original content, conduct data analysis, or interpret research findings. The authors take full responsibility for the content, interpretations, and conclusions presented in this manuscript.

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