Community Resources and Capacity for Vector Control: Analyzing the Knowledge, Attitude, and Practice (KAP) Gap in Dengue Prevention Readiness

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ABSTRACT

***Background**: Dengue Hemorrhagic Fever (DHF) is still a significant burden to global public health. Successful prevention is a function of community capacity, including locus of control (internal belief in one's ability) and collective potential to implement prevention.* ***Objectives**: The objective of this research was to measure K, A and P with a specific emphasis on examining the degree to which these mentored K, A and P align with community sense-making (meaning), constructed capacity (function), and perceived controllability for making useable space free from vectors.* ***Methods**: A cross-sectional design was used, with 102 respondents (mainly women, productive age group and primary education level). Descriptive statistics, Chi-Square test for bivariate analysis and Multivariate Logistic Regression were used to determine independent predictors.* ***Results**: A noticeable gap between the KAP was determined. Although the proportion of respondents with favorable attitudes is high (66.7%), that of preventive practices was low (54.9% poor score). There was marginal knowledge (45.1% poor) with a high proportion of critical misconceptions (80.4% incorrect response to key transmission point). On multivariate analysis, significantly associated with good knowledge were education (Junior High vs Primary School) (OR=4.1, p=0.015) and middle income for favorable attitudes (OR=2.9, p=0.041). Notably, neither demographic variable (age, gender, education nor income) showed association with good preventive practice.* ***Conclusion**: The poor practice indicates a lack in the ability of DHF preventive activities, i.e. the capacity and collective control despite of high motivation (attitude). That practice was not also predicted by demographics implies that barriers are structural and environmental. Hence, interventions will need to move away from knowledge-based approaches to community mobilization for control and resource movement towards dismantling structural drivers for closing the attitude-practice gap.*

***Keywords**:* Community Readiness; Dengue Hemorrhagic Fever; KAP Assessment; Preventive Practice

INTRODUCTION

Dengue Hemorrhagic Fever (DHF) is the most challenging viral vector-borne diseases with highest rates of expansion worldwide. From a vast public health perspective, at least 50% of the world's population lives in areas where dengue has a potential risk of transmission (Li et al., 2025; Zhang et al., 2024). There are about 50 million of new infections annually, and the disease is a major cause of morbidity and mortality worldwide (Yoshikawa, Kusriastuti and Liew, 2020; Sutriyawan, Suherdin and Ratna Dian Kurniawati, 2024). Dengue is endemic in Indonesia. The number of cases are s till increases; the latest report of Central Ministry of Health mentioned 73,518 cases with death as many as 705 in all province at year 2021 compared to 143,266 and 1,237 respectively (Kemenkes RI, 2023). This escalation highlights need for adaptive and sustainable prevention measures, given the fact that dengue fever can progress from mild stage to severe in concerning

Received: 31-10-2025, Accepted: 22-12-2025, Published Online: 09-01-2026

cases Dengue Shock Syndrome (DSS) (Hamed, 2024).

Dengue dissemination is dictated by a complex relationship between environmental, climatic and social determinants. Several social determinants like level of education, household characteristics, population density, sanitation habits and water storage practices have been shown to influence the dynamics of proliferation of *Aedes aegypti* (Telle *et al.*, 2021). Human behavior is the cornerstone of successful disease control where daily practices in communities play a significant role in conditioning factors such as, vector breeding sites, feeding on blood and viral spread (Ghani *et al.*, 2019; Selvarajoo *et al.*, 2020). The prevailing public health response, however, is mostly reactive because there are no reliable, behavior-based interventions in place that demonstrate effective reduction of the vector populations in the long-term frequency (Islam *et al.*, 2022; Iqtadar, Akram and Khan, 2024) and which continues to rely on emergency operations such as massive insecticide sprays that have been unsustainable and inefficient over time.

Although traditionally thought of as a disease of the city and low lands, climate change (warmer temperatures and more unpredictable rainfall) has extended its range. These changing climate conditions lead to increased humidity and a faster *Aedes aegypti* life cycle which allows the vector to effectively spread in safe high-altitude areas (Acharya *et al.*, 2018; Stolerman, Maia and Kutz, 2019). Malang Regency, at the local level had perked in high observed disease vulnerability up to 1,570 (Putra and Lestari, 2023). The data demonstrate unambiguously that the risk of transmission now encompasses all locations in Malang Regency, mountainous regions included, requiring an extended focus on epidemiology.

The success of vector control is largely reliant on communities' participation to carry out PSA 3M Plus action programs (Zhang *et al.*, 2023). Awareness may be related to socioeconomic factors (Selvarajoo *et al.*, 2020), but that the problem generally remains so stubborn, is that there is a discrepancy between KAP – knowledge, attitude and practice—here understanding/knowing what can be done follows from knowing/understanding and will to act does not follow from would like to act. The model is the best framework to understand this health promotion gap, and more exactly through community Sense of Coherence (Antonovsky, 1979).

A comprehensive SOC includes 3 dimensions, which is comprehensibility (the perception that life makes sense, stems from cognition), meaningfulness (perceiving that demands are worthy of investment, comes from affectivity), and manageability (the conviction that one can cope with what it asks for, is rooted in behavior) (Eriksson and Lindström, 2008; González-Siles *et al.*, 2022). It is when the KAP gap arises—the moment of reckoning—that there is a failure to manage—the community perceives that their internal resources (knowledge and attitude) are not enough to overcome external, structural forces or restraints (Mittelmark *et al.*, 2022). Thus, research needs to question critically why strong meaningfulness (positive attitude) does not convert into ongoing behavior (low manageability) and processing barriers that the community believes constrain control and resource capacity for day-to-day prevention.

