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## Role of Public Health Campaigns in Controlling Dengue Fever in Pakistan: A Case Study of Faisalabad

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**ABSTRACT**

Dengue fever is still among the topical issues of the vector-borne public health in Pakistan, and the city of Faisalabad turns out to be a new epicenter of outbreaks. This paper explores the impact of community based dengue fever control in Faisalabad and discusses the role played by dengue fever awareness campaigns, community mobilization efforts, vector control programs and government lead interventions on disease control between 2015 and 2024. They were able to use a quantitative survey approach to sample 250 respondents who represented different residential and demographic backgrounds in Faisalabad. Measured knowledge, attitudes and practices (KAP) regarding dengue prevention and the exposure and perceived effectiveness of public health campaigns in the respondents was measured by using structured questionnaires. Preventive health behaviors were associated with campaign exposure through the use of descriptive statistics, frequency distributions, chi-square tests, and regression analysis. Results show that those communities who were exposed to sustained and multi-channel health campaigns had higher knowledge levels regarding dengue transmission, more uptake of the practices of controlling vectors including eradication of stagnant water and the use of mosquito nets, and also improved health-seeking behavior. But major gaps still exist in rural and peri urban regions where campaign coverage is still paltry. The research concludes that a significant role of public health campaigns in the control of dengue has been established in Faisalabad even though its effect has been limited by inconsistencies in implementations, lack of follow-up and engagement. Some suggestions are made to improve campaign design, inter-agency responses, and grassroots health communications to improve dengue control in Pakistan.

**Keywords:** dengue fever, community health campaigns, Faisalabad, Pakistan, control of vectors, knowledge attitudes and practices, disease prevention, health communication, community mobilization, mosquito control.

## INTRODUCTION

Dengue fever is a rapidly spreading infectious disease caused by the dengue virus (DENV) and spread mainly by the Aedes aegypti mosquito and is estimated by the World Health Organization (WHO) that about 390 million cases of dengue infections are occurring per year (WHO, 2023). Urbanization, climate variability, poor sanitation, and lack of proper infrastructure in the surveillance of vectors have contributed to the increased burden of dengue in South Asia over the past decades. Pakistan is a nation with more than 220 million individuals, which is going through a nervous spiral of dengue outbreaks since the first years of the last century (Fatima et al., 2021).

The industrial hub of the country and the third-largest city of Pakistan, Faisalabad, has become a particularly susceptible city of dengue transmission. The high population density, the growing informal settlements, and the industrial drainage systems provide the perfect breeding ground to the Aedes mosquitoes (Ahmad et al., 2020). Repeat infections with outbreaks year after year have overloaded resources in the form of public health, saturated hospital capacities, and added to high morbidity and economic losses. In 2011-2023, thousands of dengue cases were confirmed in Faisalabad, and the

mortality rates signified the intensity of high years (Punjab Health Department, 2022).

The absence of a universally available dengue vaccine makes public health campaigns the most important element of preventative strategy. The activities of these campaigns have a wide range of interventions, such as community awareness campaign, operations of vector surveillance and control, school-based educational programs, media campaigns, and inter-sectoral coordination between health, municipal, and environmental authorities (Gubler, 2011). Governmental and non-governmental actors in Pakistan have initiated several waves of such campaigns in the country, especially following the cases of outbreaks but long term effectiveness and their community penetrations are still under-researched (Javed et al., 2020).

The current body of literature about dengue prevention in Pakistan indicates the importance of knowledge-action gap: the communities in the country usually have a minimum amount of knowledge about dengue transmission but ultimately cannot convert this knowledge into regular preventive action (Khan et al., 2019). This gap identifies structural constraints in terms of the way campaigns are planned, executed, and maintained. According to the health communication theory, behavior change must involve information delivery and attitudinal change, perceived self-efficacy, social norms, and enabling environments, which most campaign appraisal in Pakistan have not captured (Nutbeam, 2000; Bandura, 1986).

The study fills in a major gap of the body of research by critically assessing the purpose and efficiency of dengue fever public health campaigns in Faisalabad. The study uses primary survey data of 250 residents to examine the degree to which exposure to health campaigns is linked to better knowledge, attitudes and preventive practices. It also reviews obstacles that can hinder the campaign effectiveness such as the socioeconomic status, educational attainment, gender and geographic location in the city (Bhatt et al., 2013).

