Knowledge, Attitudes, and Practices of Health Officials on Dengue Prevention in Sri Lanka: Ethical, Equity, and Social Implications

Shuja M.I.M.[1], Thilfar A.C.A.[2,*], Vajna R.[3], Shanjeetha M.I.[4], Jayasinghe C.D.[5]

[1]Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka
[2]Ashraff Memorial Hospital (AMH), Kalmunai, Sri Lanka
[3]Hanson Medical Centre, Craigieburn, Australia
[4]Heart Command Centre, Durdans Hospital, Colombo, Sri Lanka
[5]Faculty of Natural Sciences, Open University of Sri Lanka, Nawala

[*]Corresponding author: thilfaraara@gmail.com

Abstract

Dengue remains one of the most important mosquito borne diseases in Sri Lanka, causing recurrent outbreaks despite the availability of national prevention policies. This indicates a persistent gap between policy formulation and field level implementation. Such gaps are not only technical public health concerns but also raise ethical, equity, and social implications, as vulnerable communities may experience a disproportionate disease burden when prevention systems are weak. This mixed method study assessed the knowledge, attitudes, and practices of health officials involved in dengue prevention in Sri Lanka and explored system level barriers affecting implementation. A descriptive cross sectional design was used. Quantitative data were collected from 80 health officials representing Medical Officers, Public Health Inspectors/Public Health Officials, Field Workers, and Administrative Staff using a WHO adapted, translated, and pre tested questionnaire. Qualitative data were obtained through 10 key informant interviews. Quantitative data were analysed using descriptive statistics, ANOVA, and Chi square tests, while qualitative data were analysed thematically. Only 27.5% of participants had satisfactory knowledge of dengue prevention policy and national targets. Although attitudes were moderately positive, reported prevention practices were weak, with only 11.3% demonstrating good practices. Knowledge and practice scores differed significantly across professional groups, indicating unequal training and capacity within the workforce. Qualitative findings identified barriers such as staff and resource shortages, funding delays, weak intersectoral coordination, limited enforcement authority, training gaps, and underuse of surveillance tools. The findings highlight the need to strengthen workforce capacity, governance support, intersectoral coordination, and field level implementation. Improving dengue prevention is essential not only to reduce disease burden but also to promote fairness, public trust, and social well being.

Keywords: dengue, ethics, equity, health officials, policy implementation, social impact

Introduction

Dengue fever is one of the fastest spreading mosquito borne viral diseases in the world. It mostly affects tropical and subtropical countries. Dengue leads to many illnesses, hospital admissions, and sometimes deaths, especially in severe cases. Besides harming health, dengue also causes serious economic problems. Families may lose income because people miss work, and they also face hospital costs. At the same time, governments spend a large amount of money on dengue prevention and outbreak control. Sri Lanka faces repeated dengue outbreaks. Some years show very high numbers of dengue cases, especially during rainy seasons. In 2017, Sri Lanka experienced a severe dengue epidemic. After this, national attention increased, and policy planning became

stronger. The Ministry of Health introduced the National Action Plan for Dengue Prevention and Control (2019–2023) to reduce incidence and prevent deaths. The plan includes several strategies such as integrated vector management, stronger surveillance, community participation, and intersectoral coordination. However, even with national plans, dengue outbreaks still occur. This shows a major issue: having a policy is not enough if implementation is weak. Many policies fail because they are not properly translated into action at the field level. Field success depends heavily on the people who implement the programme. In Sri Lanka, dengue prevention activities are done by a mixed group of health officials, such as Medical Officers, Public Health Inspectors, field workers, and administrative staff. They are responsible for surveillance, field inspections, fogging decisions, source reduction, community awareness programmes, legal enforcement, and coordination with other sectors like local government and schools. Many studies on dengue focus on community knowledge and practices. But fewer studies examine the health officials who carry out dengue prevention. This is an important gap because the performance of officials affects service quality directly. If officials have poor knowledge about policy targets, weak attitudes, or poor practices, the programme will not succeed. This research paper is also linked with ethics and equity. Dengue outbreaks affect poor and rural communities more seriously. These communities often live in places with weak waste disposal systems, poor drainage, and limited space, which increases mosquito breeding. If dengue prevention services are weak, the burden becomes unfair. Ethics means doing the right thing for communities, providing fair protection, and supporting the health workforce properly. Equity means ensuring that all groups benefit equally and that prevention capacity is not concentrated in only one part of the system. Repeated dengue outbreaks can reduce public trust in institutions and create frustration, which affects social well being. Therefore, this study was conducted to assess the knowledge, attitudes, and practices of health officials involved in dengue prevention in Sri Lanka and to identify key barriers to policy implementation at the field level.

