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Integrated Management Strategy for Dengue Prevention and Control in Deprived Community, Karachi, Pakistan

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Article Details ABSTRACT

Keywords: Dengue Control, Community Health, Integrated Strategy, Public Health Intervention

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Background: Dengue is a persistent public health threat in underserved communities, where limited infrastructure, poor sanitation, and low health literacy contribute to recurring outbreaks. **Objective:** This paper outlines an integrated management strategy for dengue prevention and control tailored to deprived community, focusing on sustainable and community driven approaches. **Methods:** The strategy combines community-based vector control, environmental management, health education, and strengthened primary healthcare services. It emphasizes local participation, inter-sectorial collaboration, and low-cost interventions such as eliminating mosquito breeding sites, improving water and waste management, and promoting early case detection. **Conclusion:** By aligning evidence-based practices with active community engagement, this model aims to reduce dengue transmission, strengthen local health systems, and create lasting improvements in public health outcomes.

INTRODUCTION

The Public Health Emergency Operations Center (PH-EOC), **together with the** Incident Management System (IMS**),** provides a structured framework **for** intersectional coordination and collaboration aimed at improving outbreak response efforts and enhancing the management of public health threats. Dengue fever **(DF)** has emerged as a significant public health concern, with the potential to escalate into a major community health crisis if not effectively controlled. Strengthening surveillance, preparedness, and coordinated response mechanisms is therefore critical to mitigating the impact of dengue outbreaks (1). The IMS for Dengue Prevention and Control updates the methodological working model that the countries have been deploying and strengthening over the last 10 years, to prevent and organize national responses to outbreaks, epidemics, and inter-epidemic periods. IMS-Dengue is also the result of the experience acquired and the lessons learned since IMS-Dengue was first deployed in 2003 and draws on the best practices developed by the countries. Its purpose is to contribute to a reduction of the social and economic burden caused by dengue in the Pakistan. The foundations of this material are the various technical documents, strategies, action plans, and resolutions adopted by the countries, both globally and regionally/sub-regionally.

Globally, the most substantial and one of widespread viral diseases is dengue fever. It is a viral infection (mosquito-borne**)** that has rapidly spread across tropical and subtropical regions worldwide. The disease is primarily transmitted by **"***female Aedes aegypti mosquitoes***"**, with "*Aedes albopictus***"** serving as a secondary vector. Both mosquito species are also responsible for transmitting other viral infections, including **"**chikungunya, yellow fever, and Zika virus**"** (2). Dengue fever are a rapidly expanding febrile disease throughout the world. Not only has its prevalence increased considerably in endemic regions, but it is spreading into areas where the viruses responsible for the disease did not previously exist. It is a major public health problem for most tropical and subtropical cities. The frequency of dengue has risen intensely everywhere in the world in recent decades. A huge mainstream of circumstances are asymptomatic or minor and self-managed, and hence forth the definite records of dengue incidents are under-reported. Numerous cases are correspondingly misdiagnosed as further fever dailments (3).

Pakistan is grappling with a wide range of public health challenges, both infectious and non-communicable. **Tuberculosis (TB)** remains one of the country's leading infectious diseases, driven by overcrowding, poverty, and gaps in early detection(4). Among these, **dengue fever** stands out as a recurring vector-borne epidemic, placing seasonal strain on healthcare systems and underscoring the urgent need for vigorous prevention and management efforts.

Diabetes Mellitus (DM) is on the rise, fueled by lifestyle changes, urbanization, and limited access to preventive care (5). **Hepatitis**, particularly hepatitis B and C, affects millions, largely due to unsafe medical practices and inadequate screening programs (6). It is predictable that 40% of the world's population exists in areas at threat of pollution, and that about 390 Million infections and 20,000 demises be fall every year in more than 125 endemic nations. The 30 countries with the upper most described frequency of dengue (7). As of December 05, 2019, A total of 52,877 definite Dengue circumstances were informed from all across Pakistan with extreme cases conveyed from Rawalpindi and Islamabad collectively i.e. 20,988 (40%), surveyed by Karachi 14,768 (28%), and Peshawar 2,699 (5%), though AJK reported 1,690 (3%). A entire of 92 deaths occurred all across Pakistan, out of which 43 (47%) happened in Karachi, 23 (25%) in Rawalpindi, and 22 (24%) in Islamabad (8).

