

Salando Health Journal
e-ISSN 3026-1821
Volume 5 Issue 1, 2026, page 43-51
DOI: 10.33860/shj.v4i1.4237
Website: https://jurnal.poltekkespalu.ac.id/index.php/snj
Publisher: Poltekkes Kemenkes Palu

Night Eating Syndrome and Nutritional Status among Adolescents at SMAN 1 Martapura

Melinda Restu Pertiwi[1]*, Mayada Salsa Biila[2]
[1-2] Stikes Intan Martapura, Banjar, South Kalimantan, Indonesia
Corresponding author: mrs.melinda9@gmail.com

open access

ARTICLE INFO
Article History:
Received: 2026-10-09
Accepted: 2026-10-29
Published: 2026-10-30

Keywords:
Adolescents;
Nutritional Status;
Eating Behavior;
Night Eating Syndrome (NES);
Body Mass Index.

ABSTRACT
Background: Night Eating Syndrome (NES) is a condition characterized by nighttime eating patterns and may be an aspect of concern in meeting adolescents' nutritional needs. This study aimed to describe NES and nutritional status among adolescents at SMAN 1 Martapura, South Kalimantan, Indonesia.
Methods: This descriptive quantitative study was conducted at SMAN 1 Martapura, Banjar Regency, in 2026. The study population comprised 670 students, and 50 respondents were selected using consecutive sampling based on the inclusion and exclusion criteria until the sample size was reached. Data on NES were collected using the Night Eating Diagnostic Questionnaire (NEDQ) via Google Forms, while nutritional status was determined using body mass index (BMI) calculated from measured weight and height. The data were analyzed using univariate analysis in IBM SPSS Statistics version 24 to present the frequency distribution and percentage of each variable.
Results: The primary outcomes were the distribution of NES categories and nutritional status. Moderate NES was the most common category (n = 27; 54.0%), followed by mild (n = 14; 28.0%) and severe NES (n = 9; 18.0%). Regarding nutritional status, 40.0% of respondents had normal status, whereas 38.0% were undernourished, 20.0% were overweight, and 2.0% were obese.
Conclusion: Moderate NES was the most frequent category, and normal nutritional status was the most common, although undernutrition and overnutrition were also present. These findings may inform school-based education on regular eating patterns and balanced nutrition. Future studies should use larger samples and analytic designs to examine the relationship between NES and nutritional status, as well as related factors such as sleep quality, stress, physical activity, dietary patterns, and gadget use.

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INTRODUCTION

Nutritional status reflects the balance between nutrient intake and the body's requirements for growth, maintenance, and daily activity. Good nutritional status is achieved when the intake of energy, protein, vitamins, and minerals meets physiological needs, allowing bodily functions, immunity, and cognitive activity to operate optimally (Prasetya et al., 2023). In adolescents, nutritional status refers to the fulfillment of nutrient requirements, namely the balance between nutrient consumption and absorption. An imbalance between the two can lead to nutritional problems, either overnutrition or undernutrition (Hartini et al., 2023) One factor

related to adolescents' eating patterns is night eating syndrome (NES), a condition associated with dietary patterns, sleep quality, and emotional state in adolescents (Putri et al., 2023).

According to the World Health Organization, adolescents are defined as individuals aged 10 to 19 years (WHO, 2022). Adolescents in many countries continue to face a double burden of malnutrition, which includes both undernutrition and overnutrition. Globally, approximately 340 million adolescents are affected by overnutrition, while the prevalence of undernutrition has been reported to range from 4% to 8% (UNICEF, 2022). In Indonesia, the prevalence of undernutrition among adolescents reaches 7.6%, while that of overnutrition is 16.2% (Kementerian Kesehatan Republik Indonesia, 2024). These nutritional problems highlight the importance of considering factors related to adolescents' eating patterns and behaviors, one of which is NES (Isnaini et al., 2024).