The research was carried out in Ngadas Village, Poncokusumo Malang which is a peculiar highland wet tropical region. Even though its climate is relatively cool, high humidity and the frequent rainfall contribute to amplifying the possibility of *Aedes* mosquitoes breeding (Putra and Lestari, 2023). At the community level, most people are vegetable farmers who habitually store water in open containers at home and during watering of agricultural crops. This operation, a matter of life for them means they actually generate numerous perfect places for laying mosquito eggs without even knowing it. Such a situation has been described as “environmental setting and practice” but it contrasts with the low community awareness and knowledge of mosquito life cycle (trauma) shs-and-the-needs for PSN 3M Plus measure according to the findings (Statistik, 2021).

The success of dengue’s control depends largely on the communities participation in preventive activities (Zhang *et al.*, 2023). Nevertheless, these are often found alongside a Knowledge, Attitude and Practice (KAP) Gap in which knowledge and willingness (Attitude) lack

Received: 31-10-2025, Accepted: 22-12-2025, Published Online: 09-01-2026

connection with their practical execution on daily basis of the preventive measures (Practice) (Erlanger, Keiser and Utzinger, 2008; Windyaraini *et al.*, 2024). For Ngadas Village, this KAP Gap is possibly increased by a relatively low perceived risk, considering the geographic setting. Even if residents are knowledgeable basely, they might perceive PSN 3M Plus practices such as application of larvae-contained products (abate) to be both non-urgent or irrelevant in their area.

Given the spread of dengue risk to highland, and unique behavioral barriers in Ngadas Village; this study intends to have an in-depth analysis of KAP Gap on dengue prevention among community dwellers. The outputs of the cross-sectional study will pin point the sociodemographic determinants of KAP and map the structural barriers as well as misperceptions that are associated with lower section in Practice. These findings are important for promoting the development of more dynamic, focused and sustainable community based intervention strategies to be considered by Malang District Health Office and local primary health centers.

METHODS

Study Area

The research was carried out at Ngadas Village, Poncokusumo District, Malang Regency, East Java Province, Indonesia. Geographically, Ngadas Village is located on Bromo mountain with a high elevation (Statistik, 2024). While there is the perception in the past that dengue predominated at lower elevations, this study becomes very important especially as DHF cases has increased significantly across Malang Regency as a whole during early 2024 and 2025 pointing to an escalating risk for transmission. This distinctive hilly terrain provides us with an opportunity to assess dengue preparedness for prevention in a non-endemic lowland setting.

Study Design, Population, and Determination of Sample Size

This study was quantitative cross-sectional design, conducted in September 2025. This was designed in order to allow the collection of both Knowledge, Attitude and Practice (KAP) data, as well demographic information in the same setting with which current relationships and predictive factors can be identified. The study population included all productive age (19-60 years old) residents of Ngadas Village. Respondents were permanent residents of Ngadas Village who agreed to participate in the study after being informed about it. A sample of 102 subjects were taken by consecutive sampling method for the study. Recruitment was sequential for included subjects until the predetermined sample size was reached. The Universitas Brawijaya Ethics and Innovation Committee granted approval for this study (No. 519/UN10/KERIS/12/2025).

Data Collection

A structured questionnaire, which was developed based on similar research conducted by Hamed (2024) and Saghir (2022), was used to gather data. The reliability and validity of the questionnaire was tested and a Cronbach's Alpha coefficient of >0.70 was reported. The tool was divided into the following four major sections: (1) demographic profile including age, gender, level of education and monthly income; (2) Knowledge scale consisting of 7 items; (3) Attitude scale with 5 items with responses graded on a five-point Likert-type scale; and lastly, (4) Practice scale comprising of 7 items using a four-point frequency rating. Structured interviews in person by the researchers were conducted to mitigate *social desirability bias* and falsehoods.

Knowledge was indicated by the three items where 1 point was given for the correct answer and 0 points were given to an incorrect/don't know response with a total range of score from 0–7. Attitudes were assessed with a 5-point likert scale (1 = strongly disagree, 5 = strongly agree), and the total scores of attitudes ranged from 5 to 25. Practices were assessed on a 4-point frequency scale (e.g., 1 = never, 4 = always) with possible scores ranging from 7–28. Using calculated mean score as the cut-off point, the knowledge, attitude and practices of the respondents were dichotomised into two: satisfactory(good) and unsatisfactory(bad) (Indiastari *et al.*, 2025; Rosandy *et al.*, 2025).

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Data Analysis

Responses from the questionnaires were manually captured and later transferred into a Microsoft Excel for

Received: 31-10-2025, Accepted: 22-12-2025, Published Online: 09-01-2026

sorting and cleaning. Data was then tested using SPSS Statistics Version 26. We conducted univariate analysis to describe the characteristics of respondents; and distribution of KAP variables. The KAP scores were stratified into the two groups (satisfactory and unsatisfactory) according to the above-defined cut-off. For statistical testing the association between demographic characteristics and categories of KAP score, we first applied bivariate analysis (the chi-square test) ($p < 0.05$). Multivariate logistic regression analysis was then performed to determine demographic characteristics independently associated with satisfactory KAP scores. Odds Ratios (OR) and 95% Confidence Intervals (95% CI) were calculated showing $p<0.05$ as significance level.

Also, consistent with the salutogenic approach, the last analysis viewed knowledge (comprehensibility) and positive attitude (meaningfulness) as fundamental and necessary internal salutogenic resources while practice scores (manageability) were evaluated to indicate external barriers within the organization that hampered effective application of these resourses for VC preparedness.

