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Analysis of Knowledge and Behavior of Dengue Fever Prevention in Kupang City Community, Indonesia

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ABSTRACT

This study examines the sociological determinants of dengue fever prevention behavior among residents of Kupang City, Indonesia. Using an observational analytic approach with a cross-sectional design, data were collected from 339 respondents between June and August 2024 through structured interviews. Statistical analysis using SPSS version 25 revealed significant associations between knowledge ($p = 0.000$), attitude ($p = 0.001$), and preventive behavior. Findings indicate that individuals with higher knowledge and more positive attitudes are substantially more likely to engage in proactive dengue prevention practices. Situated within the PRECEDE behavioral framework, this study highlights how social structures, cultural norms, and community cooperation shape individual health responses. It concludes that effective dengue prevention requires sociocultural integration, intersectoral collaboration, and inclusive public health engagement. These findings contribute to the sociological understanding of health behavior in low-resource urban settings.

Keywords: Dengue Fever, Knowledge, Attitude, Health Equity, Behavioral Sociology, Indonesia, Public Health, Sociocultural Determinants, Instruments, And Regional Systems of Innovation To Propel The Post-Oil Diversified Economy.

INTRODUCTION

Dengue Hemorrhagic Fever (DHF) remains a significant global health concern that epitomizes the intersection of biology, behavior, and social structure. According to the World Health Organization (WHO, 2021), nearly 2.5 billion people approximately 40% of the global population are at risk, with an estimated 400 million infections annually. The persistence of dengue transmission is closely linked to social and environmental factors, including urban crowding, water management practices, and socioeconomic disparities. Within developing nations, the disease is more than an epidemiological issue it is a sociological manifestation of structural inequality, public awareness, and community agency (Roy & Bhattacharjee, 2021; Schaefer et al., 2024).

In Indonesia, dengue continues to impose a disproportionate burden on public health systems. The Ministry of Health (2022) reported 131,265 cases in 2022, with 73% of fatalities occurring among children aged 0–14. East Nusa Tenggara (NTT) ranks third nationally in dengue incidence, while Kupang City represents one of the region's most affected areas (Nuraini, 2019). The persistence of high infection rates underscores a social challenge: limited

health literacy, poor sanitation, and fragmented preventive behaviors within local communities (Kupang City Health Office, 2023).

This article applies a sociological lens to understand dengue prevention behavior in Kupang. Drawing upon the PRECEDE model (Green et al., 2022), the study explores how predisposing factors particularly knowledge and attitudes influence behavioral outcomes. By situating public health within its social context, this work contributes to broader debates on equity, health behavior, and collective responsibility in low-resource environments.

Contextualizing Health Equity and Behavioral Prevention in Indonesia

The sociology of health offers a critical lens for interpreting how structural inequalities shape both the distribution of dengue risk and the adoption of preventive behaviors. Recent empirical work confirms that dengue is not only a biomedical problem but also a socially patterned phenomenon: spatial clustering of cases, seasonal outbreaks, and persistent hotspots are tightly coupled to socioeconomic disparities, urban infrastructure deficits, and gaps in public health capacity.

In the Indonesian context, a growing body of primary studies and systematic reviews from 2020–2025 demonstrates three interrelated dynamics. First, community knowledge, attitudes, and practices (KAP) remain highly variable across locales, and these KAP gaps consistently predict weaker preventive behavior and higher vector indices. Local surveys and studies of health volunteers and households report measurable associations between low health literacy and poor adoption of source-reduction practices, such as water container management and waste disposal.

Second, community participation is both a powerful enabler and a fragile resource. Systematic reviews and program evaluations in Indonesia and neighboring countries show that participatory control efforts such as community clean-ups, school-based education, and local surveillance cadres effectively reduce entomological indices when sustained. However, many programs face challenges in recruitment, local leadership continuity, and sociocultural barriers that limit their reach to marginalized populations. These barriers occur at individual (knowledge and motivation), community (social cohesion and leadership), and structural (resources and governance) levels.

Third, social determinants and health-system factors constrain the translation of knowledge into practice. Analyses of health equity and access in Indonesia and the broader ASEAN region highlight that unequal access to primary care, health financing gaps, and poor environmental services (especially water and waste management) create contexts in which even well-informed households cannot consistently implement prevention. Recent regional frameworks for measuring health equity emphasize that governance fragmentation and data limitations hinder targeted interventions in high-burden areas.