The prevalence of NES varies according to population characteristics and country. In the general population, it has been reported to range from 0.6% to 4.6%. Among individuals with obesity, it ranges from 6% to 16% (Tzischinsky & Latzer, 2025). In Indonesia, the prevalence of NES among late adolescents has been reported at 46.2% (Utami et al., 2023). A preliminary study conducted on April 9, 2026, at SMAN 1 Martapura, South Kalimantan, found a total enrollment of 670 students. Initial observations and simple data collection indicated that some students had irregular eating habits, particularly a tendency to eat at night. If this pattern persists, it may develop into NES, which can affect adolescents' nutritional status and overall health.

The direct cause of NES in adolescents is disturbed sleep patterns and poor sleep quality. Adolescents who stay up late or frequently wake up at night tend to consume large amounts of food at night (Afifah & Prikhatina, 2021). When experiencing stress, adolescents are more likely to develop sleep disturbances, which can trigger night eating behavior. If this behavior persists, it may develop into NES. Adolescents with this condition typically eat after 7:00 p.m., which can affect metabolism and increase the risk of overweight (Putri et al., 2023). Other factors influencing NES include psychological stress (academic stress and anxiety), a modern lifestyle involving nighttime gadget use, irregular eating patterns (skipping meals from breakfast to lunch), and a high intake of energy-dense foods such as fast food, which increases food consumption late at night (Tetasa et al., 2025).

NES in adolescents has both short-term and long-term consequences. In the short term, NES can cause sleep disturbances, fatigue, mood changes, and reduced concentration in learning. In the long term, excessive night eating can increase the risk of weight gain, obesity, metabolic disorders, elevated blood glucose levels, and psychological problems such as anxiety and depression. Overnutrition that begins in adolescence may also contribute to the risk of obesity in adulthood (Maryani et al., 2023) Overweight adolescents tend to experience reduced work capacity and efficiency, lower resistance to illness, fatigue, heat intolerance, and more frequent sweating compared with adolescents of normal weight. In obese adolescents, the body's fat and nutrient reserves are already full, so excess nutrients accumulate in atypical sites, including around the heart, kidneys, and liver. This can impair the function of these organs and increase the risk of long-term health problems (Hartini et al., 2023).

Although research on NES has been conducted in various populations, the reported prevalence varies according to the characteristics of the respondents and the populations studied. Previous studies in Indonesia have reported the occurrence of NES among late adolescents and examined its relationship with nutritional status in various populations (Utami et al., 2023; Maria et al., 2024). However, information on NES and nutritional status assessed together among adolescents in South Kalimantan, particularly students at SMAN 1 Martapura, remains limited. Therefore, this study was conducted to describe NES and nutritional status among students at SMAN 1 Martapura. The results are expected to provide baseline data on both aspects among adolescents in the local school setting and to serve as a consideration for schools and health workers in planning nutrition education that meets adolescents' needs.

METHODS

This study used a quantitative approach with a descriptive design to describe NES and nutritional status among adolescents at SMAN 1 Martapura, Banjar Regency, South Kalimantan,

Indonesia. The study population consisted of 670 students enrolled in 2026. A total of 50 respondents were recruited using consecutive sampling. The inclusion criteria were students who had a habit of eating dinner after 7:00 p.m. for three consecutive months and who consumed excessive amounts of food after waking during the night. Operationally, excessive eating was defined as a caloric intake after dinner exceeding 25% of total daily caloric intake. This criterion was used to identify patterns of nighttime energy consumption, which is one of the characteristics of NES. The exclusion criteria were students who were absent during data collection or who did not complete all questionnaire items, because incomplete data could hinder the assessment of the study variables.

NES was assessed using the Night Eating Diagnostic Questionnaire (NEDQ) developed by Nolan and Geliebter (2017), which was completed online via Google Forms. The questionnaire covers 11 aspects: evening eating patterns, morning appetite, evening cravings, sleep disturbance, eating after nocturnal awakenings, self-perception of night eating, night shift work, mood disturbance, weight-loss dieting, height and weight, and confirmation of completion. Responses were evaluated against five diagnostic criteria.

1. Criterion I: Consumption of ≥25% of daily caloric intake after the evening meal and/or nocturnal eating episodes ≥2 times per week for at least three months.
2. Criterion II: Awareness and recall of evening and nocturnal eating episodes.
3. Criterion III: Presence of at least three of five symptoms: morning anorexia or breakfast skipping; an urge to eat between dinner and bedtime or during the night; sleep disturbance ≥4 times per week; eating to return to sleep; and evening mood deterioration.
4. Criterion IV: Distress related to night eating behavior.
5. Criterion V: An irregular eating pattern persisting for at least three months.