RESULTS AND DISCUSSION

Respondent Demographic Characteristics

A total of 102 participants took part in this survey. The demography characteristics indicated that study population in Ngadas Village was female dominated (90.2%) and concentrated among productive age group of 31–50 years (70.6%) with mean age of 40.02±9.67 years. Notably, most of the respondents were educated only up to a primary school level (SD) (66.7%), and their income group was primarily at an average-low level of IDR 1,000,001–3,000,000 (51.0%).

This partiality for adult women of low formal education is crucial to the interpretation of the KAP findings. Women are generally acknowledged to be the most important household human resource for sanitation and vector control (Hidayah, Prabamurti and Handayani, 2021; Zhang *et al.*, 2023, 2024). Indonesian studies have not been neglected in indicating the key responsibility of mothers to limit disease transmission in the family (Van Truong *et al.*, 2025).

Moreover, the relatively low level of formal education (only one in three having a junior high school level or higher) clearly indicates that this community may have limitations in its ability to access, process and fully understand more complex forms of health information especially regarding the fine-grained details on pests' water-borne lifecycle such as Aedes aegypti and the risks for secondary dengue infection (Zhang *et al.*, 2023; Anggraini Ningrum *et al.*, 2024). This profile highlights the need for an innovative visual, non-specialist, and contextually-relevant health education efforts in Ngadas Village that does not place so much emphasis on a high level of literacy to be effective.

Table 1. Respondent Demographic Characteristics

Variable	Frequency [n(%)] (n=102)
Age (years old), mean±SD	**40.02±9.67**
19-30	18 (17.6)
31-50	72 (70.6
>50	12 (11.8)
Gender	
Male	10 (9.8)
Female	92 (90.2)
Education Status	
Elementary school	68 (66.7)
Middle school	26 (25.5)
High school	8 (7.8)
Income	
≤Rp 1.000.000	30 (29.4)
Rp 1.000.001 – Rp 3.000.000	52 (51.0)
Rp 3.000.001 – Rp 5.000.000	20 (19.6)

SD = Standard Deviation, n = total

Respondent's Knowledge of Dengue Fever

The basic information about the disease transmission and symptoms is not as easily verified for other diseases, but still fairly strong. Most of respondents correctly identified the transmitting agent as a mosquito (82.4%) and knew the major symptoms of the disease (78.4%). This implies that basic public health messaging has been successful in the community (Erlanger, Keiser and Utzinger, 2008). Nevertheless, an examination of each item showed important gaps in knowledge. An erroneous perception was found regarding permanent immunity after an initial infection: only 20.5% responded correctly

Received: 31-10-2025, Accepted: 22-12-2025, Published Online: 09-01-2026

to this item. That such a high proportion of the public may hold this misperception (80.4%) has ominous long-term implications for lowered vigilance. On a scientific basis, the second infections by different dengue virus serotypes and subsequent risk of escalating to severe DHF or DSS are higher (Brady *et al.*, 2012; Prayitno *et al.*, 2025). Heingartner's perspective here is that this universal error in judgment is one that makes the achievement of sustained readiness so difficult.

Additionally, there was poor knowledge regarding the specificity of being dengue vector; only 47.1% knew that characteristics (e.g. biting time and habitat) are specific to dengue transmitting mosquitoes. Such imprecision means that prevention programs might be directing interventions to the wrong places, and may well be "doing harm" while attempting to do good (Kemenkes, 2017; Prayitno *et al.*, 2025). It means that although the community has basic dengue knowledge, the existence of these lethal misperceptions and specific knowledge gaps is a great impediment to on-going workable preparedness.

Table 2. Distribution of Respondent's Knowledge Answers on Dengue Fever

Questions	Distribution of Answer (n[%])	
Knowledge section	**Incorrect**	**Correct**
1. Dengue Fever is caused by a virus	34 (33.3)	68 (66.7)
2. The *Aedes aegypti* mosquito usually bites in the morning and afternoon	48 (47.1)	54 (52.9)
3. The main symptoms of Dengue Fever are high fever, muscle aches, and a skin rash	22 (21.6)	80 (78.4)
4. Dengue Fever is transmitted through mosquito bites	18 (17.6)	84 (82.4)
5. Stagnant clean water that is not covered can become a breeding ground for mosquitoes	22 (21.6)	80 (78.4)
6. Not all mosquitoes can transmit dengue	54 (52.9)	48 (47.1)
7. People who have been infected with dengue once will not get it again	82 (80.4)	20 (19.6)

Respondent's Attitude of Dengue Prevention

The level of respondent attitude toward DHF prevention was predominantly favorable, with 66.7% of the respondents' attained satisfactory attitude score. This would suggest a very high sense of intrinsic motivation in the community for carrying out preventive activities. Analysis at the item level yielded strong agreement and endorsement of organized, routine preventive activities. The greatest consensus was towards routine inspection of water container, with a 90.2% selecting agree or strongly agree (Table 1). These high levels of support were also recorded for the importance of jumantik cadres (community-based mosquito larval inspectors) and the concept that environmental cleanliness is an individual's responsibility (both 76.5% agreement). In addition, attitude towards assisting 3M Plus routine activities in the village was very positive (agreement= 74.6%).

Together, they confirm that the community has adequate collective intention and positive attitude to engage with dengue control activities (Zaki *et al.*, 2019). But, one point of dissent became evident: the claim about the safety and necessity of using abate (larvicide) obtained higher rates for neutrality or disagreement. Such reluctance is indicative of positive community sentiment towards behavioral and collective actions (e.g., cleaning) while chemical-based approaches to solve the problems are likely perceived as a technical barrier, exuded from either prohibitive costs or genuine fear of being unhealthy (Rakhmani and Zuhriyah, 2024). This gap in strong overall attitude and specific hesitancy is an important finding in understanding the drivers of KAP Gap.

