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Original Research

ENVIRONMENTAL SANITATION AWARENESS ATTITUDES TOWARD PERSONAL HEALTH BEHAVIOR OF JUNIOR HIGH SCHOOL STUDENTS IN TERNATE

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ABSTRACT

Environmental Sanitation Awareness Attitude Towards Personal Health Behavior of Junior High School Students in Ternate. *Awareness of environmental sanitation among adolescents not only contributes to pro-environmental behavior, but it may also be related to personal health behavior. This study aims to analyze the relationship and influence of environmental sanitation awareness attitudes on the personal health behavior of junior high school students in Ternate City, North Maluku Province. The study uses a quantitative approach with a correlational (cross-sectional) design involving 122 junior high school students. Data were collected through questionnaires on environmental sanitation awareness attitudes and personal health behavior within a score range of 0–100. Data analysis included descriptive statistics, prerequisite tests (residual normality, linearity, and homoscedasticity), Pearson correlation, and simple linear regression. Descriptive results showed an average environmental sanitation awareness attitude score of 83.47 (SD=6.87) and an average personal health behavior score of 72.28 (SD=6.85). Pearson correlation test showed a strong positive relationship between environmental sanitation awareness and personal health behavior (r=0.714; p<0.001). Simple linear regression indicated a significant effect with R^2=0.510 and the model equation Y = 31.725 + 0.716X, meaning that a one-unit increase in environmental awareness predicts a 0.716-point increase in personal health behavior. These findings underscore the importance of integrating environmental education in schools as a dual strategy to enhance ecological concern while supporting healthy lifestyle behaviors among adolescents.*

INTRODUCTION

Environmental and personal health are important factors in the formation of healthy behavior, particularly among adolescents who are still in a critical developmental stage. One of the key components of environmental health is sanitation, which includes the management of cleanliness in school environments, residential settings, and basic sanitation facilities such as clean toilets, handwashing facilities, and waste management (1). Various sanitation and environmental education programs have been shown to improve knowledge and attitudes; however, behavioral change is often inconsistent. This condition indicates a gap between sanitation awareness attitudes and daily health practices.

Awareness attitudes toward environmental sanitation and personal health behavior among students represent a multifaceted issue involving awareness, education, and practical application [(2)]. Several studies have demonstrated that students generally possess strong awareness of environmental issues, yet this awareness is not consistently translated into proactive environmental behavior. For example, a study among university students revealed that although environmental awareness was high, actual environmental behavior remained relatively weak, indicating a gap between awareness and action [(3)]. Similarly, research conducted in Yekaterinburg found that students were aware of environmental problems but often exhibited inconsistent and limited environmental practices [(4)]. Students frequently demonstrate strong environmental awareness; however, their behaviors do not always align with this awareness [(5)].

Educational programs focusing on environmental sanitation and personal health can significantly enhance students' knowledge and behavior. For instance, a program implemented in Yogyakarta increased students' knowledge of school environmental health by 14.81% through interactive lectures and practical activities [(6)]. Participatory classroom pedagogy in Nepal has been shown to be effective in changing students' sanitation and hygiene behaviors, emphasizing the importance of integrating such content into the curriculum [(7)]. Interventions through educational programs and participatory approaches have been proven to improve knowledge and behavior related to environmental sanitation and personal health [(8)].

Cases of environmentally based diseases among students in Ternate City are still reported, highlighting the importance of understanding whether students' sanitation awareness attitudes contribute to their personal health behavior. Environmental sanitation awareness attitudes play an important role in promoting personal health behavior. However, based on available data, cases of environmentally based diseases such as diarrhea and skin infections are still found among junior high school students. This condition indicates that sanitation awareness attitudes have not yet been fully established, thereby influencing students' personal health behavior [(9)]. To date, many studies have primarily emphasized descriptive assessments of knowledge or evaluations of interventions, while quantitative evidence regarding the strength of the relationship and the predictive contribution of sanitation awareness attitudes to personal health behavior among junior high school students—particularly in Ternate—remains limited. Therefore, further research is needed to determine the extent to which environmental sanitation awareness attitudes influence the personal health behavior of junior high school students in Ternate City.