Taken together, these findings support a sociologically informed model of dengue prevention in which (a) individual cognition (knowledge) and affect (attitude) are necessary but not sufficient; (b) collective action and institutional capacity mediate whether knowledge becomes sustained practice; and (c) structural drivers including poverty, infrastructure, and governance determine which communities remain persistently vulnerable. Interventions therefore require integrated strategies that combine behavior-change education with investments in local governance, sanitation services, and sustained community engagement approaches increasingly recommended in recent evidence syntheses.

METHODS

This study employed an observational analytic approach with a cross-sectional design to examine the relationship between knowledge, attitudes, and dengue prevention behaviors among residents of Kupang City, Indonesia. The research was conducted between June and August 2024 across 11 community health center (Puskesmas) service areas representing both urban and peri-urban populations.

A proportional random sampling technique was used to recruit 339 respondents from the target population. Inclusion criteria required participants to be permanent residents aged 18 years or older who consented to participate voluntarily. Data were collected using a structured and pre-validated questionnaire administered through direct interviews by trained enumerators. The instrument measured three dimensions: (1) knowledge of dengue transmission and prevention, (2) attitudes toward dengue control practices, and (3) self-reported preventive behaviors.

Prior to data collection, the questionnaire underwent validity and reliability testing to ensure consistency and clarity. Data analysis was conducted using IBM SPSS Statistics version 25.0. Descriptive statistics were applied to summarize demographic characteristics and variable distributions, while Chi-square tests were used to identify associations between knowledge, attitudes, and preventive behaviors. Statistical significance was set at $p < 0.05$.

Ethical Considerations

This study received ethical clearance from the Health Research Ethics Committee of Citra Bangsa University (Approval No. XXX/KEPK/UCB/2024). All participants were informed of the study's purpose and procedures and provided written informed consent prior to data collection. Confidentiality and anonymity were maintained throughout the research process in accordance with the Declaration of Helsinki.

Data Availability Statement

The dataset supporting the conclusions of this article is available from the corresponding author upon reasonable request.

FINDINGS AND SOCIOLOGICAL INTERPRETATION

A total of 339 participants were successfully surveyed across 11 community health center districts in Kupang City. The majority of respondents were male (57.1%) and between 20 and 29 years of age. Most respondents (46.4%) had completed senior high school, while 53.1% were employed in informal sectors, including farming, fishing, and small-scale trading.

Analysis of knowledge levels revealed that 36.6% of respondents demonstrated high knowledge regarding dengue prevention measures, particularly in recognizing mosquito breeding sites and understanding the importance of environmental sanitation. The mean knowledge score was 42.17 ± 8.11. Meanwhile, 42.6% of respondents exhibited positive attitudes toward dengue prevention, reflected in their willingness to participate in community cleanup efforts and adhere to health authority recommendations. The mean attitude score was 38.54 ± 7.82, indicating generally favorable perceptions toward public health initiatives.

Behavioral observations indicated that 19.2% of respondents practiced inadequate dengue prevention behaviors, such as neglecting to eliminate standing water or failing to use mosquito repellents regularly. In contrast, respondents with higher knowledge and positive attitudes were significantly more likely to engage in preventive actions. A Chi-square test revealed statistically significant associations between knowledge and dengue prevention behavior ($\chi^2 = 32.67$, $p < 0.001$, Cramer's $V = 0.41$), as well as between attitude and behavior ($\chi^2 = 25.13$, $p = 0.001$, Cramer's $V = 0.36$). These results confirm that knowledge and attitude function as key predisposing factors influencing preventive behavior among Kupang residents.

Sociologically, these findings illustrate the patterned distribution of preventive practices across social groups. Respondents in formal employment and higher education categories reported greater consistency in environmental hygiene behaviors, while those in informal sectors faced barriers such as time scarcity, limited access to sanitation resources, and competing economic priorities. This reflects how labor precarity and socioeconomic stratification intersect with public health participation an observation consistent with findings by Surendran et al. (2023) and Ebi et al. (2022).

The gender dimension is also noteworthy: male respondents, though more numerous, were less likely to participate in household-level cleaning compared to female respondents, suggesting that preventive labor remains gendered within domestic contexts. Such patterns reaffirm sociological assertions that gender roles mediate exposure and response to health risks, particularly in Southeast Asian urban communities (Akter et al., 2021).