Table 3. Distribution of Respondent's Answers on Attitude of Dengue Prevention

Questions	Distribution of Answer (n[%])				
Attitude Section	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1. I feel it is important to routinely check water storage containers.	6 (5.9)	2 (2.0)	2 (2.0)	46 (45.1)	46 (45.1)

Received: 31-10-2025, Accepted: 22-12-2025, Published Online: 09-01-2026

2.	I believe Jumantik volunteers play an important role in dengue prevention.	14 (13.7)	9 (7.8)	2 (2.0)	52 (51.0)	26 (25.5)
3.	Using abate is safe and important to do.	26 (25.5)	2 (2.0)	16 (15.7)	42 (41.2)	16 (15.7)
4.	Cleaning the environment is a personal responsibility.	14 (13.7)	6 (5.9)	4 (3.9)	40 (39.2)	38 (37.3)
5.	I support routine 3M Plus activities in the village.	20 (19.6)	2 (2.0)	4 (3.9)	48 (47.1)	28 (27.5)

Respondents Practice of Dengue Prevention

Perceived DHF prevention practice at the population level was poor in general with 54.9% classified as poor practice. This outcome inherently supports the evidence of the presence of a large Attitude-Practice Gap (KAP Gap) in the study area (Windyaraini *et al.*, 2024). While the attitude (control) is rather high, the transfer from motivation to regular behaviour seems to be poor.

An examination of scores on the practice items (Table 4) indicate that the main obstacles are not lack of ability, but entrenched beliefs in low local risks and organizational vulnerabilities. The practices that were the least widely practiced were those most directly related to proactive prevention against mosquito threat. Abate/larvicide used by 82.3% were reported as "never" or "sometimes" (never in 72.5% and sometimes in 9.8%). Mosquito nets or repellant were ever used by 78.4% of the respondents (55.9% never and 22.5% sometimes). The low uptake of targeted interventions is understood as a kind of local rationality. In Ngadas stakeholders have identified that the risk of mosquitoes would historically be low due to its high altitude and thus the adoption non-urgent or excessive (Mamenun *et al.*, 2024).

In contrast, respondents adhered to more easily applicable, low-cost and simple practices more strongly, such as draining water containers routinely 94.2% reported doing this “often” or “always”. Water storage container covers 82.4% reported "often" or "always". While these scores are high, they conflict with the low performance of abate use, suggesting that "draining and covering" might be performed as part of general cleanliness habits rather than as a targeted vector control strategy. Furthermore, despite supportive attitudes, the practice of participating in community work (kerja bakti) for dengue prevention still showed vulnerability, highlighting a weakness in the collective mobilization framework that community policies should enforce (Ghani *et al.*, 2019). Overall, the Practice data confirm that the main inhibitors are rooted in ingrained low-risk perception and a lack of mandatory structural enforcement for collective action.

Table 4. Distribution of Respondents Answer on Practice of Dengue Prevention

Questions		Distribution of Answer (n[%])			
Attitude section		**Never**	**Sometimes**	**Often**	**Always**
1.	I routinely drain water storage containers at least once a week.	2 (2.0)	4 (3.9)	68 (66.7)	28 (27.5)
2.	I use mosquito nets or mosquito repellent in the house.	57 (55.9)	23 (22.5)	12 (11.8)	10 (9.8)
3.	I always cover or seal places that can become mosquito breeding sites (buckets, plant pots, bathtubs).	12 (11.8)	6 (5.9)	38 (37.3)	46 (45.1)
4.	I dispose of used items or trash that can collect rainwater.	36 (35.3)	4 (3.9)	26 (25.5)	36 (35.3)
5.	I use abate/larvicide.	74 (72.5)	10 (9.8)	6 (5.9)	12 (11.8)
6.	I know the Jumantik volunteer in my residential area.	58 (56.9)	14 (13.7)	14 (13.7)	16 (15.7)
7.	I have participated in community work or community education activities about dengue prevention.	22 (21.6)	26 (25.5)	34 (33.3)	20 (19.6)

Overall KAP Summary

Overall, respondents achieved an average knowledge score of 4.2±1.9, placing 54.9% in the satisfactory category. A similar result for dengue knowledge was obtained in previous study in Malaysia

Received: 31-10-2025, Accepted: 22-12-2025, Published Online: 09-01-2026

(Firdous *et al.*, 2017). The attitude variable achieved the highest mean (18.5±4.7) with most of them (66.7%) considered satisfactory. This high attitude score demonstrates that community's intention and commitment are very strong to DHF prevention efforts meaningfully (internal motivation) and positively toward the target population (Zaki *et al.*, 2019). On the other hand, the lowest mean score was in practice 16.6±3.5 where more than half of participants (54.9%) fell into unsatisfactory level (poor). This study in line with previous study that more than 65% of the participants had poor preventive practice (Harapan *et al.*, 2018). The KAP Gap (attitude-practice gap) between satisfactory attitude (66.7%) and good practice (45.1%) as indicated by the empirical study is evident in the data (Windyaraini *et al.*, 2024).

This result possibly indicates that due to limited capability, despite high meaningfulness (identity) and moderate comprehensibility (knowledge), the community is not able to transform its intention into preventive behavior. Certainly, this observation indicates that the community mean already have a strong internal salutogenic resources but is obstructed by external/structural demands or the absence of effective collective (gotong royong) related to co-creating vector-free environment (Ghani *et al.*, 2019; Zhang *et al.*, 2023).