Based on these criteria, respondents were categorized as mild if they met Criterion I, moderate if they met Criterion I plus at least three symptoms of Criterion III, and severe if they met Criterion I plus at least three symptoms of Criterion III and both Criteria IV and V (Allison et al., 2010)

Nutritional status was assessed using body mass index (BMI), calculated as body weight in kilograms divided by height in meters squared. BMI values were classified as undernutrition (≤18.5 kg/m^2), normal (18.5–22.9 kg/m^2), overweight (23–24.9 kg/m^2), or obesity (25–29.9 kg/m^2). Body weight was measured once by the school health unit nurse of SMAN 1 Martapura using a GEA analog scale, while height was measured once using a microtoise. The measurements were carried out in accordance with the procedures applied by the UKS nurse.

Data were entered into Microsoft Excel and analyzed using SPSS version 24 for Windows. Univariate analysis was used to present the frequency distribution and percentage of each variable. The study adhered to research ethics principles: participation was voluntary, respondents' identities were protected by collecting initials only, and all data were kept confidential and reported in aggregate form.

This study was conducted after obtaining permission from the relevant parties. The researcher submitted a research permit request through Stikes Intan Martapura, which was then forwarded to SMAN 1 Martapura through the Banjar Regency Education Office in accordance with the applicable procedures. The implementation of the study was subsequently coordinated with the school. Respondents' consent was obtained through an informed consent form provided on the first page of the Google Form. Before completing the questionnaire, respondents were given information about the study and were asked to state their willingness to participate voluntarily and without coercion through electronic consent. The confidentiality of respondents' information and data was maintained in accordance with the applicable regulations.

RESULTS

This descriptive quantitative study was conducted at SMAN 1 Martapura, Banjar Regency, South Kalimantan, Indonesia, in 2026. The study population consisted of 670 active students. Respondents were recruited using consecutive sampling over one day, involving students from two classes in turn. Before completing the questionnaire, prospective respondents were screened

according to the predetermined inclusion and exclusion criteria. Based on this screening, 50 respondents met the criteria, and their data were analyzed in this study. The respondents' demographic characteristics included age, gender, and grade level.

Table 1. Demographic Characteristics of Respondents

Characteristics	n	%
Age		
16 years	13	26
17 years	31	62
18 years	6	12
Gender		
Male	20	40
Female	30	60
Grade level		
X	10	20
XI	40	80

Source: Primary data, 2026.

Table 1 shows that most of the respondents were female, accounting for 60% of the sample. The majority were in grade XI, representing 80% of the respondents. Most of the respondents were aged 17 years, accounting for 62% of the sample.

Table 2. Distribution of Night Eating Syndrome and Nutritional Status

Variables	n	%
Night eating syndrome		
Mild	14	28
Moderate	27	54
Severe	9	18
Nutritional status		
Undernutrition	19	38
Normal	20	40
Overweight	10	20
Obesity	1	2

Source: Primary data, 2026.

Table 2 shows that most of the respondents had moderate NES, accounting for 54% of the sample. The largest proportion of respondents had normal nutritional status, representing 40% of the sample.

DISCUSSION

This study found that most adolescents at SMAN 1 Martapura experienced moderate NES, while smaller proportions experienced mild and severe NES. Regarding nutritional status, the most common category was normal, although undernutrition, overweight, and obesity were also identified among the respondents. These findings indicate that night eating behavior was common among the adolescents, whereas their nutritional status varied across categories.

Night Eating Syndrome

This study found that most adolescents at SMAN 1 Martapura were in the moderate category of NES, while the others were in the mild and severe categories. The classification was based on the NEDQ, which considers the pattern and frequency of night eating as well as other characteristics related to the behavior. In the moderate NES category, many respondents reported a desire to eat after dinner and night eating more than twice a week. Most respondents also stated that this eating pattern had lasted for more than three months. In addition, some respondents reported eating at night and consuming larger amounts of food in the evening or at night.