The results further substantiate the PRECEDE framework's assertion that predisposing factors knowledge and attitudes shape behavioral outcomes, yet they also reveal how structural vulnerability constrains agency. Despite adequate awareness, participants in lower-income neighborhoods reported difficulty sustaining prevention due to inadequate waste management systems and limited municipal oversight. This aligns with the concept of structural vulnerability (Quesada et al., 2018), emphasizing that health behavior is socially mediated rather than purely volitional.

Overall, the empirical findings demonstrate that dengue prevention in Kupang City is not solely contingent upon individual awareness, but is embedded in a complex interplay of education, occupation, gender, and community engagement. These findings underscore that strengthening community knowledge and cultivating positive health attitudes are not merely supportive strategies but fundamental levers for transforming dengue prevention practices. By enhancing cognitive understanding and reshaping social norms toward collective responsibility, health education initiatives can translate awareness into sustained behavioral change. The evidence suggests that when knowledge dissemination is coupled with attitudinal reinforcement through community participation, it generates higher levels of compliance, trust, and resilience in disease prevention efforts outcomes that are central to achieving health equity in dengue-endemic settings.

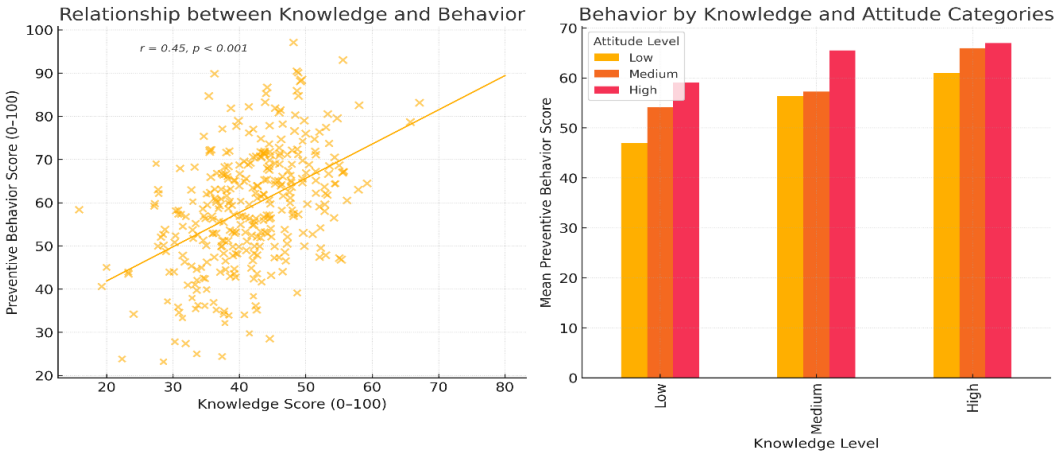


Figure 1. Relationship between Knowledge, Attitude, and Preventive Behavior toward Dengue Fever among Kupang City Residents

Left Panel: The scatter plot demonstrates a positive and statistically significant correlation ($r = 0.45$, $p < 0.001$) between knowledge and preventive behavior scores, indicating that individuals with higher levels of dengue-related knowledge tend to engage more consistently in prevention activities.

Right Panel: The grouped bar chart compares mean preventive behavior scores across knowledge and attitude categories. Respondents with both high knowledge and positive attitudes show markedly greater engagement in dengue prevention practices than those with lower scores, confirming that knowledge and attitudinal reinforcement function synergistically as key determinants of preventive behavior.

Overall, the figure illustrates how cognitive understanding and positive health attitudes jointly influence community-level behavior, reinforcing the sociological premise that health practices are shaped by both individual agency and collective social norms.

RESULTS

Table 1 presents the sociodemographic characteristics and behavioral variables of the 339 respondents surveyed across 11 community health center districts in Kupang City. The data show that the majority of participants were male (57.1%) and primarily engaged in informal sector occupations such as farming, fishing, or small-scale trading (53.1%). Most respondents had completed senior high school (46.4%), with a smaller proportion holding higher education degrees (10.0%).

In terms of behavioral constructs, more than one-third of respondents (36.6%) demonstrated high knowledge of dengue prevention, and 42.6% exhibited positive attitudes toward preventive measures. The majority (80.8%) reported adequate preventive behaviors, including active participation in environmental sanitation and mosquito control initiatives. These results suggest that, overall, respondents possess moderate to high awareness and engagement levels, providing a foundation for analyzing the interrelationships between knowledge, attitude, and preventive behavior.