Table 5. Average Score Obtained by Respondents

Outcome Variable	Score Received by Respondent's		Mean ± SD	Satisfactory	Unsatisfactory
	Minimum	Maximum		n (%)	n (%)
Knowledge	0	7	4.2±1.9	56 (54.9)	46 (45.1)
Attitude	5	25	18.5±4.7	68 (66.7)	34 (33.3)
Practices	7	24	16.6±3.5	46 (45.1)	56 (54.9)

Predictors of Respondent Knowledge

A multivariate logistic regression analysis was conducted (Table 5) to find out the demographic variables that had independent effects on the probability of having satisfactory knowledge of DHF. Results showed that factor associated with knowledge were age, gender, education status, and income, but education is the only significant predictor among all tested variables. Respondents with Junior High School (JHS) educational levels were 4.1 times more likely (OR=4.1; 95%CI:1.3–12.7; *p*=0.015) to have satisfactory DHF knowledge compared with those having Primary School (PS) education level (used as the reference category). This is an important finding that emphasizes the importance of formal education in aiding internalization and understanding of complex health information (Prayitno *et al.*, 2025).

Females and older participants had higher knowledge scores, but these differences were not statistically significant (all p > 0.242); however, the Income variable approached significance. Medium and high income levels (IDR 1,000,001–5,000,000) found to have had a high Odd ratio compared with low-income groups (OR=2.9-3.9), even though p-values for the result were slightly over 0.05 threshold (p=0.071 and p=0.069). In line with previous study in Laos and Indonesia that higher education was significantly associated with knowledge (Harapan *et al.*, 2018; Rahman *et al.*, 2021). In summary, this study asserts that education is the strongest internal factor in predicting respondent knowledge for DHF.

Table 6. Predictors of Respondent Knowledge

Variable	Satisfactory n (%)	Unsatisfactory n (%)	*p*-value (X^2)	OR	95% (CI)	*p*-value
Age (years old)						
19-30	18 (100.0)	0 (0.0)	<0.001*	Ref.	Na.	Na.
31-50	32 (44.4)	40 (55.6)		Na.	Na.	0.999
>50	6 (50.0)	6 (50.0)		Na.	Na.	0.999

Received: 31-10-2025, Accepted: 22-12-2025, Published Online: 09-01-2026

Variable	Satisfactory n (%)	Unsatisfactory n (%)	*p*-value (X^2)	OR	95% (CI)	*p*-value
Gender						
Male	2 (20.0)	8 (80.0)	0.020*	Ref.	Na.	Na.
Female	54 (58.7)	38 (41.3)		3.5	0.4-29.3	0.242
Education Status						
Elementary	28 (41.2)	40 (58.8)	<0.001*	Ref.	Na.	Na.
school	20 (76.9)	6 (23.1)		4.1	1.3-12.7	0.015
Middle school	8 (100.0)	0 (0.0)		Na.	Na.	1.000
High school						
Parent's Income						
≤IDR 1.000.000	10 (33.3)	20 (66.7)	0.015*	Ref.	Na.	Na.
IDR 1.000.001 - 3.000.000	32 (61.2)	20 (38.5)		2.9	0.9-9.5	0.071
IDR 3.000.001 - 5.000.000	14 (70.0)	6 (30.0)		3.9	0.9-16.8	0.069

OR = odds ratio, CI = confidence interval, * = significant at 5% (p<0,05), [b] = significant at 25% (p<0,25), Ref = reference, X^2 = chi-square

Predictors of Respondent Attitude

Using these variables, we conducted the multivariate logistic regression (Table 6) to estimate what demographic characteristics independently contribute to people being positively associated with having a favorable attitude for DHF prevention. The findings also revealed that none sociodemographic factor other than category was statistically significant.

Respondents who earned monthly income of IDR 1,000,001 – 3,000,000 were more likely (OR=2.9; 95%CI:1.04–8.2; p=0.041) to have a favorable attitude three times than low-income group (≤IDR 1,000,000). This result suggests that even a small amount of wealth or less hardship (the lower-middle income group) could boost a respondent's confidence and concern for prevention. This state may be associated with a higher SOC, meaning that the subjects consider themselves to have more resources available than those they need in order to deal with the threat of DHF and therefore adopt an optimistic and positive perception (Nutbeam, no date).

On the other hand, age (p>0.211), gender (p=0.387) and education (for all p-values > 0.697) emerged as non-significant predictors of attitude. This warns us that internal motivation or confidence in DHF prevention is more heavily affected by level of economic status than educational level, gender and age.

Table 7. Predictors of Respondent Attitude

Variable	Satisfactory n (%)	Unsatisfactory n (%)	*p*-value (X^2)	OR	95% (CI)	*p*-value
Age (years old)						
19-30	14 (77.8)	4 (22.2)	0.174	Ref.	Na.	Na.
31-50	44 (61.1)	28 (38.9)		0.3	0.06-1.8	0.211
>50	10 (83.3)	2 (16.7)		2.1	0.1-30.8	0.587
Gender						
Male	6 (60.0)	4 (40.0)	0.638	Ref.	Na.	Na.
Female	62 (67.4)	30 (32.1)		2.3	0.3-15.4	0.387
Education Status						
Elementary school	44 (64.7)	24 (35.3)	0.801	Ref.	Na.	Na.
Middle school	18 (69.2)	8 (30.8)		0.9	0.3-2.9	0.994
High school	6 (75.0)	2 (25.0)		0.6	0.1-6.7	0.697
Parent's Income						
≤IDR 1.000.000	16 (53.3)	14 (46.7)	0.072	Ref.	Na.	Na.
IDR 1.000.001 - 3.000.000	40 (76.9)	12 (23.1)		2.9	1.04-8.2	0.041
IDR 3.000.001 - 5.000.000	12 (60.0)	8 (40.0)		1.2	0.3-4.1	0.785

OR = odds ratio, CI = confidence interval, * = significant at 5% (p<0,05), [b] = significant at 25% (p<0,25), Ref = reference, X^2 = chi-square

Received: 31-10-2025, Accepted: 22-12-2025, Published Online: 09-01-2026

Predictors of Respondent Practice

Multivariate logistic regression analysis (Table 7) was performed to determine the independent sociodemographic factors contributing towards association with DHF prevention practice scores. The most significant finding of the entire study emerged from this analysis and it was that none of the predictive factors tested, which included age (p>0.258), gender (p=0.222), education (p>0.529) or income (p > 0.383).