MATERIALS AND RESEARCH METHODS

This study employed a quantitative approach with a cross-sectional correlational design to examine the relationship and effect of environmental sanitation awareness attitudes (X) on personal health behavior (Y) among junior high school students in Ternate City, North Maluku Province. A total of 122 junior high school students from five schools participated in the study. Recruitment was conducted proportionally by school (as clusters) based on the number of students present and willing to participate on the day of data collection. The inclusion criteria were active students who completed the questionnaire in full, while incomplete questionnaires were excluded from the analysis.

(a) The first stage of the study involved instrument preparation, including the development of an environmental sanitation awareness attitude questionnaire and a personal health behavior questionnaire, standardization of completion instructions, and brief socialization sessions at each school to ensure consistency in measurement procedures. (b) The second stage was data collection: questionnaires were administered face-to-face during school hours, completed independently without personal identifiers to maintain confidentiality, and collected on the same day. At this stage, the researchers conducted a rapid check to ensure

that no items were left unanswered. (c) The third stage involved data management and scoring: responses were coded, entered, and re-verified (including checks for data entry errors and detection of extreme values). Composite scores for each variable were calculated by summing item scores and converting them to a 0–100 scale. Scores were then categorized using the criteria <60 (low), 60–80 (moderate), and >80 (high). For personal health behavior, aspect-specific scores (e.g., healthy lifestyle, disease prevention, and mental/emotional balance) were also calculated as supplementary analyses. (d) The fourth stage was data analysis: analyses included descriptive statistics (median, mean, standard deviation, and distribution indicators), Pearson correlation, and simple linear regression with examination of basic assumptions (residuals, linearity, and variance distribution). After assumptions were met, the relationship between variables was tested using a two-tailed Pearson correlation at a significance level of 0.05 ($r = 0.714$; $p < 0.001$). The effect was then analyzed using simple linear regression to obtain the regression coefficient, coefficient of determination, and the predictive model equation $Y = 31.725 + 0.716X$ with $R^2 = 0.510$.

Data were collected using a 24-item environmental sanitation awareness attitude questionnaire and a 20-item personal health behavior questionnaire, which were developed by adapting the core indicators of WASH in Schools [(10)] [(11)] and the personal hygiene dimensions of the HICORIN instrument [(12)]. Following linguistic adaptation and expert review, the instruments were pilot-tested on 40 students. Item validity was assessed using Pearson item–total correlations, with all attitude items deemed valid ($r = 0.325–0.677$; $p < 0.05$). In the behavior scale, one item (Y17) was found to be non-significant ($r = 0.219$; $p = 0.064$) and was therefore excluded; consequently, behavioral scores in the main study were calculated based on 19 items. Reliability analysis demonstrated excellent internal consistency for the attitude scale (Cronbach's alpha = 0.886; 95% CI 0.829–0.943) and acceptable internal consistency for the behavior scale (Cronbach's alpha = 0.725; 95% CI 0.652–0.798).

A limitation of this study is that behavioral data were obtained through self-report questionnaires, which are susceptible to bias, such as social desirability bias and recall bias, and may reflect reported rather than observed behavior. To minimize bias, questionnaires were completed anonymously and accompanied by standardized instructions. Therefore, future research is recommended to incorporate structured observations or additional records as triangulation methods.

RESEARCH RESULTS AND DISCUSSION

This study involved 122 junior high school students in Ternate City, North Maluku Province. Descriptive statistics were used to illustrate general trends and inter-student variability prior to analyzing relationships among variables. Overall, environmental sanitation awareness attitudes were categorized as high, while personal health behavior was classified within the moderate to high range (Table 1). Greater variability among students was observed in personal health behavior compared to sanitation awareness attitudes. Overall, these findings indicate that the majority of students possess good environmental awareness, although a small proportion of students exhibit lower levels of awareness.

Table 1. Descriptive Statistics of Environmental Sanitation Awareness Attitudes and Personal Health Behavior

Statistic	Environmental Sanitation Awareness Attitudes	Personal Health Behavior
Valid	122	122
Median	83.33	72.50
Mean	83.47	72.28
Standard Deviation	6.868	6.853
Minimum	62.50	46.25
Maximum	97.92	91.25

When the data were categorized based on score ranges, students with scores below 60 were classified as low, scores between 60 and 80 as moderate, and scores above 80 as high. Based on this classification, the majority of students fell within the moderate to high categories for both environmental sanitation awareness attitudes and personal health behavior. This pattern indicates a consistent positive tendency: students with higher levels of environmental awareness generally also demonstrate better personal health behavior. The relationship suggested by these descriptive findings was subsequently examined in greater depth through correlation and regression analyses to assess the strength and significance of the association between variables and to determine whether sanitation awareness attitudes are related to and contribute as predictors of personal health behavior.