Meanwhile 2010, Pakistan has been plagued by annual dengue epidemics that highest in post-monsoon period. Not with standing monitor determinations effectuated in cooperation by WHO, 47,120 cases of dengue were inveterate in 2019 (9). **Mental health disorders** are widespread yet underdiagnosed, with conditions like **postpartum depression** often going untreated because of stigma and limited services (10). **Polycystic Ovary Syndrome (PCOS)** is an increasingly recognized reproductive health issue among women, contributing to infertility and metabolic complications (11). The transmission rate of vector borne diseases is likewise extraordinary in the middle of immigrants. Micro and macro level studies have been accompanied in Pakistan that determines the link among dengue transmission in inner-city atmospheres by social and environment

influences in four diverse cities of Pakistan i.e., Islamabad, Rawalpindi, Lahore, and Karachi for the period of 2009–2018. The main issues accountable for dengue epidemics in Pakistan are advantageous environments, unit ended expansion, public development, converting and numerous socioeconomic aspect etc. (12). The effectiveness of a community-based intervention for dengue vector control was evaluated in the deprived community. The locality has a Catholic church and missionary schools in this area. The population of the selected deprived community is estimated to be over fifty thousand.

Given this void, the aim of our study was to assess the level of knowledge about dengue, its spread, symptoms and prevention among the population of poor community situated in Karachi, a city worst hit by dengue outbreaks in recent times. Authors were also keen to find out the level of awareness regarding the preventive measures against dengue fever. It also ensures that people have appropriate knowledge and behavior to protect their own health. Paucity of knowledge and practice surveys necessitated the conduction of this survey to find out the baseline data which will assist in identifying the population at risk, especially in relation to their socio-demographic profiles and it can direct the policy makers to develop appropriate strategies to target the health education campaign to those who need it the most.

SIGNIFICANCE OF PROBLEM

Dengue virus has speedily blown out hooked on novel humanoid silent showing to social mobile and fluctuating aptness for the mosquito vector, producing critical feverish disorder and substantial death. There is no precise management for dengue/severe dengue. Initial recognition of disease progression related with serious dengue, and contact to appropriate medical care drops casualty rates of severe dengue to below 1%. Accurate predictive models identifying changing vulnerability to dengue outbreaks are necessary for epidemic preparedness and containment of the virus. There is a dire need to make efforts to preclude the dengue infection which is possible only if the policy makers and government take an initiative. Numerous policies to control the vectors consuming biological and/or ecological and chemical methods should be planned. Furthermore, the significance of instructing the individuals and mindfulness promotions cannot be ignored (13).

METHODOLOGY

The IMS-Dengue tool was employed as a methodological framework to strengthen dengue prevention and control initiatives in underserved communities. This approach emphasizes addressing the social and environmental determinants of dengue transmission, such as poverty, inadequate health infrastructure, uncontrolled migration, poor housing conditions, and lack of basic sanitation. The methodology was informed by a review of dengue control practices over the past decade and insights gathered during face-to-face consultations, community assessments, and priority-setting workshops. The project was conducted in an underserved community in Karachi, Pakistan, characterized by severe socioeconomic and environmental challenges. The area experiences frequent overcrowding, power outages, and poor sewage facilities, contributing to a high prevalence of communicable diseases, including malaria, cholera, and dengue. The absence of a proper waste disposal system has led to unhygienic living conditions, with garbage frequently discarded in open streets. While water supply was available, most households consumed unsafe water, increasing the risk of waterborne infections. Residents accessed basic food and household items from local merchants, often traveling on foot. Unemployment was widespread, and malnutrition and low immunity were common, leaving the population highly vulnerable to infectious diseases. Although primary, secondary, and tertiary healthcare facilities were located nearby, utilization was limited due to low health literacy and a lack of community-level awareness.

Community health services in the area were primarily focused on maternal and child health, with minimal dengue-specific education or intervention. On average, 3–5 dengue cases were reported monthly in this community. To address this, multiple outreach strategies were employed, including community awareness

sessions and educational activities that engaged approximately 250 residents. Post-intervention evaluations were conducted to assess the effectiveness of these activities and to measure changes in knowledge and awareness regarding dengue prevention.