This nonsignificant finding is of substantial importance, because it demonstrates that the major obstacle to sustainable vector prevention behavior is not the personal cognitive resources (comprehensibility or meaningfulness) but a deficiency in collective manageability. Co-occurrence of high attitude scores and low practice scores, and no sociodemographic predictors for the practice constructs, provide strong empirical evidence that the KAP Gap is structurally induced (Windyaraini *et al.*, 2024).

The reasons above are perhaps the most likely destroying the intent to practice of any external-overriding-penis attitude. Since the elevated place lead to historically low risk perception, tight adoption is exerted indirectly by the lack of accesses toward effortful practices such as larvicide (Mamenun *et al.*, 2024). More crucially, the poor score on communal activities (Table 4, 7), in spite of positive attitudes towards quality and usefulness indicates a serious fault line in gotong royong. Success in vector control demands ongoing efforts together (Zhang et al., 2024). (Lack of the demographic predictor means that, in order to address the practice gap and enable cocreation of health, interventions should move beyond providing information provision for individuals towards implementing community-wide policies mandating regular vector control behaviour, that is standardization of collective resources and Manageability as a function of anything else than one's individual personality.

Table 8. Predictors of Respondent Practice

Variable	Satisfactory n (%)	Unsatisfactory n (%)	*p*-value (X^2)	OR	95% (CI)	*p*-value
Age (years old)						
19-30	14 (77.8)	4 (22.2)	0.006*	Ref.	Na.	Na.
31-50	27 (37.5)	45 (52.5)		0.5	0.1-1.8	0.258
>50	4 (33.3)	8 (66.7)		0.6	0.1-4.6	0.661
Gender						
Male	2 (20)	8 (80)	0.106	Ref.	Na.	Na.
Female	43 (46.7)	49 (53.3)		3.3	0.5-23.2	0.222
Education Status						
Elementary school	25 (36.8)	43 (63.2)	0.003*	Ref.	Na.	Na.
Middle school	12 (46.2)	14 (53.8)		1.4	0.5-3.6	0.529
High school	8 (100)	0 (0.0)		Na.	Na.	0.999
Parent's Income						
≤IDR 1.000.000	13 (43.3)	17 (56.7)	0.836	Ref.	Na.	Na.
IDR 1.000.001 - 3.000.000	22 (42.3)	30 (57.7)		0.6	0.2-1.7	0.383
IDR 3.000.001 - 5.000.000	10 (50.0)	10 (50.0)		0.7	0.2-2.5	0.546

OR = odds ratio, CI = confidence interval, * = significant at 5% (p<0,05), [b] = significant at 25% (p<0,25), Ref = reference, X^2 = chi-square

Strengths and Limitations of the Study

This study has some important strengths, especially about context and method. Contextually, the manuscript provides empirical insights for KAP preparedness in highland areas such as Ngadas Village region which conventionally is described non-endemic area of DHF. These were methodologically sound with the detailed item-level and multivariate analyses. They led to awareness of a deadly misconception about immunity and unmistakably confirmed the existence of structural barriers to practice in that none demographic variable was significant predictor of satisfactory practice scores (Ghani *et al.*, 2019). Multivariate Logistic Regression was used to successfully tease apart the independent effects of each predictor.

Received: 31-10-2025, Accepted: 22-12-2025, Published Online: 09-01-2026

Nevertheless, the study has some inherent restrictions. It is impossible to establish a causal path between demographic determinants and KAP outcomes as part of the cross-sectional study. Also, Practice was based on self-report and may be subject to social desirability bias. The respondents may over report on their frequency good practices to meet community norms which could result in a little of an upward bias on the P score (Windyaraini *et al.*, 2024).

Policy and Research Recommendations

Given the discovery of a KAP Gap rooted in structural barriers and low risk perception among poor communities living there, interventions that work need to move beyond individual health promoting strategies towards those that enable people to co-create health and enhance collective manageability. First, the health authorities need to conduct a risk perception recalibration by providing unobscured evidence of rising DHF risk throughout Malang Regency. This includes to involve the community on social communication procedure for a shared understanding of a healthy environment. Second, the village government and RT/RW unit must set up binding policies or social norms to integrate PSN activities in particular through institutionalizing gotong royong (routine communal clean-up) and obligatory independent jumantik. This institutionalisation of collective endeavour is also central to reversing the communitarian failure and addressing the Manageability deficit. Lastly, educational campaigns should focus on rectifying the deadly misunderstanding of immunity via targeted visual means for those who are less educated.

CONCLUSION

This research has been able to conclusively demonstrate the presence of a marked KAP gap in Ngadas Village in which its high perceived meaningfulness (positive attitude) was not translated into actual manageability (sustainable act of prevention). It is this separation (feature of control) together with the universal, deadly misperception on post infection immunity (lack of comprehensibility), that critically limits DHF-readiness.

The most remarkable finding is that at a single demographic level (age, gender, education or income factor), there was not enough evidence to assume for its role as a significant predictor of practicing properly. This strongly supports the conclusion that the principal barriers are located not in deficiencies at the level of the individual but in the absence of structural support for collective action in other words, the failure of manageability and sense of control. These structural elements include a deeply entrenched old chestnut that the environment does not pose much of a risk, and an Achilles' heel in the communal mobilization mechanism (*gotong royong*).

