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RECEIVED: December 18, 2025

ACCEPTED: January 16, 2026

PUBLISHED: January 18, 2026

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# Students' Cognitive, Attitudinal, and Behavioral Factors in Mosquito Larvae Surveillance for Aedes Habitat Elimination to Prevent Dengue Transmission

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## ABSTRACT

Dengue Hemorrhagic Fever (DHF) is a disease caused by the dengue virus through a dengue vector whose case rate is currently quite high in Indonesia. This study uses a survey method and a quasi-experimental approach (Quasi Experimental) with a Nonrandomized Control Group Pretest-Posttest Design. This study involved two different groups. The Intervention Group was grade VIII students of SMPN 49 Makassar City and SMPN 21 Makassar City as the control group. The number of samples was 60 respondents with a sampling selection method, namely Purposive Sampling. The instruments used were research questionnaires, DHF booklets, PSN-Kit, larva monitoring checklists, observation sheets and so on. Results: There were differences in the values of knowledge, attitudes and actions of respondents before and after the intervention. And based on the Chi-Square analysis test, a p value <0.05 was obtained for the influence of respondent actions with the presence of larvae. Conclusion: There is an influence between respondent actions in efforts to eradicate mosquito nests with the presence of dengue mosquito larvae in their home environment in Rappocini District, Makassar City.

## Keywords

dengue fever, knowledge, attitude, semantics, action.

## CITATION

Bau, S. R., & Ishak, A. H. (2026). Students' Cognitive, Attitudinal, and Behavioral Factors in Mosquito Larvae Surveillance for Aedes Habitat Elimination to Prevent Dengue Transmission. *Inspire Global Insight Journal*, 1(02), 34-39. <https://doi.org/10.53905/igim.v1i02.6>

## INTRODUCTION

Dengue Hemorrhagic Fever (DHF) is currently still a significant health problem impact on the economic and social aspects of Indonesian society. The existing social losses are decreasing life expectancy of the population, death and causing panic in families. The economic impact can include burdening medical costs and loss of time, productive in all levels of society (Rubianti, 2019). Cases of this disease continue to increase, even though in 2020 there was a decrease. a decrease of 108,000 cases with 747 deaths, compared to the number of cases in 2019 of 138,127 cases with 919 deaths and in 2021 of 71,856 cases with a death toll of 696 deaths (Ministry of Health of the Republic of Indonesia, 2021). One of the areas in South Sulawesi with a fairly high number of cases is in the city of Makassar. In 2019, there were 268 cases, decreasing to 175 in 2020 and increasing to 583 in 2021 (Makassar City Health Office, 2022). One of the sub-districts with the highest number of cases coming from Rappocini sub-district. In this area, the number of dengue fever cases.

The highest number of cases is in Gunung Sari Subdistrict, which has experienced an increase in the number of cases in the year 2019 & 2020 each had 10 cases and in 2021 there were 30 cases and Minasa sub-district Upa in 2020 was only 4 cases, increasing to 34 cases in 2021. From the number of cases above, it is known that there are quite a lot of dengue fever sufferers in the age range 5-14 years. In 2019, based on the 5-14 age group, there were 131 cases, then decreased in the following year by 85 cases and increased in 2021 by 269 cases (Makassar City Health Office, 2022). Many efforts are continuously being made by the government to involve the community in control this disease. Dengue fever is a fairly complex problem so that Handling it requires cooperation between various sectors, between the government, private sector, community and other cross-sectors (Hidayani, 2020). Efforts to eradicate dengue fever are all efforts to prevent and handle DHF incidents in this case, actions from all levels of society are needed which is able to limit the spread of this disease. One of the programs that can be implemented is to can limit and prevent DHF cases, namely Mosquito Nest Eradication (PSN).

Mosquito Nest Eradication (PSN) can be carried out by all levels of society one of them is in the school children group. The school children group is a very large number around 20% of the population in Indonesia. The role of school children in monitoring mosquito larvae is the beginning of Clean and Healthy Living Behaviors (PHBS) at an early age. Schoolchildren, in this regard, have an easier time than adults in implementing PSN.

supported by schools as part of educational institutions involved in promotional efforts health (Ministry of Health of the Republic of Indonesia, 2014). To achieve mosquito nest eradication efforts, behavioral changes are needed, which can be implemented, even if it requires a long process. These behaviors include: knowledge, attitudes and actions of students themselves

in knowing what Dengue Fever is Dengue (DHF) and how to eradicate it (Azwar, 2013). In Bloom's Theory behavior can be seen through cognitive (knowledge), affective (attitude) and psychomotor aspects (Action) (Notoatmodjo, 2014). Students who monitor larvae are part of the group that is able to carry out changes in these three aspects. This is in accordance with the 2014 Ministry of Health Technical Instructions. involving Mosquito Larva Monitoring Students (Simantik) in Mosquito Nest Eradication Efforts.