With relatively high mean values, balanced medians, and small standard deviations, both environmental sanitation awareness attitudes and personal health behavior reflect a generally stable condition among students in maintaining environmental awareness while simultaneously practicing healthy behaviors. The subsequent inferential analyses therefore focus on the strength of the relationship and the practical significance of the contribution of sanitation awareness attitudes to personal health behavior.

Classical Assumption Testing

Prior to conducting correlation and regression analyses, the data were examined to ensure the appropriateness of parametric analysis. The assessment included evaluation of residual patterns, the form of the relationship between variables X and Y, and the homogeneity of variance (homoscedasticity). These prerequisite tests are essential because correlation and regression results are considered valid only when the analyzed data satisfy the underlying assumptions. Without adequate assumption testing, the resulting conclusions may be biased or misleading. Accordingly, tests of normality, linearity, and heteroscedasticity were applied as a foundation to ensure data quality.

The results of the normality test using the Shapiro–Wilk method yielded significance values of 0.017 for environmental sanitation awareness attitudes and 0.041 for personal health behavior. Although these values are slightly below the commonly used threshold of 0.05 for assessing normality, the relatively large sample size (more than 100 respondents) and the bell-shaped distribution observed in the standardized residuals histogram indicate that the data can still be considered approximately normally distributed. This interpretation is consistent with the Central Limit Theorem, which states that with sufficiently large sample sizes, the sampling distribution tends to approximate normality despite minor deviations.

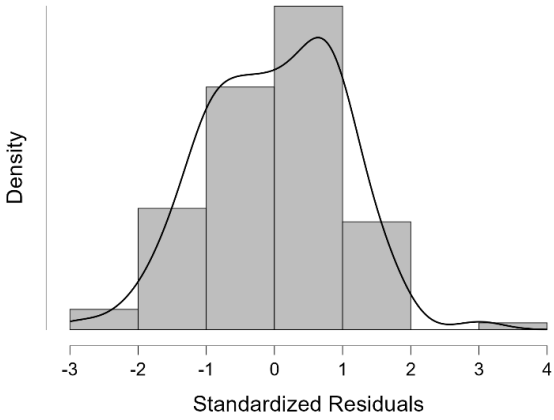

Figure 1. Standardized Residuals Histogram

In addition to the normality test, a linearity test was conducted to assess whether there is a linear relationship between the independent variable, environmental sanitation awareness attitudes, and the dependent variable, personal health behavior. The results indicated a linear relationship, meaning that increases in environmental sanitation awareness attitudes correspond proportionally with improvements in personal health behavior. This suitability is important because linear regression is valid only when the relationship between variables is linear or proportional. These findings also support the preliminary observations from the descriptive analysis, suggesting that the two variables are consistently related and can be further analyzed quantitatively.

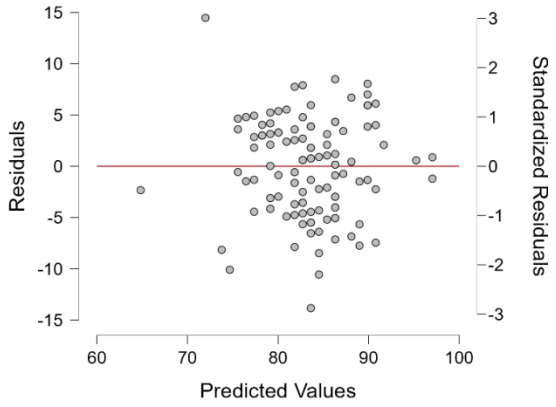

Figure 2. Residuals vs. Predicted Values Plot

Heteroscedasticity was assessed using a scatterplot of residuals against predicted values. The plot showed a random distribution of residual points around the horizontal zero line, without a fan- or funnel-shaped pattern. This indicates that the residual variance is constant (homoscedasticity assumption is met). Violations of heteroscedasticity can lead to biased standard errors, which may compromise the validity of t-tests, F-tests, and regression results [(13)]. Meeting the homoscedasticity assumption ensures that the regression outcomes are more reliable [(14)].