Therefore, DHF preparedness cannot be achieved by top-down health education merely for individual. Interventions need to be reimagined as community capacity-building strategies toward co-generation of health. Efforts in this regard need to be directed at risk recalculation through social communication and the implementation of obligatory collective policies, which will institutionalize needed structural resources and collective action in order to increase the community's general SOC.

ACKNOWLEDGEMENT

The authors are very thankful for the valuable help in conducting this research. The author would like to thank the Research and Community Service Unit (*Badan Penelitian dan Pengabdian kepada Masyarakat* - BPPM) of the Faculty of Medicine, Universitas Brawijaya (FKUB) for funding contribution that made it possible to conduct this study. Such smooth preparation and successful field activities would not have been achieved without full support, excellent collaboration from the Ngadas Village Health Cadres, as well as the Poncokusumo Public Health Center (Puskesmas). We are also grateful to all people of Ngadas Village, Poncokusumo Sub-District for their involvement participation and sharing data.

CONFLICT OF INTEREST AND FUNDING DISCLOSURE

The authors declare that there are no conflicts of interest in this study, which could have influenced the outcome, interpretation, or presentation of the results.

Received: 31-10-2025, Accepted: 22-12-2025, Published Online: 09-01-2026

REFERENCES

Acharya, B. K. *et al*. (2018) 'Present and Future of Dengue Fever in Nepal: Mapping Climatic Suitability by Ecological Niche Model.', *International journal of environmental research and public health*, 15(2). doi: 10.3390/ijerph15020187.

Anggraini Ningrum, D. N. *et al*. (2024) 'Artificial Intelligence Approach for Severe Dengue Early Warning System.', *Studies in health technology and informatics*, 310, pp. 881–885. doi: 10.3233/SHTI231091.

Antonovsky, A. (1979) 'Health, stress, and coping', *New perspectives on mental and physical well-being*, pp. 12–37.

Brady, O. J. *et al*. (2012) 'Refining the global spatial limits of dengue virus transmission by evidence-based consensus.', *PLoS neglected tropical diseases*, 6(8), p. e1760. doi: 10.1371/journal.pntd.0001760.

Eriksson, M. and Lindström, B. (2008) 'A salutogenic interpretation of the Ottawa Charter', *Health promotion international*, 23(2), pp. 190–199.

Erlanger, T. E., Keiser, J. and Utzinger, J. (2008) 'Effect of dengue vector control interventions on entomological parameters in developing countries: a systematic review and meta-analysis.', *Medical and veterinary entomology*, 22(3), pp. 203–221. doi: 10.1111/j.1365-2915.2008.00740.x.

Firdous, J. *et al*. (2017) 'Knowledge, attitude and practice regarding dengue infection among Ipoh community, Malaysia', *Journal of Applied Pharmaceutical Science*, 7(8), pp. 099–103. doi: 10.7324/JAPS.2017.70814.

Ghani, N. A. *et al*. (2019) 'Comparison of Knowledge, Attitude, and Practice among Communities Living in Hotspot and Non-Hotspot Areas of Dengue in Selangor, Malaysia.', *Tropical medicine and infectious disease*, 4(1). doi: 10.3390/tropicalmed4010037.

González-Siles, P. *et al*. (2022) 'Sense of Coherence and Work Stress or Well-Being in Care Professionals: A Systematic Review', *Healthcare (Switzerland)*, 10(7), pp. 1–19. doi: 10.3390/healthcare10071347.

Hamed, M. (2024) 'Knowledge, attitude, and practices toward dengue fever among the public: a cross-sectional study in the Western region of Saudi Arabia', *Frontiers in Public Health*, 12(March), pp. 1–11. doi: 10.3389/fpubh.2024.1327427.

Harapan, H. *et al*. (2018) 'Knowledge, attitude, and practice regarding dengue virus infection among inhabitants of Aceh, Indonesia: A cross-sectional study', *BMC Infectious Diseases*, 18(1), pp. 1–16. doi: 10.1186/s12879-018-3006-z.

Hidayah, N. N., Prabamurti, P. N. and Handayani, N. (2021) 'Determinants of Household Waste Management Behavior in Dengue Fever Prevention Among Housewives in Sendangmulyo Village', *Indonesian Public Health Media*, 20(4), pp. 229–239.

Indiastari, D. *et al*. (2025) 'Association Between Personal Hygiene Practices and Peripheral Blood Profiles in Agrarian Workers: An Analysis with Socio-demographic and Helminthiasis Considerations', *The Indonesian Journal of Occupational Safety and Health*, 14(2), pp. 164–179. doi: https://doi.org/10.20473/ijosh.v14i2.2025.164-179.

Iqtadar, S., Akram, J. and Khan, A. (2024) 'The Urgent Need for Dengue Vaccination: Combating an Escalating Public Health Crisis in Pakistan.', *Vaccines*, 12(8). doi: 10.3390/vaccines12080913.

Islam, Z. *et al*. (2022) 'Dengue Virus Cases Surge Amidst COVID-19 in Pakistan: Challenges, Efforts and Recommendations.', *Infection and drug resistance*, 15, pp. 367–371. doi: 10.2147/IDR.S347571.

Kemenkes (2017) *Profil Kesehatan Indonesia. Kementerian Kesehatan Republik Indonesia, Jakarta*.

Kemenkes RI (2023) *Laporan Kasus Demam Berdarah Dengue Indonesia Tahun 2022*.