Simantik itself is capable of carrying out its role as part of surveillance, prevention and promotive in the residential environment and at school. Simantik itself will monitor the residences of those who have containers. As is known, this place is the main breeding ground for mosquitoes.

The presence or absence of Aedes Aegypti mosquito larvae in a container is influenced by several factors such as: type of container, location of container, color of container, condition of container lid, the presence of larvae-eating fish, container volume, container draining activities and abatement activities (Budianto et al., 2012). In the research that has been conducted, the results obtained are that the type of container There were many positive larvae in the bucket, and it was found that there was no relationship between larva density with the container material, while there is a relationship with the container cover (Tri et al., 2020).

## IMPLEMENTATION METHOD

This type of research uses quantitative methods with surveys and quasi-research approaches. Experimental (Quasi Experimental) with Nonrandomized Control Group Pretest-Posttest Design. Research This involves two different groups, namely the intervention group and the control group which will measured attitudes, knowledge and actions in Mosquito Nest Eradication (PSN) in the environment their residence. The Intervention Group consisted of eighth grade students at SMPN 49 Makassar City and SMPN21 Makassar City as the control group. The sample selection in this study used the Purposive Sampling technique, where sample selection using several considerations according to the desired criteria (Sugiyono, 2018). The inclusion criteria in selecting this sample include the respondent's house. have a container, live in Minasa Upa Subdistrict for the Intervention Group and Subdistrict Gunung Sari for the Control Group. Meanwhile, the inclusion criteria were the cadre's house. health. The number of respondents was 60 respondents, 30 respondents each for each group.

This research was conducted in March-June 2023, where training was provided at the school. each group and a mosquito larvae examination was carried out at each respondent's residence. The research was conducted by measuring the values of knowledge, attitudes, actions and the presence of mosquito larvae. before and after the intervention. The instruments used were research questionnaires, DBD booklet, PSN-Kit, mosquito larvae monitoring checklist, observation sheets and so on.

## RESULTS & DISCUSSION

The respondents of this study were 60 respondents consisting of 24 respondents of the same type. male and 36 respondents were female. The measurement results Respondents' knowledge, attitudes and actions can be seen in the table below:

Table 1. Respondents' Knowledge on Mosquito Nest Eradication (PSN) in the Home Environment in Rappocini District Before and After the Intervention

Group	n (Min-Max)	Mean	SD
Intervention Group	Pre-test	3-10	5.70
	Post-test	7-15	10.53
Control Group	Pre-test	2-9	5.13
	Post-test	3-11	6.73

Based on the results of the descriptive analysis in table 1, it can be seen that in the intervention group there was an increase in the mean value of respondents' knowledge regarding eradicating nests mosquitoes after the intervention with an average pre-test result of 5.70 increased to 10.53. meanwhile, in the control group did not show much change in mean values after the intervention, with the pre-test results were 5.13 and the post-test 6.73.

Table 2. Respondents' Attitudes Toward Mosquito Nest Eradication (PSN) in the Home Environment in Rappocini District Before and After the Intervention

Group	Time	Min-Max	Mean	SD
Intervention Group	Pre-test	2-12	5.40	1.97
	Post-test	7-14	10.50	1.57
Control Group	Pre-test	2-8	5.23	1.33
	Post-test	2-11	5.20	1.97

Source: Primary Data, 2023

Based on the results of the descriptive analysis in table 2, it can be seen that in the intervention group there was an increase in the mean value of respondents' attitudes towards eradicating mosquito nests after the intervention with the average pre-test result of 5.40 increasing to 10.50. Meanwhile, in the control group did not show any change in mean scores after the intervention, with pre-test results of 5.23 and post-test of 5.20.