The paper is presented in the context of the discussion of the role of urban health governance in low- and middle-income countries (LMICs), where the issues of developing long-term, community-driven disease prevention strategies are the most acute (Roth et al., 2018). The experience of Faisalabad can be used to provide insights that can be generalized to other Pakistani cities and other similar urban settings across South and Southeast Asia, where dengue burden is also highly concentrated in the rapidly growing urban centers (Messina et al., 2019).

The importance of the study can be explained by the fact that Pakistan is still prone to dengue, especially during post-monsoon period between September and November. Although annual anti-dengue mobilisation of anti-dengue squads and government announcements of dengue emergencies, little systematic assessment of campaign results has been done. This has meant that policy makers have not had empirical evidence to inform their investments in particular campaign modalities or which segments of the population are underserved and to be targeted by the campaign (Hadinegoro et al., 2015).

The paper will follow the following sequential: Section 2 entails a thorough literature review of the available literature on the epidemiology of dengue, the effectiveness of public health campaigns, and health communication models. Section 3 provides a description of the methodology such as sampling design, data collection instruments, and methods of analysis. Section 4 reports about the conclusions of the quantitative analysis, descriptive and inferential statistics, which are backed by tabular data. Section 5 makes a discussion on the implications of the findings against the existing literature and local context. Section 6 gives the conclusion and policy and practice recommendations.

Finally, the current research would add to the literature regarding the importance of health promotion in the control of the emerging diseases transferred by vectors, and offer a regionalized empirical base in enhancing dengue prevention governance in Pakistan. The behavioral science, public health infrastructure, and community participation intersection are the analytical tool that is used to evaluate and measure the effectiveness of the Faisalabad anti-dengue campaigns (Simmons et al., 2012; Murtaza et al., 2020).

## LITERATURE REVIEW
### Global Dengue Burden and the Prevention role

The dengue fever has no longer been a local and tropical disease, but transformed into a worldwide epidemic health issue with over 100 nations reporting its endemic transmission (Brady et al., 2012). WHO estimates that half of the global population is at risk, and the number of dengue cases has grown thirty-fold over the last five decades and is mostly due to urbanization, movement of the population, poor water storage habits, and the warming of the climate increasing the geographic range of the Aedes mosquitoes (Bhatt et al., 2013). Without a universally implementable therapeutic or vaccine, the most important dengue preventive and control tool is public health campaigns aimed at controlling the vectors and altering the behavior of people.

The behavioral change models are the theoretical basis of the dengue prevention campaigns. The Health Belief Model (HBM) is a theory that people tend to become more active in practicing preventive health when they perceive themselves as vulnerable to some disease, its severity, and they have the belief that the action proposed to them is worthwhile and possible (Rosenstock, 1974). Research using the HBM to determine the association between perceived susceptibility and preventive practice adoption in Indonesia, Thailand, and Brazil has found moderate

to strong correlations between perceived susceptibility and preventive practice adoption, indicating that campaigns based on personal risk may increase the behavioral adherence (Syed et al., 2010; Hadinegoro et al., 2015).

**Dengue epidemiology in Pakistan**

Pakistan is a country where the burden of dengue has radically increased since the 2011 outbreak in Lahore that caused more than 21,000 confirmed cases and became a watershed moment in handling dengue in the country (Fatima et al., 2021). This has since been followed by the annual outbreaks with varying severity in the big cities such as Karachi, Rawalpindi, Islamabad, and Faisalabad. Epidemiology shows that the dengue burden in Pakistan is most often caused by urbanization, seasonality in the monsoon season, and inadequate infrastructures in the public health system (Ahmad et al., 2020). The province of Punjab, where Faisalabad is situated, has always recorded most of the dengue cases in the country, owing to high level of urban population and intensive agricultural land-use which forms water retention.

In Pakistan, climatic factors are of great essence in the dynamics of transmission of dengue. Climate change and increased temperatures along with changes in the patterns of precipitation have also increased the breeding seasons of mosquitoes, which have also led to the out-of-season incidences of dengue transmission (Murtaza et al., 2020). Khan et al. (2019) have developed a significant positive relationship between the average monthly temperature and the incidence of dengue cases in Punjab, which highlights the necessity of climate-sensitive responses to the issue of public health. All dengue serotypes have been identified in Pakistan: DENV-1 to DENV-4 with DENV-2 and DENV-3 serotypes as the most recent, leading to high-risk situations of severe cases of dengue in previously infected populations.