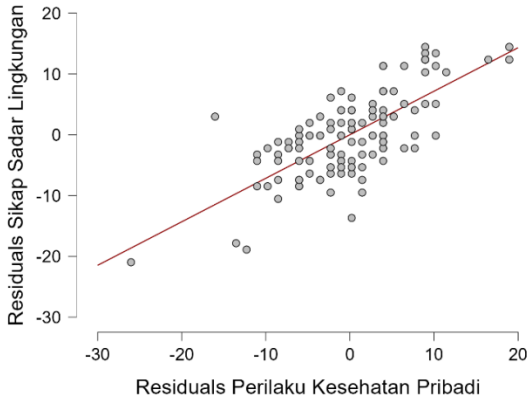

Figure 3. Partial Plot of Environmental Sanitation Awareness Attitudes and Personal Health Behavior

With the assumptions of residual normality, variance homogeneity, and homoscedasticity satisfied, the simple linear regression model employed in this study can be considered valid. Examination of the assumptions revealed no significant violations, allowing the Pearson correlation and simple linear regression results to be interpreted reliably within this sample.

Correlation between Environmental Sanitation Awareness Attitudes and Personal Health Behavior

Pearson correlation analysis indicated a strong positive relationship between environmental sanitation awareness attitudes and students' personal health behavior. Substantively, students with higher sanitation awareness tended to report better personal health habits. This relationship aligns with the Theory of Planned Behavior [15], which posits that a positive attitude toward a behavior increases intention, subsequently influencing actual behavior. In this context, students with high environmental awareness are more likely to intend to take care of themselves, their surroundings, and to practice healthy habits [16]. Within the school setting, reinforcing sanitation awareness attitudes should be translated into practical opportunities, such as handwashing routines, waste management, and toilet maintenance, to ensure more consistent behavioral change.

This relationship is grounded in environmental education principles, which cultivate a deep understanding of conservation and sustainability, ultimately leading to environmentally friendly habits [17]. By engaging in sustainable practices, such as reducing waste and conserving resources, students not only improve their personal well-being but also contribute positively to their environment [18]. Furthermore, prioritizing health and fitness is essential, as it motivates individuals to make choices beneficial to their well-being [19].

The Value-Belief-Norm Theory (Stern et al., 1995) emphasizes that individual values and beliefs regarding human-environment relationships shape moral norms, which in turn guide pro-environmental actions [20]. Environmental awareness fosters a moral responsibility to protect one's own health. This is also consistent with the Social Cognitive Model, in which environmental awareness can strengthen self-efficacy and social norms that encourage healthy behavior. Enhancing environmental awareness through social education improves students' understanding of environmental issues and promotes critical thinking, in line with the Social Cognitive Model, by fostering moral responsibility and proactive behavior toward both nature and personal health [21].

Table 2. Summary of Main Results of Correlation and Regression Analyses

Analysis	Key Parameter	Summary of Results	Substantive Meaning
Pearson Correlation	r; p	r = 0.714; p < 0.001	Strong positive relationship between environmental sanitation awareness attitudes and personal health behavior.
Simple Linear Regression	R^2	0.510	The contribution of sanitation awareness attitudes is substantial; however, personal health behavior is also influenced by other contextual factors.
Direction of Effect (Regression)	Coefficient B; p	B = 0.716; p < 0.001	Increases in sanitation awareness attitudes are associated with corresponding increases in personal health behavior, indicating a linear relationship.

Behaviors, including health-promoting behaviors [23]. Family, educational, and social environments influence students' environmental awareness, which is subsequently reflected in healthy and sustainable lifestyle behaviors [21]. Environmental awareness has been shown to be an important predictor of students' personal health behavior, although some aspects remain influenced by other external factors.

Effect of Environmental Sanitation Awareness Attitudes on Personal Health Behavior

Simple linear regression analysis demonstrated that environmental sanitation awareness attitudes are a significant predictor of students' personal health behavior. Substantively, students with higher sanitation awareness attitudes tend to exhibit better personal health behaviors, and the contribution of this predictor is substantial within the school context.

Table 3. Model Summary of Environmental Sanitation Awareness Attitudes on Personal Health Behavior

Model	R	R^2	Adjusted R^2	RMSE
M_0	0.000	0.000	0.000	6.868
M_1	0.714	0.510	0.506	4.826

Note. M_1 includes Personal Health Behavior

The ANOVA test yielded an F-value of 125.0 with $p < 0.001$, indicating that the regression model is statistically significant. The regression coefficient of 0.716 ($p < 0.001$) suggests that for every one-unit increase in environmental sanitation awareness attitudes, the personal health behavior score is expected to increase by 0.716 units.