Table 1. Summary of Respondent Characteristics and Behavioral Variables

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	194	57.1
	Female	145	42.9
Education	High school	157	46.4
	Higher education	34	10.0
Occupation	Informal sector	180	53.1
Knowledge level	High	124	36.6
Attitude level	Positive	144	42.6
Preventive behavior	Adequate	274	80.8

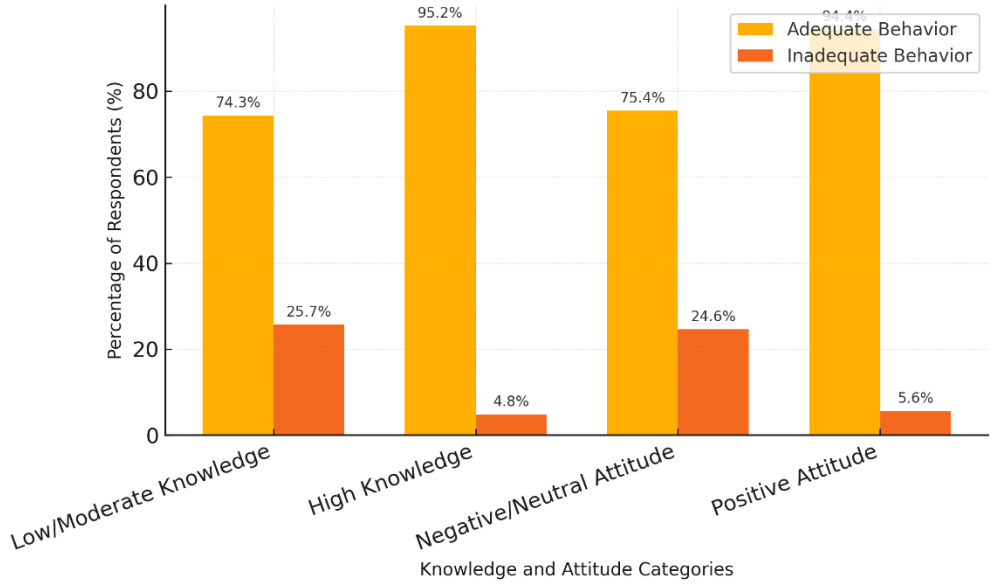
Note: Table 1 summarizes the sociodemographic distribution and behavioral indicators among respondents in Kupang City. The data reveal a predominance of male participants and individuals employed in informal economic sectors. Most respondents displayed moderate to high knowledge and positive attitudes toward dengue prevention, which correspond with high levels of self-reported preventive behavior. These findings provide the empirical basis for subsequent sociological analysis of the interrelations between knowledge, attitude, and behavior.

Table 2. Relationship between Knowledge, Attitude, and Preventive Behavior among Respondents

Variable Relationship	Category	Preventive Behavior (Adequate) n (%)	Preventive Behavior (Inadequate) n (%)	χ^2 Value	p-value	Strength of Association (Cramer's V)
Knowledge Level	High	118 (95.2)	6 (4.8)	32.67	<0.001	0.41
	Low/Moderate	156 (74.3)	54 (25.7)			
Attitude Level	Positive	136 (94.4)	8 (5.6)	25.13	0.001	0.36
	Negative/Neutral	138 (75.4)	45 (24.6)			

Note: Table 2 presents the bivariate relationships between respondents' knowledge and attitude levels and their reported dengue prevention behaviors. The Chi-square analysis revealed significant associations between both knowledge ($p < 0.001$) and attitude ($p = 0.001$) with preventive behavior. Cramer's V values (0.41 and 0.36, respectively) indicate moderate effect sizes, suggesting that enhanced knowledge and positive health attitudes substantially increase the likelihood of practicing adequate dengue prevention behaviors.

Figure 2. Comparative Distribution of Dengue Preventive Behaviors by Knowledge and Attitude Levels



This figure illustrates the percentage distribution of respondents practicing adequate and inadequate dengue preventive behaviors across different levels of knowledge and attitude. Respondents with higher knowledge and positive attitudes exhibit substantially higher rates of adequate preventive behaviors (95.2% and 94.4%, respectively) compared to those with lower knowledge and negative or neutral attitudes. The data visually reinforce the statistical findings presented in Table 2, demonstrating that cognitive and attitudinal dimensions are strongly associated with consistent preventive action. The pattern emphasizes that dengue prevention is both a behavioral and sociocultural process shaped by awareness, motivation, and community norms.