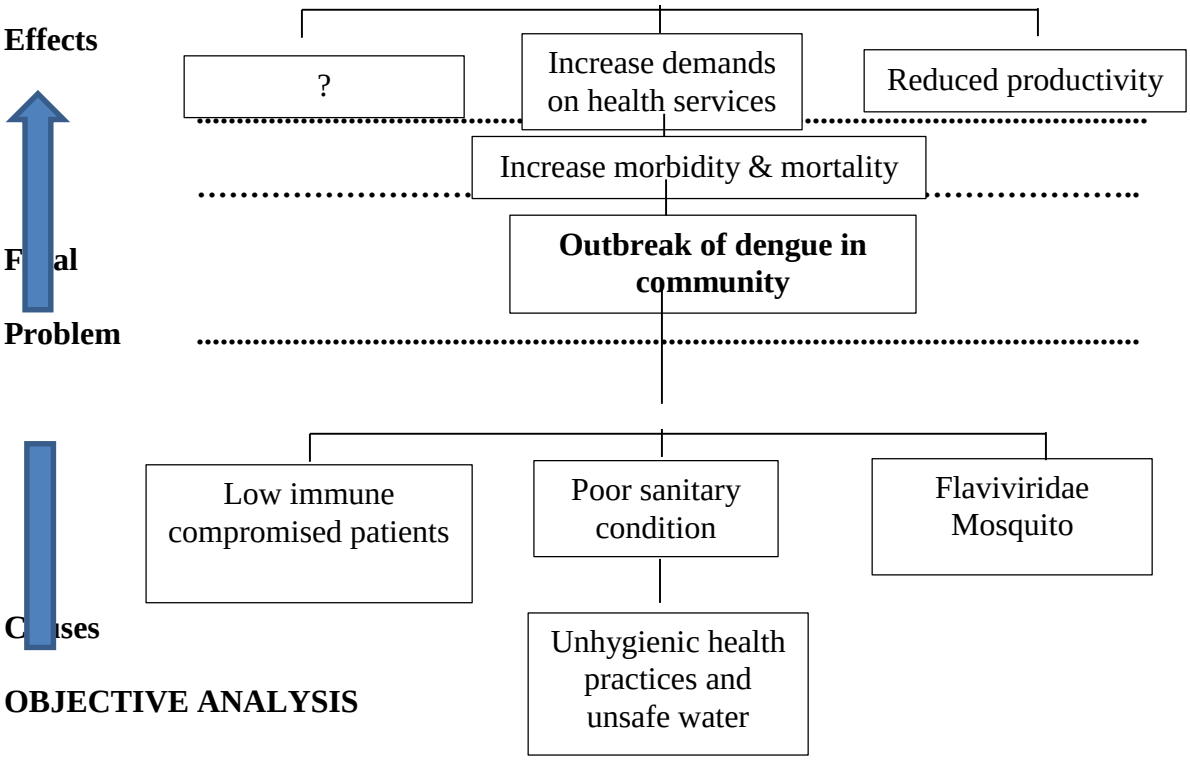
NEED ASSESSMENT OF THE COMMUNITY

The publics existing in deprived settings. Services were not accessible as government was not assisted in health subdivision. Public places prerequisite preparedness about their healthy standard of living, through which they can develop their health and avert from diseases. So, awareness were provided to the community people including controlling dengue fever as the cases were increasing.

GOAL OF THE PROJECT

To reduce the dengue case fatality rate by at least 30% within two years.

Figure 1: Problem Tree Analysis of Dengue Fever in



OBJECTIVE ANALYSIS

1. To enhance the capacity for the detection and management of all denguecases in a specific community.
2. To strengthen epidemiological surveillance systems and implement.
3. To prevent the community for new cases of dengue fever and preserves their lives.
4. To improve their environmental sanitation, and unhealthy lifestyle.