Mamenun *et al*. (2024) 'Spatiotemporal Characterization of Dengue Incidence and Its Correlation to Climate Parameters in Indonesia', *Insects*, 15(5), p. 366.

Mittelmark, M. B. *et al*. (2022) *Salutogenesis and the Sense of Coherence in Middle Adulthood*. Second edi, *The Handbook of Salutogenesis: Second Edition*. Second edi. Springer Nature Switzerland AG The. doi: 10.1007/978-3-030-79515-3_18.

Nutbeam, D. (no date) 'World Health Organisation Discussion Paper: Promoting, measuring and implementing health literacy - Implications for policy and practice in non-communicable disease prevention and control'. Available at: http://www.who.int/global-coordination-mechanism/working-groups/background.pdf?ua=1.

Received: 31-10-2025, Accepted: 22-12-2025, Published Online: 09-01-2026

Prayitno, A. *et al*. (2025) 'Addressing knowledge, attitude and practice gaps for effective dengue management strategies in Indonesia.', *Frontiers in public health*, 13, p. 1540121. doi: 10.3389/fpubh.2025.1540121.

Putra, M. J. F. and Lestari, K. S. (2023) 'Unsur-Unsur Iklim yang Berhubungan dengan Incidence Rate Demam Berdarah Dengue di Kabupaten Malang Tahun 2011-2020', *Media Gizi Kesmas*, 12(1), pp. 219–227. doi: 10.20473/mgk.v12i1.2023.219-227.

Rahman, M. S. *et al*. (2021) 'Knowledge, attitudes, and practices on climate change and dengue in Lao People's Democratic Republic and Thailand', *Environmental Research*, 193(November 2020), p. 110509. doi: 10.1016/j.envres.2020.110509.

Rakhmani, A. N. and Zuhriyah, L. (2024) 'Knowledge, Attitudes, and Practices Regarding Dengue Prevention Among Health Volunteers in an Urban Area – Malang, Indonesia', *Journal of Preventive Medicine and Public Health*, 57(2), pp. 176–184. doi: 10.3961/jpmph.23.484.

Rosandy, M. G. *et al*. (2025) '3.+PROMKES_Milanitalia+(27-38) 12', *The Indonesian Journal of Health Promotion and Health Education*, 13(1 SI), pp. 27–38. doi: 10.20473/jpk.V13.I1SI.2025.27-38.

Saghir, M. A. *et al*. (2022) 'Knowledge, attitude, and practices of the community toward dengue fever in Shabwah Governorate, Yemen: a descriptive study.', *The Journal of the Egyptian Public Health Association*, 97(1), p. 27. doi: 10.1186/s42506-022-00121-5.

Selvarajoo, S. *et al*. (2020) 'Knowledge, attitude and practice on dengue prevention and dengue seroprevalence in a dengue hotspot in Malaysia: A cross-sectional study.', *Scientific reports*, 10(1), p. 9534. doi: 10.1038/s41598-020-66212-5.

Statistik, B. P. (2021) 'Kecamatan Poncokusumo dalam angka 2022', 16, pp. 7–8.

Statistik, B. P. (2024) *Kecamatan Poncokusumo Dalam Angka 2024*.

Stolerman, L. M., Maia, P. D. and Kutz, J. N. (2019) 'Forecasting dengue fever in Brazil: An assessment of climate conditions.', *PloS one*, 14(8), p. e0220106. doi: 10.1371/journal.pone.0220106.

Sutriyawan, A., Suherdin and Ratna Dian Kurniawati (2024) 'Epidemiological Determinants and Trend Analysis of Dengue Fever Disease', *Window of Health : Jurnal Kesehatan*, 7(1), pp. 1–13. Available at: http://jurnal.fkmumi.ac.id/index.php/woh/article/view/woh7101.

Telle, O. *et al*. (2021) 'Social and environmental risk factors for dengue in Delhi city: A retrospective study.', *PLoS neglected tropical diseases*, 15(2), p. e0009024. doi: 10.1371/journal.pntd.0009024.

Van Truong, L. *et al*. (2025) 'From controversy to confidence: Strengthening dengue vaccines safety reporting.', *Vaccine*, 62, p. 127489. doi: 10.1016/j.vaccine.2025.127489.

Windyaraini, D. H. *et al*. (2024) 'Spatial study of dengue and its association with livestock farming in Bantul Regency, Yogyakarta Province, Indonesia.', *Veterinary world*, 17(11), pp. 2667–2674. doi: 10.14202/vetworld.2024.2667-2674.

Yoshikawa, M. J., Kusriastuti, R. and Liew, C. (2020) 'An interdisciplinary study: disseminating information on dengue prevention and control in the world-famous travel destination, Bali, Indonesia.', *Evolutionary and Institutional Economics Review*, pp. 265–293. doi: 10.1007/s40844-019-00138-0.

Zaki, R. *et al*. (2019) 'Public perception and attitude towards dengue prevention activity and response to dengue early warning in Malaysia.', *PloS one*, 14(2), p. e0212497. doi: 10.1371/journal.pone.0212497.

Zhang, S. X. *et al*. (2024) 'Global, regional, and national burden of dengue, 1990–2021: Findings from the global burden of disease study 2021', *Decoding Infection and Transmission*, 2(September), p. 100021. doi: 10.1016/j.dcit.2024.100021.

Zhang, Y. *et al*. (2023) 'Knowledge, attitude and practice (KAP) and risk factors on dengue fever among children in Brazil, Fortaleza: A cross-sectional study', *PLoS Neglected Tropical Diseases*, 17(9 September), pp. 1–16. doi: 10.1371/journal.pntd.0011110.

Received: 31-10-2025, Accepted: 22-12-2025, Published Online: 09-01-2026