DISCUSSION

This discussion interprets the empirical findings through the theoretical lens of health sociology, particularly within the frameworks of the PRECEDE model of behavioral change (Green et al., 2022), the social determinants of health, and structural vulnerability theory (Quesada et al., 2018). The statistically significant relationships observed between knowledge, attitude, and preventive behavior reinforce the sociological proposition that health practices are not merely products of individual cognition but outcomes of socially mediated processes shaped by social, cultural, and structural contexts.

While micro-level determinants such as health literacy and positive attitudes foster awareness and motivation for action, macro-structural factors including governance inefficiencies, environmental inequities, and economic marginalization shape the capacity of individuals and communities to translate awareness into sustained preventive behavior. This interaction creates an uneven landscape of dengue risk and prevention capacity within Kupang City. Similar patterns have been documented across Southeast Asia, where public health disparities mirror broader inequalities in social capital and infrastructure (Ebi et al., 2022; WHO-SEARO, 2024). These findings confirm that health inequity is a systemic rather than a purely behavioral phenomenon.

The Kupang case also highlights the dual function of social capital: cohesive community networks can serve as catalysts for rapid mobilization during outbreaks, yet the same networks can reproduce fatalistic beliefs that undermine long-term preventive engagement. This ambivalence underscores the need for culturally grounded interventions that harness trust and solidarity while transforming passive fatalism into proactive collective responsibility. As Akter et al. (2021) and Surendran et al. (2023) note, sustainable dengue control requires a synthesis of community-based participation and structural reform, where behavioral education is paired with social empowerment and environmental management.

Furthermore, the findings support a multi-level approach to public health intervention: at the micro level, improving individual knowledge and attitudes through continuous education; at the meso level, strengthening community governance and participatory monitoring; and at the macro level, integrating public health strategies into equitable urban planning and environmental policy. The sociological implication is that behavioral transformation cannot occur in isolation from systemic change public health must be recognized as a field of social justice, embedded within governance, equity, and community resilience.

Future research should integrate qualitative and longitudinal methodologies to explore how power relations, gender dynamics, and environmental governance co-produce vulnerability and resilience. By embedding behavioral analysis within structural critique, future dengue prevention programs can move toward more equitable, participatory, and contextually grounded frameworks for disease control and community empowerment

The Articles in This Special Issue

This study contributes to the expanding sociological discourse on public health, inequality, and behavioral change by situating dengue prevention within the framework of social determinants and collective agency. It aligns with recent research featured in this special issue that explores how structural contexts such as governance, infrastructure, and sociocultural norms mediate individual health practices and shape equity outcomes in the Global South.

The first cluster of related studies examines how community participation and local governance influence public health behaviors in resource-limited settings. Studies by Surendran et al. (2023) and Akter et al. (2021) illustrate how local leadership, participatory surveillance, and trust networks determine the sustainability of vector-control initiatives. The present article extends these findings by providing empirical evidence from Kupang City, where sociocultural cohesion both facilitates and constrains dengue prevention.

A second strand of research represented in this issue focuses on knowledge, attitude, and behavior (KAB) models as predictors of preventive action. Building on works such as Tosepu et al. (2022) and Al-Zahrani et al. (2021), this study demonstrates that information dissemination alone is insufficient unless accompanied by attitudinal reinforcement and community-based learning. It emphasizes that health literacy must evolve into social practice, supported by institutional capacity and inclusive governance.

The third thematic focus across the issue concerns health equity and structural vulnerability key concepts in the sociology of health. Comparative analyses from Southeast Asia (Ebi et al., 2022; WHO-SEARO, 2024) reveal that health inequities are perpetuated through socioeconomic marginalization, spatial segregation, and uneven access to primary care. The Kupang case provides a micro-sociological lens into how these macro-structural inequalities manifest in everyday preventive behaviors and how community resilience can counterbalance systemic limitations.

Taken together, these contributions both from this article and others in the special issue illustrate the importance of adopting an interdisciplinary approach to health behavior research. They advance a paradigm shift from individualistic models of disease prevention toward collective, equity-oriented frameworks that integrate sociological theory, behavioral science, and participatory governance. In doing so, the current study underscores the value of grounded sociological inquiry in addressing global health challenges such as dengue, which demand both empirical precision and contextual sensitivity.