Table 1: Logical Framework Matrix for Dengue Fever prevention and Control Strategy

	OBJECTIVES	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
GOAL	To reduce the impact of climate change and			

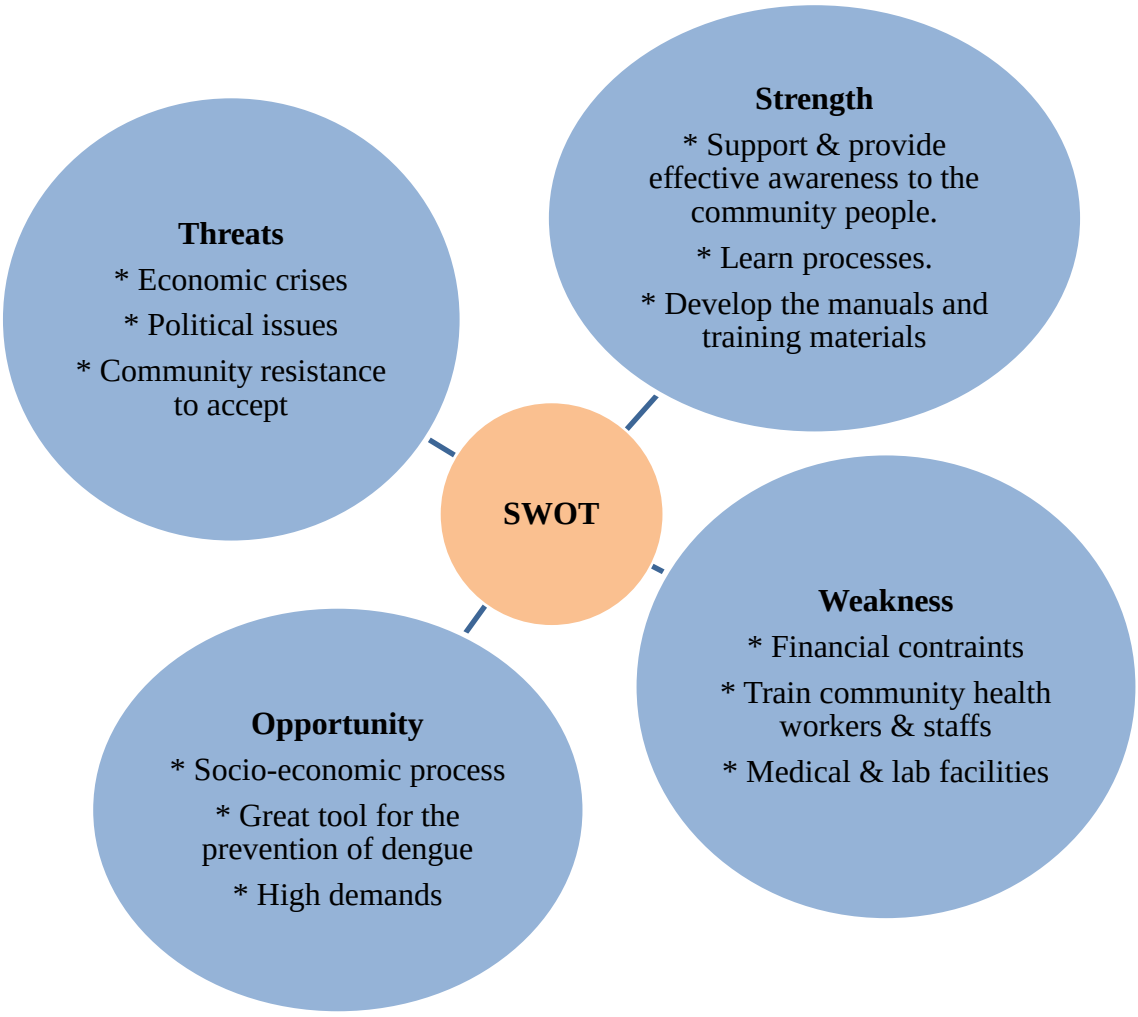
	environment in health issue through raising awareness of the community on dengue prevention activities.			
OUTCOME	1. The implementation will reduce the dengue fever from the community. 2. It will strengthen the dengue preventive measures.	• Dengue prevalence in selected vulnerable community is decreased by the end of 2021. • At least 75% of dengue fever mitigation projects implemented by Master's students and the implementation are evaluated as successful in preventing or reducing the spread of dengue fever by the end of 2021.	• Assess the rate of dengue fever. • Ensure the policy of dengue preventive measure must be follow for the community benefits.	• Community participates for the dengue preventive sessions. • Adequate supports from health and local authorities in community-based dengue prevention and control.
OUTPUT	1. The master students are provided with knowledge and skills on dengue prevention and clean environment by the help of community health workers. 2. Response system for dengue outbreak is established. 3. Capacity of community to implement dengue prevention measures is strengthening.	• About 20 staff and volunteers are active in dengue prevention and control. • Manuals and guidelines for staff and volunteers on dengue prevention developed. • Data are developed and update • A contingency plan is created. • No. of interpersonal health education sessions conducted.	• Training reports • Copy of manuals • Project progress reports • Survey results.	
ACTIVITIES	1. Update emergency health strategy. 2. Develop and finalize manual on dengue prevention for community. 3. Organize teaching session. 4. Organize training course for community and volunteers in community. 5. Organize regular coordination meeting. 6. Organize community environmental events. 7. Conduct public camps on awareness rising on dengue fever prevention. 8. Educate to use mosquito nets. 9. Distribute posters and leaflets.	RESOURCES • Printing of trainings manuals. • Training materials. • Accommodation • Transportation • Training and meeting venue. • Incentives for volunteers. • Mosquito nets. • Environmental cleaning tool kits.		