Literature Review

Dengue prevention is challenging because it depends on many connected factors. Dengue is transmitted mainly by Aedes mosquitoes, which breed in clean stagnant water. Breeding places are often found in artificial containers such as tyres, bottles, roof gutters, coconut shells, and uncovered water storage containers. Because of this, dengue prevention needs regular environmental cleaning and source reduction. Fogging can reduce adult mosquitoes but is not a permanent solution. The long term solution is to remove breeding sites and change community behaviour. Many studies show that dengue control is successful only when different sectors work together. Dengue is not only a problem for the health department. It also involves local government services like waste management, cleaning drainage systems, water supply, school programmes, workplace support, and community leadership. If these groups do not cooperate, mosquito breeding places will remain, and dengue will continue to spread. Another important factor is the strength of the health system. Even if people in the community know something about dengue, prevention still needs regular surveillance and strong field work. Surveillance includes reporting cases, finding hotspot areas, doing inspections, and responding quickly. Health officials should clearly understand policy goals and what actions they should take. If they are not aware of the expected targets, they may not follow the correct priorities. Also, if training is not equal, some staff groups become well trained while others remain weak, and this can reduce the overall quality of the dengue control programme. Equity is also strongly connected to dengue. Poor areas often have more mosquito breeding sites due to waste accumulation and poor drainage. Low income families may not have safe housing or may store water in open containers. These conditions increase risk. So, dengue prevention is also a fairness issue. If prevention services reach only some areas, outbreaks become more severe in disadvantaged communities. Ethics in public health means fairness, accountability, and protecting people who are most at risk. When dengue prevention fails, it causes more suffering and also increases financial losses. People may start to lose trust in public health services. During dengue outbreaks, fear can spread quickly, and people may

start blaming others. Sometimes one group may blame another group for mosquito breeding places. Because of this, dengue outbreaks can also harm social unity and trust in society. Today, dengue control also depends on digital and information systems. Good surveillance needs quick reporting and accurate data. In some countries, systems like GIS mapping, digital reporting tools, and early warning systems are used to control outbreaks faster. But if these tools are not used properly, the response becomes slow. Problems like weak governance, lack of training, and limited resources can reduce the proper use of these digital systems. These points show that dengue prevention is both a technical and a social issue. It is important to study the knowledge, attitudes, and practices of health officials and identify barriers to strengthen implementation.

Methodology

This study used a descriptive cross sectional mixed method design. It allows measuring knowledge, attitudes, and practices using quantitative methods while also exploring deeper system level problems using qualitative interviews.

Study population and setting

The quantitative component of the study included 80 health officials who were actively involved in dengue prevention and control activities. Participants were recruited from relevant institutions at different levels of the health system and represented four key professional groups: Medical Officers, Public Health Inspectors/Public Health Officials, Field Workers, and Administrative Staff. This ensured that the sample reflected a broad range of roles and responsibilities directly linked to dengue prevention work in Sri Lanka.

Sampling

A stratified random sampling method was used for the quantitative component. This ensured that each professional category was represented. Within each category, participants were selected randomly. Non responders were replaced using systematic methods. For the qualitative component, 10 key informant interviews were conducted. Key informants were selected purposively because they had direct experience and deeper involvement in dengue prevention implementation.

Data collection

Quantitative data were collected over six months from October 2024 to March 2025 using a WHO adapted and pre tested KAP questionnaire that was aligned with the Sri Lankan National Dengue Action Plan. The questionnaire included sections on participant demographics, knowledge related items, attitude statements measured using a Likert scale, and questions on dengue prevention practices. It was distributed both as a printed form and through Google Forms to improve accessibility. Written informed consent was obtained from all participants before data collection. In addition, qualitative data were gathered using a semi structured interview guide. These interviews explored practical experiences in dengue prevention, with a focus on implementation challenges, system level barriers, and suggestions for improving the effectiveness of dengue control activities.

Data analysis

Quantitative data were analysed using descriptive statistics to summarize frequencies and percentages. ANOVA and Chi square tests were used to assess differences between professional groups. Statistical significance was considered at $p < 0.05$. Qualitative data were analysed using thematic analysis. Interviews were transcribed, codes were developed, and themes were created based on repeated patterns.

Ethical considerations

Ethical approval was obtained from the relevant ethics review committee. Participation was voluntary. Confidentiality and anonymity were maintained. No identifying details were included in the analysis or reporting.