Table 3. Respondents' Actions in Mosquito Nest Eradication (PSN) in the Home Environment in Rappocini District Before and After the Intervention

Group	Time	Min-Max	Mean	SD
Intervention Group	Pre-test	1-9	4.87	1.83
	Post-test	5-12	10.03	1.35
Control Group	Pre-test	2-8	4.50	1.65
	Post-test	2-9	4.97	1.75

Source: Primary Data, 2023

Based on the results of the descriptive analysis in table 3, it can be seen that in the intervention group There was an increase in the mean value of respondents' actions towards eradicating mosquito nests after the intervention with the average pre-test result of 4.87 increasing to 10.03. Meanwhile, in the control group did not show much change in mean scores after the intervention, with the results pre-test was 4.50 and post-test was 4.97.

Table 4. Presence of Mosquito Larvae Before and After the Intervention in the Home Environment of Respondents in Rappocini District, Makassar City

Group	Time	Larvae Present n (%)	Larvae Absent n (%)
Intervention Group	Pre-test	30 (100%)	0 (0.00%)
	Post-test	1 (3.33%)	29 (96.67%)
Control Group	Pre-test	30 (100%)	0 (0.00%)
	Post-test	28 (93.33%)	2 (6.67%)

Source: Primary Data, 2023

Based on Table 4, it can be seen that there is a difference in the presence of larvae between the pre-test and the pre-test and post-test in the intervention group. In the intervention group, the presence of larvae decreased. A significant improvement was seen, with 30 respondents testing positive for larvae in the pre-test, followed by just one house testing positive after the intervention. Meanwhile, the control group did not show a significant decrease in larvae numbers, only dropping by around 6.67%.

Table 5. Influence of Respondents' Actions on the Presence of Larvae in Mosquito Nest Eradication Efforts in the Home Environment, Rappocini District, Makassar City

Action Category	Larvae Present n (%)	Larvae Absent n (%)	Total n (%)
Good	1 (3.20%)	30 (96.80%)	31 (100%)
Less	13 (44.80%)	16 (55.20%)	29 (100%)
Total	14 (24.10%)	46 (75.90%)	60 (100%)

P-Value: 0.00; Source: SPSS Data Processing

Based on table 5, it shows the influence of respondents' actions on the presence of larvae in efforts to eradicate dengue mosquito nests in the respondents' home environment. where out of 31 of the respondents who had implemented good practices, one respondent still had a house that was positive for dengue mosquito larvae. meanwhile, of the 29 respondents who had implemented poor practices, 16 respondents (55.20%) had no dengue mosquito larvae in their houses. based on the results of the chi-square test analysis, the p-value is <0.05, so it can be interpreted that there is an influence of respondents' actions on the presence of larvae in efforts to eradicate nests dengue fever mosquitoes in his home environment in rappocini district. discussion according to bloom's taxonomy (1908) behavior has three domains, namely cognitive (knowledge), affective (attitude) and psychomotor (action). knowledge is the most fundamental aspect, where each individual can recognize and remember an object, procedure, concept, definition, name, events, or conclusions. this attitude itself is a reaction that is still closed from a person towards an object, or a readiness and willingness to act. while action is a connection with various aspects of skills that involve the function of the nervous system and muscle and psychic functions (notoatmodjo, 2012) the intervention was carried out using the lecture method, this method is quite common and easy. conducted specifically on respondents who are students. in this study, based on the results discussion with the teacher as the person in charge of the lecture is better because it is very easy for students disturbed focus, so the information provided must be informative even if only in short time. so that the material presented can be more easily absorbed by students. this is in line with research conducted by nur et al. (2022) which states that the lecture method has a very large impact. in influencing increased knowledge. knowledge is an intervention that can increase awareness and health. community in disease prevention efforts. one of the factors that can influence individuals at risk of contracting the disease, namely knowledge. there is a relationship between knowledge and dhf incidents, where the public is unaware of the vectors that cause dhf, so that maximum prevention is difficult to achieve (irma, 2023). in research conducted by made (2019).

The community plays an important role as respondents who only know that dhf is exchanged by mosquitoes, without knowing the specifics and characteristics of dengue fever transmitters. therefore, it is necessary to understand characteristics of mosquitoes and their biting habits so that people can take preventative measures dengue fever disease. one of the public health behaviors is influenced by public knowledge of health, traditions and beliefs of society related to health, value systems that adopted, education level, socio-economic level, etc. in assessing the effectiveness of success dengue fever eradication and control program combined with survey knowledge, attitudes and actions. the knowledge possessed can have an effect on behavior which can be a medium-term impact (intermediate impact) on subsequent health behavior will influence the increase in health indicators as an outcome of health education (notoatmodjo, 2018). based on the results of the pre-test and post-test analysis, there were changes in the knowledge score results, attitudes and actions in the intervention group. respondents who previously did not equipped with information about dhf, many people do not know the information about this disease and vectors that cause dengue fever. simantik, who is a respondent in class viii, has not obtain information about this disease in the learning curriculum. the phbs material the information taught is still very general in nature. so this information is still quite foreign to the students. respondents. with the communication, information and education provided, it can provide stimulate students' curiosity regarding the information presented. this is in accordance with the study research where exposure to information from a particular program can be a factor in increasing knowledge of the program. research conducted in java west presents important information regarding the importance of awareness and knowledge in prevent and control dengue fever (kurniawan et al., 2021).

