

# Knowledge, Attitudes, and Behavior of Students in Combating Mosquito Nest: A Case Study in High School

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## ABSTRACT

**Aim:** Assessing the relationship between high school student knowledge, attitudes, and behavior of students in eliminating mosquitoes.

**Study design:** This research employed a cross-sectional design with participant all students in Binatama Vocational Health School, Sleman, Yogyakarta

**Place and Duration of Study:** This research was done at Binatama Health Vocational School, Sleman, Yogyakarta, in November 2023.

**Methodology:** Quantitative research with a cross-sectional design was employed. The population and sample in this study were all from Binamata Vocational High School (311 students). An online questionnaire was used to collect the students' responses.

**Results:** A relationship exists between students' knowledge and behavior in eliminating mosquito nests.

**Conclusion:** The results of this study indicate no significant relationship exists between knowledge and high school students' attitudes regarding the elimination of mosquito nests. There is a relationship between the knowledge and behavior of high schools in eliminating mosquito nests.

*Keywords: knowledge, attitude, behavior, mosquito nests*

## 1. INTRODUCTION

Mosquitoes are considered the world's most dangerous organisms, causing approximately 750,000 global deaths in 2018 through the spread of mosquito-borne diseases [1]. Mosquitoes are vectors of many infectious diseases caused by parasitic and viral agents such as lymphatic filariasis, chikungunya, and Zika, which cause essential pathologies in humans and animals [2]. The most common viral infection caused by the Aedes mosquito is dengue fever. More than 3.9 billion individuals in more than 129 countries are at risk of contracting dengue fever, with an estimated 96 million symptomatic cases and approximately 40,000 deaths annually [1]. In addition, around 2,400 million people worldwide are at risk of malaria, while dengue fever is estimated to cause 100-400 million infections each [3][4]. Diseases transmitted by mosquitos are endemic in many areas, including Southeast Asia. This disease is a significant cause of death and morbidity in many underdeveloped countries.

Previous research also explains that several factors can influence the incidence of dengue fever, including environmental conditions around the house, such as distance from residential areas, house design, type of water storage container, altitude, and climate. Apart from that, community behavior has a significant impact because it can provide support or create an environment that supports the development of mosquitoes that cause dengue fever. Social factors such as people's habits can be detrimental to health, for example, low

compliance with clean and healthy living behavior, such as lack of activity in cleaning water reservoirs and lack of concern for yard cleanliness, as well as low [5].

Indonesia is one country that suffers from dengue disease. This country tries to control dengue spreading through mosquito control, meaning preventing and eradicating dengue fever by breaking the chain of transmission by controlling the vector through the eradication of dengue hemorrhagic fever mosquito nests in Indonesia, called PSN-DBD. Based on previous research, teenagers' role in preventing mosquito-borne diseases such as dengue hemorrhagic fever still needs to be improved [6]. This can be seen from teenagers' lack of participation or involvement in various environmental activities, including cooperation activities, ecological cleaning, and implementation of 3M actions (Drying, Covering, Burying potential breeding places) and Mosquito Nest Eradication (called PSN). Even though teenagers are considered the nation's next generation and pioneers of the reform movement who have significant duties and responsibilities towards their families, environment, and society, their involvement in dengue prevention activities still needs to be increased [7]. To carry out these efforts, teenagers must have good knowledge and understanding. Based on previous research, community behavior, which includes knowledge, attitudes, and actions, is one of the critical factors in successfully eradicating mosquito nests [8]. On the other hand, education and learning about mosquito control can improve youth attitudes and help them adopt protective practices. Previous knowledge, attitudes, and practices (KAP) studies conducted in various regions of Bangladesh regarding malaria and dengue fever have shown knowledge gaps among communities regarding transmission, prevention, or treatment and their reluctance to take preventative measures for mosquito-borne diseases [9].

Binatama Health Vocational School is one of the schools that specializes in the health curriculum. This school is located in Sleman District, Yogyakarta, and is an urban location, making it prone to dengue transmission. With these issues in mind, researchers wish to observe about the knowledge, attitudes, and practices of Binatama Health Vocational School students. This study has significance for offering input to schools and the larger community on KAP that needs to be improved among teenagers.

## **2. MATERIAL AND METHODS**

This research used a cross-sectional design carried out at the Binatama Health Vocational School, Sleman, Yogyakarta. Population in this study was 311 students in this school from first to third grade. During data collection, we included all students as our sample, except students who were absent during data collection for reasoning such as six.