Results and Discussions

This section presents both quantitative and qualitative findings. The results show clear weaknesses in knowledge and practice among health officials, and they also show deep system level barriers that reduce implementation.

Quantitative Results

A total of 80 health officials completed the questionnaire. Nearly half of the participants were aged 20–30 years (47.5%), and most were male (60.0%). The sample mainly consisted of Medical Officers (41.3%) and Field Workers (36.3%), while Public Health Inspectors/Public Health Officials (3.8%) and Administrative Staff (2.5%) formed smaller proportions. Overall, the sample largely represented frontline workers and medical staff directly involved in dengue prevention activities.

The knowledge assessment showed that only 27.5% of officials had satisfactory knowledge, while 72.5% had unsatisfactory knowledge. The main gaps concerned national policy targets and the principles of integrated vector management. When knowledge scores were compared across professional categories, Public Health Inspectors/Public Health Officials recorded the highest mean score (4.34), followed by Medical Officers (2.76), while Field Workers had the lowest mean score (1.96). These differences were statistically significant (ANOVA, $p = 0.007$), indicating that knowledge was not evenly distributed across the workforce.

Attitudes toward dengue prevention and policy were moderately positive, with 51.3% of participants showing positive attitudes. Many officials recognized the importance of community participation and multi sector collaboration. However, several responses also reflected frustration related to inadequate resources, transport, staffing and institutional support for field work. This suggests that motivation alone is not enough when structural barriers restrict effective implementation.

Prevention practices were generally weak, with only 11.3% of participants demonstrating good dengue prevention practices. Many reported irregular field inspections, weak follow up, limited monitoring of breeding sites and difficulties in enforcement. Practice scores also differed significantly across professional categories ($p = 0.006$), with Public Health Inspectors/Public Health Officials demonstrating stronger practices than other groups. This finding highlights an internal equity concern, as uneven practice capacity across staff groups can weaken the overall dengue prevention programme. However, interpretation of differences involving smaller professional subgroups should be made cautiously because of the limited number of participants in those categories.

Qualitative Results

The qualitative interviews explained why dengue prevention knowledge and practices were weak among health officials. Thematic analysis identified eight key themes that reflected barriers to policy implementation at field level. Resource constraints were a recurring theme. Participants reported shortages of staff, transport, equipment and funding. Field inspections require vehicles, fuel and basic supplies; without these, officers cannot adequately cover their assigned areas. Staff shortages increased workload and reduced service quality, while delays in funding disrupted planned dengue prevention activities. Weak surveillance and reporting were also identified as major barriers. Informants stated that case reporting was sometimes delayed and that collected data were not always analysed promptly to guide action. Since dengue control depends on rapid information flow, participants emphasized the need for stronger training, supervision and practical use of surveillance data. Poor intersectoral coordination was another important theme. Dengue breeding is closely linked to waste accumulation, poor drainage, water storage and environmental management, which cannot be addressed by the health sector alone. Informants described coordination meetings as irregular, roles as unclear and accountability as weak. This led to delays, duplication of work and mutual blame between sectors. Limited legal and enforcement authority was highlighted as a practical obstacle. Although Public Health Inspectors have legal responsibilities, enforcement procedures were described as slow and penalties as insufficient. This reduced the impact of warnings and allowed some community members and institutions to ignore regulations. Participants also described a gap between community awareness and sustained action. Many community members were aware of dengue prevention messages but did not maintain preventive practices over time. During outbreaks, people often cleaned their surroundings temporarily because of fear, but routine practices declined once the outbreak reduced. Informants emphasized that community engagement should be continuous and ownership based rather than limited to short term awareness campaigns. Training gaps among staff were repeatedly mentioned.

Table 1: Summary of key findings and interpretations related to dengue prevention policy implementation.

Indicator	**Main Finding**	**Interpretation**
Satisfactory knowledge	27.5% of participants	Low knowledge of policy targets and integrated vector management may weaken field implementation.
Positive attitudes	51.3% of participants	Attitudes were moderately positive, but motivation was limited by structural barriers.
Good prevention practices	11.3% of participants	Reported practices were weak, suggesting a gap between awareness and routine field action.
Professional group differences	Knowledge: $p = 0.007$; Practice: $p = 0.006$	Unequal capacity across professional groups indicates a workforce equity issue.