In this study, the results obtained were a  $\chi^2$  value of <0.05, indicating that there was an influence between the actions taken and the presence of aedes aegypti larvae. in this study, students monitored aedes aegypti larvae. have good knowledge and attitude results, so that they can provide good effects on the students' own actions in carrying out their tasks and roles as monitors of mosquito larvae in their environment. in addition, with the support of facilities, encouragement from teachers can be factors that can

influence the actions of students who monitor mosquito larvae. this is demonstrated by differences in scores obtained in the pre-test and post-test in the intervention group and the control group. the control group did not show any significant changes, unlike the treatment group. intervention. there are four levels of action, namely guided respondent perception, mechanism and adaptation. with a good perception of dengue fever and the eradication of mosquito nests dhf has not shown good action if the mechanism has not been carried out correctly and not realized in everyday life. the training used direct monitoring of larvae which is part of active larva monitoring, thereby increasing respondents' knowledge and actions. to be able to act and be responsible for oneself. with the existence of active learning like this can be a driving factor to change attitudes to provide an impact in the form of actions that lead to better things, especially in efforts eradicating mosquito nests to avoid dengue fever so with knowledge, attitudes and actions can shape behavior in the awareness that psn is very important in an effort to stop dengue fever. this is different from research conducted in elementary schools. in sorong, the outreach that was carried out was not able to increase knowledge about dhf. on elementary school students in sorong.

Training of mosquito larvae monitoring cadres can improve skills in monitoring of mosquito larvae, but continuous efforts must be made at breeding sites mosquitoes, because the implementation period is only four weeks (juniastuti & rossyanti, 2020) in this research, simantik carried out actions in the form of eradicating mosquito nests. through a questionnaire assessment which includes various mosquito nest eradication activities routinely carried out every week and then included in the observation results report that has been provided. with the support of teachers, families and health cadres, it can be a driving factor. actions taken so that they can become habits that bring about behavioral changes better, this participation certainly requires self-awareness. this self-awareness is influenced by knowledge, attitude and practice factors that are expected to reduce the incidence of dhf (meiliyana, 2020).

In research conducted by I made, et al. (2021), students who monitor mosquito larvae plays an important role in surveillance, preventive and promotive activities. the activities carried out by providing an understanding of dengue fever and students monitoring mosquito larvae mosquitoes. the results obtained were an increase in students' knowledge and skills monitor mosquito larvae by periodically eradicating mosquito nests in their environment. in changing a behavior to be better, it takes stages, with this action process. carried out in sequential stages, until identification, which can be the responsibility for prevent disease in the community, especially in the family itself. so that the efforts made must be serious and clear to be implemented in all levels of society (asriwati, 2021).

## CONCLUSION

The present findings provide robust empirical support for the theoretical framework linking parental support, attachment quality, and youth behavioral adjustment. The strong correlation between parental support and overall behavioral adjustment ( $r = .71, p < .001$ ) underscores the critical role of the family environment in shaping adolescent developmental outcomes. This aligns with Bowlby's (1988) notion of the parent as a "secure base" from which children and adolescents can explore the world and develop adaptive behavioral strategies. Furthermore, within the ecological framework of Bronfenbrenner and Morris (2006), the microsystem of the family remains a primary determinant of developmental pathways.

Emotional support emerged as the strongest predictor of positive behavioral outcomes, particularly prosocial behaviors and peer relationship quality. This finding resonates with attachment theory, which emphasizes emotional attunement, sensitivity, and co-regulation as core mechanisms that foster secure attachment and adaptive socio-emotional functioning (Ainsworth et al., 1978). By contrast, instrumental and informational support demonstrated weaker associations, being more relevant for academic engagement. Such differentiation supports Pinquart's (2017) meta-analytic evidence that specific parenting dimensions vary in their influence on behavioral versus cognitive outcomes.