Data was collected via an online form with a set of questionnaires that developed by research group under discussion with the expert. Respondents were given a total of 31 questions, which included 9 knowledge questions, 11 attitude questions, and 11 practice questions. They completed the questionnaire at the same time in their classes, supervised by their teachers. Data were calculated and scored, in knowledge a right and wrong answer were scored with 1 and 0 respectively. In attitude, a five-Likert scale (very agree, agree, disagree, very disagree and don't know) was posted. Favorable questionnaire was scored as 4,3,2,1,0 respectively – and the vice versa for the un-favorable. In behavior, we provided respondent with agree and disagree questionnaire, agree was scored as 1 and disagree scored as 0. For each knowledge, attitude and behavior were calculated for the total score. **Knowledge was categorized as good and poor by using cut off score 75 (Ref) [10]**; while attitude and practice were using the median. Median for attitude and behavior were 32 and 10 - respectively. The data then analyze using chi-square.

## **3. RESULTS AND DISCUSSION**

In total we included 293 students on this study. Table 1 provides a complete description of the characteristics of teenagers involved in the mosquito nest eradication initiative. The majority of respondents were early adolescents (51.2%). The majority of the

respondents were women (93.2%). Most respondents live at home (95.9%), and most have family members of  $\leq 5$  people (77.5%). The level of knowledge of respondents is generally high (92.8%). The average attitude of respondents tends to be in the poor category, namely around 59.7%. Apart from that, it is known that most respondents showed poor behavior, as many as 52.9%.

**Table 1. Characteristics of Respondents**

Variable	n	%
<b>Age</b>		
Early teens (14-16 years)	150	51.2
Late teens (17-20 years)	143	48.8
<b>Gender</b>		
Man	20	6.8
Woman	274	93.2
<b>Residence</b>		
House	281	95.9
Boarding house or others	12	4.1
<b>Number of Family Members</b>		
$\leq 5$ people	227	77.5
$\geq 6$ people	66	22.5
<b>Knowledge level</b>		
Poor	21	7.2
Good	272	92.8
<b>Attitude</b>		
Poor	175	59.7
Good	118	40.3
<b>Behavior</b>		
Poor	155	52.9
Good	138	47.1

### 3.1 The Relationship between Knowledge and Attitudes and Behavior in Eradicating Mosquito Nests

Tables 2 and 3 provide valuable insights into the correlation between knowledge attitudes and behavior of adolescents in the context of effort eradication of nest mosquitoes. This table demonstrates the level of understanding teenagers about nest mosquitoes' ties to attitudes toward prevention and tangible conduct that they adopt to reduce the potency of breeding site potential.

**Table 2. Relationship between Knowledge and Adolescents' Attitudes in Eradicating Mosquito Nests**

Knowledge	Attitude		Total n (%)	P- value	PR CI (95%)
	Negative n (%)	Positive n (%)			
Poor	11 (3.8%)	10 (3.4%)	21 (7.2%)	<b>0.630</b>	<b>0.869</b> (0.571- 1.321)
Good	164 (56%)	108 (36.9%)	272 (92.8%)		
<b>Total</b>	<b>175 (59.7%)</b>	<b>118 (40.3%)</b>	<b>293 (100%)</b>		

Table 2 shows several systematic conclusions that can be drawn. As many as 7.2% of respondents needed to show adequate knowledge regarding eradicating mosquito nests. In this group, the majority, namely 3.8%, showed a hostile attitude regarding these prevention efforts. In contrast, respondents with good knowledge reached 92.8%. However, the majority, namely 56%, showed a less positive attitude towards eradicating mosquito nests. The results of the analysis show exciting findings regarding the relationship between teenagers' knowledge and attitudes. The results of statistical tests with a p-value of 0.630 imply no significant relationship between the level of expertise and teenagers' attitudes toward eradicating mosquito nests.

The results of this study indicate no significant correlation between the knowledge and attitudes of adolescents regarding the removal of mosquito nests. This finding is in line with the previous research, which also did not find a significant relationship between knowledge and attitudes [11]. This research differs from another one, which revealed a p-value of 0.002 between knowledge and attitudes toward eradicating mosquito nests [12]. Attitudes are identified as significant predictors of behavior, reflecting individual actions, and can be used to predict responses to challenging situations or certain conditions [13].

Other variables beyond knowledge also influence attitudes, such as exposure to information from various sources, including the media, social media, instructors, and parents [14]. Motivation, previous experience, and interactions with family members also form attitudes [15]. Personal experiences, the opinions of essential others, and cultural factors all play a role in creating attitudes [16]. Assume a person is genuinely free from obstacles that could inhibit the presentation of their attitude. In that case, the behavior that appears can be considered a more authentic form of expression. An expression of will or desire can manifest a person's knowledge and awareness of an object, especially in the dengue fever mosquito nest eradication. An individual's desire can be identified as a tendency to carry out an activity [17]. Participatory activities to eradicate mosquito nests significantly impact efforts to prevent and control diseases caused by mosquitoes [16].