Meanwhile, respondents in the mild NES category showed characteristics of night eating behavior, such as a desire to eat after dinner and food consumption at night. This category describes respondents who met the assessment characteristics at the mild level but did not meet the criteria for a higher category. In contrast, respondents in the severe NES category met the NEDQ assessment criteria for that category. This assessment considers the pattern and frequency of night eating, awareness of night eating episodes, sleep disturbance, mood changes, perceived distress or functional impairment, and the duration of the irregular eating pattern.

The findings of this study are consistent with previous studies showing a tendency toward NES among adolescents. A previous study found that this tendency also occurred among secondary school adolescents (Tetasa et al., 2025). Similar results were found among adolescents at State Senior High School 6 Depok, with a proportion of 43.8% (Putri et al., 2023). A tendency toward NES among adolescents may be marked by a desire to eat after dinner or before bedtime. This behavior may be related to the return of hunger after dinner. In addition, activities and academic workload that continue late into the night may keep adolescents awake and lead them to eat outside their usual mealtimes (Noviasty et al., 2021)

In contrast, a study among medical students in India showed a different distribution of NES severity. That study reported an NES prevalence of 13.8%, with 10.1% in the mild category, 1.7% in the moderate category, and 1.9% in the severe category (Singh et al., 2026). This difference in the distribution of NES severity may be related to respondent characteristics, as the previous study involved medical students, whereas the present study involved secondary school adolescents.

Nutritional Status

This study showed that normal nutritional status was the most common category among adolescents at SMAN 1 Martapura, with an almost equal proportion in the undernutrition category. Meanwhile, a small proportion of respondents were overweight or obese. Nutritional status reflects the balance between nutrient intake and the body's requirements (Prasetya et al., 2023). Individuals with NES may still have a normal nutritional status when their total daily energy intake is balanced with their body's requirements (Nolan & Geliebter, 2019). These findings indicate that night eating behavior is not always accompanied by abnormal nutritional status.

The relatively high proportion of undernutrition in this study cannot be explained with certainty, because daily energy intake, meal timing, and meal skipping were not measured. In general, undernutrition is related to an imbalance between nutrient intake and the body's requirements (Hartini et al., 2023). Factors reported in previous studies, such as a shift of mealtimes to the night without an increase in the amount of food consumed, or the habit of skipping breakfast and lunch, may be considered as hypotheses. However, these explanations cannot be concluded from the findings of this study and need to be tested in future studies that measure respondents' energy intake and eating patterns. Overweight, in turn, is generally influenced by a long-term imbalance between energy intake and energy expenditure, which is related to a high-calorie diet, fast-food consumption, low physical activity, and lifestyle changes (Hartini et al., 2023). In this study, only one respondent was obese, and this respondent had mild NES. Obesity is influenced by total energy intake, physical activity, genetic factors, and metabolism, so it cannot be explained by night eating behavior alone (Nolan & Geliebter, 2019).

Previous studies have reported an association between NES and higher body weight. A significant association between NES and overnutrition was found among senior high school students (Putri et al., 2023). NES was also associated with obesity among university students (Maryani et al., 2023). These findings differ from the present study, in which obesity was found in only one respondent, who had mild NES. The earlier findings support the possibility that night eating behavior may be related to weight gain in some adolescents. However, they do not fully reflect the conditions of the present study, because the previous studies used different respondent characteristics and study designs. Findings on the relationship between NES and nutritional status are also not entirely consistent. A previous study found no significant association between NES and body mass index (Dzulkafli et al., 2020).

The type of food consumed at night also needs to be considered in relation to nutritional status. Night eating among individuals with NES may involve foods high in fat and sugar (Duraccio et al., 2022). High sugar intake can affect the regulation of hunger and satiety as well as metabolic processes, while high fat intake can increase body fat accumulation (Setyaningrum et al., 2021). In addition, sleep quality is another factor that should be considered in relation to nutritional status. University students with overnutrition have been reported to have poorer sleep quality than those with normal nutritional status (Sutanto et al., 2025). Among senior high school adolescents, sleep quality has also been reported to be significantly associated with overnutrition, with those who have poor sleep quality being at higher risk (Simpatik et al., 2023). Poor sleep quality may also be related to changes in the hormones that regulate hunger and satiety, such as decreased leptin and increased ghrelin, which can increase appetite (Purnamasari et al., 2021). Thus, nutritional status is related not only to the type and amount of food consumed at night but also to sleep quality, which is part of daily lifestyle (Haryana et al., 2023).