Table 4. Effect of Environmental Sanitation Awareness Attitudes on Personal Health Behavior

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M_1	Regression	2,912	1	2,912.45	125.0	< .001
	Residual	2,795	120	23.29		
	Total	5,707	121			

Note. M_1 includes Perilaku Kesehatan Pribadi

Note. The intercept model is omitted, as no meaningful information can be shown.

These findings confirm that strengthening attitudes alone is not sufficient: personal health behavior is also influenced by other factors, such as the availability of facilities, family support, school supervision, and peer norms. Therefore, school strategies should integrate education, habit formation, and environmental support. Students with higher environmental awareness are predicted to exhibit better personal health behaviors. The relationship is linear, indicating that as X scores increase, Y scores increase proportionally and consistently. This demonstrates that while environmental awareness attitudes are an important factor, personal health behavior remains multidimensional.

Table 5. Regression Coefficients for the Effect of Environmental Sanitation Awareness Attitudes on Personal Health Behavior

Coefficients

Model			Unstandardized	Standard Error	Standardized	t	p
M_0	(Intercept)		83.470	0.622		134.242	< .001
M_1	(Intercept)		31.725	4.648		6.826	< .001
	Personal Health Behavior		0.716	0.064	0.714	11.183	< .001

These findings indicate that environmental education in schools not only fosters ecological awareness but also has a direct impact on students' health behaviors. Students with higher environmental awareness are more likely to maintain healthy lifestyles, implement disease prevention measures, and achieve better mental balance. In other words, instilling environmental awareness can serve as an important strategy to improve the overall health quality of young generations.

Environmental awareness can enhance risk perception (e.g., threats of disease resulting from unsanitary environments) while emphasizing the benefits of healthy actions. It has a direct influence on health-related consumption behaviors, such as purchasing organic products, through attitudes and social norms [(24)]. Both environmental awareness and health consciousness significantly predict health behaviors, even after controlling for demographic variables [(25)]. Studies show that improvements in physical environmental quality, through sanitation and housing conditions, coincide with enhanced public health behaviors. Enhancing physical environmental quality and sanitation attitudes is therefore critical to promoting health behaviors in the community [(26)]. Collectively, there is strong evidence that environmental interventions—whether through cultivating positive attitudes or improving infrastructure—can reinforce personal health behaviors.

The consistency between the current study's findings and recent literature demonstrates that the influence of environmental awareness attitudes on personal health behavior has a solid theoretical and empirical foundation. This underscores the importance of integrating environmental education into school curricula as a dual strategic tool [(27)], aimed at simultaneously increasing ecological awareness and promoting healthy behaviors among students. Such strategies can be implemented through interdisciplinary learning and fostering responsible citizenship, which are essential for addressing environmental challenges and building a sustainable future [(28)].

Theoretically, these findings support the frameworks of the Theory of Planned Behavior and the Health Belief Model. Attitudes and risk/benefit perceptions can motivate intentions and health actions when opportunities for practice and social support are available. Practically, schools can integrate sanitation into teaching and school health programs (UKS), such as toilet cleanliness audits, handwashing campaigns, waste management, and duty schedules based on indicators. Monitoring of student behavior should not rely solely on questionnaires but also include brief observations, checklists, and teacher feedback to ensure more accurate assessments and reinforcement of healthy practices.

CONCLUSIONS AND RECOMMENDATIONS

Environmental sanitation awareness attitudes are strongly associated with and serve as an important predictor of junior high school students' personal health behavior in Ternate City. These findings indicate that strengthening sanitation attitudes and practices has the potential for dual benefits: fostering ecological awareness while simultaneously improving

adolescents' healthy habits. However, personal health behavior remains influenced by other contextual factors, highlighting the need for comprehensive interventions. It is recommended to integrate sanitation and environmental content into project-based learning, such as classroom or toilet cleanliness audits, handwashing campaigns, and waste management activities, providing students with practical opportunities rather than mere theoretical understanding. Additionally, school physical support should be strengthened, including adequate toilets, soap and running water, trash bins, and routine cleaning systems, so that healthy behaviors are easily adopted and maintained. Behavioral evaluation should be enriched through triangulation, combining questionnaires with observational checklists, school health program records, and teacher feedback. Future research is advised to employ longitudinal or intervention designs to examine behavioral changes over time.

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