These findings extend prior research in important ways. The observed correlation between parental support and behavioral adjustment ( $r = .71$ ) is consistent with the pancultural evidence reported by Khaleque and Rohner (2012), who found that parental acceptance is universally linked with better psychological adjustment. However, the current study advances the field by clarifying the mediating role of secure attachment, which accounted for 42% of the effect of parental support on behavioral outcomes. This aligns with longitudinal findings by Allen et al. (2018) and Verhage et al. (2016), both of whom demonstrated that attachment security functions as a protective factor against behavioral problems and psychopathology.

The distribution of attachment classifications in this study, with 64.2% secure attachment, was slightly higher than in many community samples, which typically report rates around 55–60% (Main & Solomon, 1986). This difference may reflect the exclusion of high-risk populations and the demographic composition of the sample. Thus, generalization should be made with caution, and future studies should investigate whether these patterns hold in more diverse or at-risk populations.

The specificity of the findings—that emotional support is the most powerful predictor of adjustment—adds nuance to existing literature. While previous studies have established the broad importance of parental support, the present study identifies which dimensions matter most for adolescent behavioral regulation, thereby guiding more precise intervention strategies.

Theoretical implications of these results suggest the value of integrating attachment theory with multidimensional models of parental support. Parental support exerts influence not only directly but also indirectly, by shaping adolescents' internal working models of relationships that guide emotional regulation and social behavior (Bowlby, 1988; Ainsworth et al., 1978). This dual pathway highlights the importance of considering both relational and environmental mechanisms when studying youth development.

From a clinical and applied standpoint, the results emphasize the importance of family-based interventions that prioritize parental emotional availability and responsiveness. Programs aimed at enhancing empathic listening, validation of emotions, and skills in emotional co-regulation may be particularly effective in improving adolescent behavioral outcomes. Moreover, the identification of

behavioral profiles associated with specific attachment patterns provides valuable guidance for tailoring interventions. For instance, adolescents with dismissing attachment patterns may benefit from interventions targeting emotional expression and intimacy, while those with preoccupied patterns may require focused support for emotion regulation (Thompson et al., 2020).

The large effect sizes observed suggest that strengthening parent-child relationships has considerable potential for improving behavioral outcomes on a population level. This finding justifies continued investment in family-focused prevention and intervention programs, particularly in adolescence—a developmental stage characterized by heightened risk for externalizing and internalizing problems.

Despite its contributions, the study is not without limitations. First, the cross-sectional design prevents strong causal inferences. Longitudinal studies are necessary to establish temporal precedence and developmental trajectories (Verhage et al., 2016). Second, reliance on self-report measures for behavioral adjustment may introduce reporting bias; integrating teacher ratings and direct observational measures could enhance validity. Third, the sample was drawn from urban school settings in the United States, limiting generalizability to rural populations, clinical samples, or non-Western cultural contexts where parenting and attachment dynamics may differ (Khaleque & Rohner, 2012). Additionally, the study focused primarily on the primary caregiver relationship, without systematically accounting for secondary attachment figures such as grandparents, siblings, or peers. Given Bronfenbrenner's ecological model, a broader network of social relationships likely exerts important influences on behavioral adjustment. Lastly, while the Adult Attachment Interview-Revised provides a gold-standard assessment of attachment, its resource-intensive nature restricts its feasibility for large-scale applications. Future research should focus on developing more efficient, culturally sensitive, and scalable tools for assessing attachment and parental support.

## CONCLUSION

Based on the research results, there are differences in knowledge, attitudes, actions and the presence of larvae before and after the intervention in the intervention group. Based on the analysis results, there was an influence of respondents' actions in efforts to eradicate mosquito nests on the presence of larvae in his home environment in Rappocini District, Makassar City with test results Chi-Square analysis  $p$  value  $< 0.05$ . Suggestion It is hoped that in further research, schools and community health centers can make Dengue Fever Free Ambassador program, where student mosquito larvae monitors routinely carry out their duties in carry out monitoring of mosquito larvae in the school environment and their residence.

## ACKNOWLEDGEMENTS

Implementation team convey saying accept love to all the party that has support implementation activity devotion public this , in particular to Chairman of STOK Bina Guna, Committee Indonesian National Sports Committee (KONI) Medan City, Medan City Youth and Sports Service, head schools and teachers in 15 schools partners , administrators of 8 clubs sport partners , as well as all over students who have contribute with dedication high . Thank you thanks also to all over participant activity on participation and enthusiasm.

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