**Table 3. Relationship between knowledge and adolescent behavior in eradicating mosquito nests**

Knowledge	Behavior			P- value	PR CI (95%)
	Poor n (%)	Good n (%)	Total n (%)		
Poor	16 (5.5%)	5 (1.7%)	21 (7.2%)	<b>0.046</b>	<b>1,491</b> (1,143- 1,945)
Good	139 (47.4%)	133 (45.4%)	272 (92.8%)		
<b>Total</b>	<b>155 (52.9%)</b>	<b>138 (47.1%)</b>	<b>293 (100%)</b>		

From Table 3, as many as 7.2% of respondents needed better knowledge regarding eradicating mosquito nests. The majority of them, as many as 5.5%, showed poor behavior in efforts to exterminate mosquito nests. On the other hand, respondents with a good level of knowledge reached 92.8%. However, the majority of them had poor behavior at 47.4%. The results of further analysis show a p-value of 0.046. This value indicates a significant relationship between adolescents' knowledge and behavior in the context of eliminating mosquito nests. There is a relationship between teenagers' knowledge and behavior in eliminating mosquito nests. Based on previous research's findings, the p-value is 0.011, indicating that there is a significant relationship between the level of knowledge and the behavior of Eradicating Mosquito Nests (PSN) in Dengue Fever (DHF) students [18]. Knowledge is identified as a risk factor that influences a person's behavior. This is because a person with a high level of knowledge may take actions outside their understanding [19]. Influencing someone's behavior requires a lot of knowledge. Experience shows that knowledge-based behavior lasts longer than behavior that is not knowledge-based [20].

A greater understanding of mosquito nest elimination can result in more effective and convenient behavior in dealing with this problem, such as mosquito breeding. Assume a

person is genuinely free of obstacles that could impede the presentation of their mindset [21]. Therefore, it will impact a better understanding of the importance of controlling mosquito populations [22]. Someone with comprehensive knowledge will understand the need to take preventive steps to reduce the danger of disease transmission by mosquitos. One of the recommended actions is to dry the water reservoir at least once every week. In addition, methods such as carefully sealing water reservoirs after use, recycling used objects, or tossing them away are implemented [23]. In addition, competent people will be better aware of natural and chemical insect-repellent tactics. Utilizing natural mosquito repellents involves maintaining larvae-eating fish, growing mosquito-repelling plants, and using mosquito netting. Meanwhile, chemical prevention includes spreading abate powder, applying insect repellent, and fogging [24].

A person's intention to prevent dengue fever, such as cleaning up puddles of water, sleeping with a mosquito net, and installing mosquito nets on home vents, is characterized as a response to well-received information [25]. Community behavior related to Mosquito Nest Eradication (PSN) comprises the complete range of activities and attitudes adopted by the community to overcome the problem of mosquito nests, including attempts to prevent and manage mosquito populations [25]. Many factors influence the number of mosquito nests, including gender and age of family members living in the same house. This is because male and female mosquitoes may have different breeding preferences or parenting patterns, which in turn affects the presence of mosquito nests. Therefore, understanding these factors is crucial in designing prevention strategies [26]. Mosquito breeding sites inside and outside the home have been identified as a trigger for an increase in the number of disease vectors carried by mosquitoes [27].

In this context, the 3M Movement, accompanied by the Eradication of Mosquito Nests (PSN), can effectively eradicate the dengue fever virus vector. The PSN 3M plus movement involves various actions, such as drying out stagnant water, closing water storage containers, recycling or reusing used items, spraying larvae-killing larvicide, cultivating larvae-eating fish, changing the water in pots or flower vases, and other efforts [28].

#### **4. CONCLUSION**

Based on our finding, it can be concluded that there is no significant relationship between knowledge and attitudes of teenagers regarding eradicating mosquito nests. There is a relationship between knowledge and behavior of teenagers in eradicating mosquito nests.

## CONSENT

All authors declare that 'written informed consent was obtained from the respondent before they participated in this study.

## ETHICAL APPROVAL

The study was approved by the Ethical review board of Universitas Ahmad Dahlan, Yogyakarta, Indonesia (ethical approval code: 012311285). All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed by the ethical standards laid down in the 1964 declaration of Helsinki.

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