Some staff groups received training, while others did not. New staff members were not always given proper induction, and some training sessions were described as outdated or insufficiently practical for field realities. Field workers were especially identified as a group requiring more role specific training based on official policy and operational needs. Technology and innovation were viewed as useful but underused. Digital tools such as mapping systems, electronic reporting and improved surveillance platforms could strengthen dengue control. However, informants reported that these tools were not consistently used because of limited training, inadequate resources and poor internet access, particularly in rural settings. Finally, informants recommended recruiting more staff, improving the flow of funding, strengthening local level decision making, providing regular role specific training, improving supervision, and establishing clearer agreements between sectors. They also recommended local dengue task forces and stronger involvement of community leaders to sustain prevention activities beyond outbreak periods.

Discussion

The combined findings show that dengue prevention is not limited by lack of concern among health officials. Many participants showed positive attitudes toward dengue control, but their ability to act effectively was restricted by weak governance support, limited resources and unequal capacity building. This distinction is important because it shifts the focus from individual blame to system strengthening. The significant differences in knowledge and practice scores between professional groups indicate an internal equity issue within the dengue prevention workforce. Field workers perform a substantial share of ground level activities, yet they had lower knowledge and practice scores. Expecting staff to deliver effective field services without sufficient training, resources and institutional support is both unrealistic and ethically problematic. The findings are consistent with international evidence showing that dengue vector control services are often weakened by insufficient staffing, limited funding, inadequate technical capacity, poor monitoring and difficulties in community engagement. Studies from dengue endemic settings have emphasized that sustainable prevention requires integrated vector management, active surveillance, intersectoral collaboration, community participation and continuous capacity building rather than short term outbreak responses alone. The ethical implications are clear. Public health systems have a responsibility to provide fair protection to communities and fair support to the workforce delivering prevention activities. When dengue prevention fails, vulnerable communities may experience greater illness, financial stress and disruption to daily life. These outcomes are not only health problems but also fairness and social justice concerns. The social implications are also important. Recurrent outbreaks can produce fear, frustration and blame within communities. When people perceive that prevention services are inconsistent or ineffective, trust in public institutions may decline. Strengthening dengue prevention can therefore improve not only disease control but also social well being, community confidence and institutional credibility. To improve implementation, regular role specific training should be provided for all staff

Table 2: Themes identified from qualitative findings on barriers affecting dengue prevention implementation.

Theme	**Key Issue**	**Programme Implication**
Resource constraints	Shortage of staff, transport, equipment and timely funding	Field coverage and routine prevention activities become inconsistent.
Weak surveillance and reporting	Delayed reporting and limited use of collected data	Responses may be slow and less targeted.
Poor intersectoral coordination	Unclear roles between health, local government, education and waste management sectors	Breeding site control becomes fragmented.
Limited enforcement authority	Slow legal procedures and weak penalties	Warnings may not lead to sustained behaviour change.
Awareness action gap	Community knowledge does not always translate into routine practice	Continuous engagement is needed rather than short term campaigns.
Training gaps	Unequal and sometimes outdated training across staff groups	Workforce capacity remains uneven.
Underuse of technology	Limited use of mapping, electronic reporting and surveillance tools	Digital systems do not fully support decision making.
Recommendations from officials	More staff, better funding, training, supervision and local task forces	Governance support is necessary for sustainable implementation.

categories, especially field workers and newly appointed staff. National policy targets should be communicated clearly across every level of the workforce. Field level decision making should be supported through timely resources, transport, supervision and practical digital surveillance tools. Stronger intersectoral agreements with clear accountability are also needed so that waste management, drainage, school based activities and community mobilization are not treated as the responsibility of the health sector alone.

Conclusion

This study demonstrates a clear gap between dengue prevention policy and field level implementation in Sri Lanka. Although many health officials showed moderately positive attitudes, knowledge of national policy targets was limited and reported prevention practices were weak. Significant differences across professional categories indicate unequal access to training, resources and institutional support. Qualitative findings further showed that dengue prevention is constrained by staff shortages, resource limitations, funding delays, weak intersectoral coordination, limited enforcement authority, training gaps, and underuse of digital surveillance tools. These findings highlight dengue prevention as not only a technical public health issue but also an ethical and equity concern. The study contributes by showing that the performance of the dengue prevention workforce depends strongly on governance and system support, not only on the motivation of individual staff members. It also demonstrates the wider social impact of prevention failures, including reduced public trust, increased fear and stress, and greater vulnerability among disadvantaged communities. Strengthening regular role specific training, improving communication of national targets, supporting field level decision making, enhancing intersectoral accountability and investing in practical surveillance systems are essential. Such improvements can reduce dengue burden, protect vulnerable communities and strengthen public trust in health institutions.

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