Differences in nutritional status may also be related to the level of physical activity. Individuals who are physically active have greater energy expenditure, so excess energy from food intake can be used more for bodily activity. Conversely, low physical activity results in lower energy expenditure, so excess energy accumulates in the body more easily. Differences in physical activity between individuals may also lead to inconsistent findings on the relationship between night eating behavior and nutritional status, particularly when physical activity is not controlled as a factor affecting energy balance (Silveira et al., 2022).

The findings of this study have implications for adolescent health promotion in schools, particularly in improving knowledge about night eating patterns and the maintenance of nutritional status. Health education can be delivered through counseling and by empowering adolescents as peer educators to raise awareness of healthy eating patterns. Peer educators can help convey simple health information and encourage healthy eating habits in the school environment through collaboration with health workers (Chandra et al., 2025). In addition, health workers and schools can conduct regular nutritional status monitoring by measuring weight, height, and body mass index-for-age to detect potential nutritional problems early (Mubin, 2025).

However, these implications should be considered alongside several limitations of this study. First, data collection using Google Forms depended on the honesty, understanding, and seriousness of the respondents, so their answers may not fully reflect their actual conditions, even though the questionnaire was completed in the classroom with the researcher's assistance. Second, data collection lasted only one day in accordance with the school's permission, so only 50 respondents who met the inclusion criteria could be enrolled. In addition, because respondents were selected based on night eating behavior, the sample cannot be used to estimate the prevalence of NES among all students at the school. These limitations may affect the representativeness of the sample and the generalizability of the findings.

Given these limitations, future research should involve more respondents from a wider study area and allow a longer data collection period, so that the findings better represent adolescents beyond a single school. Future studies are also encouraged to use an analytic design to examine the relationship between NES and nutritional status. Additionally, exploring related factors such as sleep quality, stress level, physical activity, dietary patterns, and duration of gadget use may reveal new dimensions that were beyond the scope of this study.

CONCLUSION

This study provides an overview of NES and nutritional status among adolescents at SMAN 1 Martapura, South Kalimantan. Most respondents were in the moderate NES category. Regarding nutritional status, normal nutritional status was the most common category, with a nearly equal number of respondents in the undernutrition category. Respondents with overweight and obesity were also identified. These findings may be considered in efforts to improve adolescent health in the school setting, particularly with regard to eating patterns and nutritional status.

For educational institutions, the results of this study are expected to serve as a source of information on NES and adolescent nutritional status. For adolescents, the results are expected to raise awareness of the importance of maintaining regular eating patterns and a healthy nutritional

status. For future researchers, it is recommended to involve respondents from a wider area and from more schools and to use an analytic design to examine the relationship between NES and nutritional status, as well as other related factors. This study was limited to respondents from a single school who were selected based on specific criteria, so the findings cannot be broadly generalized to all adolescents.

Authors' Contribution Statement: Melinda Restu Pertiwi contributed to the development and preparation of the manuscript based on the research findings, provided academic supervision and guidance throughout the research and manuscript preparation process, and critically reviewed and revised the manuscript. Mayada Salsa Biila conducted the research, collected and analyzed the data, and contributed to the preparation of the manuscript. Both authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

Conflicts of Interest: The authors declare that they have no conflicts of interest. There are no financial, personal, or professional relationships that could have influenced the conduct of the study, interpretation of the results, or preparation of the manuscript.

Source of Funding: This research received no specific financial support from any public, commercial, or non-profit funding agency. The study was conducted using the authors' own resources, and no external funding agency was involved in the design of the study, data collection, analysis, interpretation of the results, or preparation of the manuscript.

Acknowledgments: The authors would like to thank Stikes Intan Martapura and the Banjar Regency Education Office for their administrative support in the research permit application process. The authors also express their appreciation to SMAN 1 Martapura for facilitating and coordinating the study. Gratitude is also extended to all respondents who took the time to participate voluntarily in this study.

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