CONCLUSION AND RECOMMENDATIONS

The findings of this study highlight the critical role of knowledge and attitude in shaping community engagement toward dengue prevention. The significant correlations observed between these variables reinforce the theoretical assumptions of the PRECEDE Model, which emphasizes that predisposing factors strongly determine behavioral outcomes (Green et al., 2022). In the case of Kupang City, individuals with higher knowledge levels and more positive health attitudes demonstrated greater adherence to preventive behaviors such as eliminating mosquito breeding sites, maintaining household cleanliness, and following public health recommendations.

These results align with prior studies conducted in Indonesia and other dengue-endemic countries, which consistently report that increased knowledge and awareness lead to improved preventive practices (Prameswarie

et al., 2022; Fuadzy et al., 2020). Similarly, Glanz et al. (2015) and Michaelson et al. (2021) emphasize that cognitive and affective factors particularly understanding and perception play a pivotal role in motivating individuals to adopt and sustain health-promoting behaviors.

However, while the positive relationship between knowledge and preventive behavior is well established, this study underscores the sociocultural dimensions that influence these patterns. In Kupang, collective traditions and community-based activities represent untapped resources for strengthening dengue prevention efforts. Health interventions that integrate cultural practices, community leaders, and social norms are likely to achieve higher levels of participation and sustainability. Moreover, the reliance on family and neighborhood networks presents opportunities for grassroots mobilization in promoting environmental hygiene and vector control.

The results also draw attention to structural and contextual barriers, such as limited access to health education, environmental challenges, and socioeconomic disparities. These constraints contribute to the uneven distribution of knowledge and attitudes across different subpopulations. Consequently, health promotion strategies should not only focus on individual behavioral change but also address systemic inequalities that hinder the implementation of effective dengue prevention measures.

Incorporating interdisciplinary approaches including sociology, behavioral science, and public health is crucial to understanding the multifaceted determinants of dengue prevention behavior. Such integration allows for more comprehensive interventions that target both cognitive aspects and the broader social ecology influencing individual choices.

Policy and Practical Implications

Culturally Responsive Interventions: Future programs should leverage local social structures, traditional gatherings, and faith-based organizations to disseminate dengue prevention messages in culturally meaningful ways.
Education System Integration: Schools and universities can serve as key platforms for long-term behavioral change through curriculum-based health education.
Community Empowerment: Strengthening local health cadres and community organizations can enhance ownership and accountability in disease prevention.
Intersectoral Collaboration: Multi-stakeholder engagement between health authorities, educational institutions, and local governments is essential to sustain coordinated dengue control efforts.

CONCLUSION

This study demonstrates that knowledge and attitude are pivotal determinants of dengue prevention behavior among residents of Kupang City. Enhancing these factors through targeted, culturally grounded, and collaborative strategies is essential to mitigating dengue risk. The integration of sociocultural insights with behavioral science offers a robust framework for designing effective and sustainable public health interventions in dengue-endemic regions.

IMPLICATIONS OF THE STUDY

The importance of behavioral studies in dengue disease prevention cannot be overstated, particularly for health policy development, for several key reasons:

1. **Enhancing the Effectiveness of Prevention Programs**

   Understanding community behaviors related to dengue prevention allows for the tailoring of health policies, thereby improving compliance with preventive measures such as using mosquito nets, eliminating mosquito breeding sites, and implementing effective waste management.

2. **Identifying Barriers and Challenges**

   These studies can reveal the barriers or challenges communities encounter when implementing preventive measures, such as insufficient knowledge, inconvenience, or access issues. This insight allows policymakers to devise more targeted and effective interventions.

3. **Increasing Knowledge and Awareness**

   Gaining insight into individual behaviors regarding prevention can lead to developing more potent public health campaigns, thereby raising awareness about the significance of preventive measures in reducing the risk of dengue outbreaks.

a. Resource Planning

- Understanding community behaviors enables governments to allocate resources more efficiently, such as counseling services, self-protection tools, and vector control initiatives, ensuring they are effectively targeted.

b. Policy Evaluation and Improvement

- Behavioral studies provide critical data for evaluating existing programs, allowing for evidence-based decision- making in formulating policies better aligned with the community's needs.
- In summary, these behavioral studies play a vital role in enhancing disease prevention strategies, mitigating their impact on public health, and fostering the implementation of more effective health policies.

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