IMPLEMENTATION OF PROJECT

Dengue case management: to improve diagnostic methods, evidence-based community management criteria, and evaluate the new clinical classification of dengue (WHO, 2009).
Vector control: to conceive new strategies for vector control, improve knowledge on how to provide services through integrated approaches (ecological, biological, social, etc.), and innovate on research activities by obtaining support from corporations and social initiatives to enable development of prevention against dengue.
Outbreak detection and response: to find new ways of compiling scientific data for the detection of warning signs that indicate the emergence of outbreaks and develop indicators and conditions for their detection.

EVALUATION PROCESS

The evaluation of the underserved community by the interactive session, all the residents were participated in all activities and training program with their full interest followed by written feedback from them.
Figure 2: SWOT Analysis for Dengue Fever Prevention



SWOT analysis (Figure 2) is strategic planning tool that helps a community to determine the ways which assisted in achieving its objectives, and identify the obstacles that must overcome or minimize to achieve desired results. According to SWOT analysis for dengue fever program, strengths, weaknesses, opportunities and threats were identified. With the help of SWOT analysis, the internal factors of strengths and weakness

within the community and the external factors of opportunities and threats to the system were examined.

PUBLIC HEALTH NURSE'S ROLE IN PROJECT PLANNING AND EXECUTION

Public health nurses played a pivotal role in planning and implementing the dengue prevention project, serving as a link between the community and healthcare systems (14). They conducted health education sessions, promoted preventive practices, and engaged residents in environmental management activities (15). Their involvement in surveillance and data collection supported evidence-based decision-making and timely response measures. By fostering trust within the community, public health nurses enhanced participation, improved awareness, and strengthened the overall impact of the intervention (16).

CONCLUSION

The Logical Framework Analysis (LFA) approach proved to be an effective tool for planning, implementing, and evaluating dengue prevention and control initiatives. Through this structured framework, clear objectives were established, measurable indicators were defined, and targeted interventions were implemented within the community. The project successfully increased community awareness of dengue prevention practices, strengthened coordination among health authorities, and highlighted critical gaps in sanitation, infrastructure, and health literacy that contribute to ongoing transmission risks. Engaging the community, local government, and other stakeholders was essential in addressing social and political barriers to effective vector control. This project demonstrates that a systematic, participatory planning process—supported by tools such as LFA and the Incident Management System (IMS) can enhance preparedness and improve outbreak response capacity. Continued investment in health education, environmental management, and intersectional collaboration is vital to sustaining progress and reducing dengue incidence in vulnerable communities.

RECOMMENDATIONS

Strengthen Community Awareness

Implement regular health education campaigns to promote dengue prevention practices and environmental cleanliness.

Improve Disease Surveillance

Enhance reporting systems and early detection mechanisms to ensure timely outbreak response.

Foster Intersectional Collaboration

Coordinate efforts between health authorities, local government, and community organizations for sustainable vector control.

Empower Public Health Nurses

Provide training and resources to enable nurses to lead community engagement and prevention initiatives effectively.

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