**Knowledge, Attitudes, and Practices of Dengue**

A large literature has used the KAP (Knowledge, Attitudes, and Practices) frameworks to evaluate community preparedness against dengue prevention. The systematic reviews of KAP studies carried out in the Asian region have repeatedly shown that the level of knowledge regarding the ways of transmission of the dengue disease is rather high, whereas the level of knowledge on the symptoms, complications, and personal protective measures is rather variable and dependant on the situation (Syed et al., 2010). Attitudinal deficits such as fatalism, distrust of health authorities and perceived low susceptibility are often mediators of the knowledge-behavior gap especially in low income urban communities.

Itrat et al. (2008) conducted a study on Pakistani studies and discovered that although 84 percent of the sampled households in Karachi were aware of dengue fever, less than 40 percent were able to identify breeding and severe dengue symptomatic sites accurately. Similar results have been preceded in Faisalabad where community-based KAP surveys identified severe gaps in practice-level adherence to preventive measures, although there is a good level of awareness about the disease (Ahmad et al., 2020). The results indicate that the awareness programs cannot be accomplished without behavioral skills-development and environmental change.

**Strategies in Public Health Campaign to control Dengue**

The most evidence-based strategy of dengue prevention is the use of vectors control campaigns directed at eliminating the breeding sites of Aedes aegypti. The WHO-approved approach of Integrated Vector Management (IVM) involves the combination of biological, environmental, and chemical control techniques with the actions of the community and legislations (Gubler, 2011). Community-based campaigns of source reduction organized around mobilizing communities to remove stagnant water in domestic containers have shown significant decreases in the Aedes larval index in Malaysia, Sri Lanka, and Cuba (Simmons et al., 2012). The effectiveness of these effects however relies on the frequency and intensity of community involvement in a critical manner.

Health campaigns carried out by means of media have been massively applied in the dengue-infested countries with mixed effectiveness. Radio, television and newspaper campaigns have proven ability to raise the dengue knowledge among population at short intervals, however, the ability to achieve long-term behavioral modification has been inconsistent (Nutbeam, 2000). New literature on the topic of digital health communication identifies the possibilities with social media platforms to spread the message about dengue prevention quickly, especially in young urban populations (Roth et al., 2018). Pakistan has a mobile phone penetration of more than 70% that consists of an untapped channel of targeted health messaging, especially through SMS based interventions.

**Pakistan government Dengue Control Programs**

The Government of Pakistan has taken a set of national and provincial dengue control measures such as the National Dengue Action Plan and The Anti-Dengue Campaign of Punjab which was launched in response to the outbreak in 2011. Such programs have included rapid response teams, school surveillance programs, municipal fumigation, and media outreach (Punjab Health Department, 2022). It has been attributed that the implementation of dengue surveillance officers and tiger mosquito squad operations in the year Faisalabad has helped in the reduction of cases in the years when there is a high activity of cases being undertaken annually, though the gains have been found to be hard to maintain in the successive years.

In Pakistan, inter agency coordination has been determined as a key factor that decides the success of a campaign. The Departments of Health, Local

Government, Education, and Environment and municipal and district governments have to work together to control dengue successfully. Research into the response that the Pakistan institutionally has given to the dengue emergence has emphasized the lack of coordination, mostly between federal and provincial levels of government, as a significant structural challenge to the effectiveness of sustained campaigns (Hadinegoro et al., 2015; Murtaza et al., 2020).

**Community Inclusion and Health Communication**
The importance of community involvement in disease prevention campaigns is the focus of the critically important theory of the field of public health. According to Freire, and the modelling of community based participatory research (CBPR) that followed after, sustainable health behavior change is realized when communities become active co-designers of health interventions and no longer passive receivers of information (Bandura, 1986). When used to control dengue, participatory interventions involving the involvement of community leaders, female groups, schoolteachers, and local health workers have shown better results than top-down campaigns in Venezuela, Vietnam, and India (Brady et al., 2012).

In Pakistan, the Pakistani community health behaviors have a great role played by the religious and community leaders who are the imams, school principals and members of the local councils, but have not been utilized as health communication partners. Faizi et al. (2017) also reported that dengue awareness messages in mosques in Lahore created significant statistically significant changes in preventive measures at a community level, compared to conventional government messages, showing the possibility of culturally integrated communication approaches. Gender also influences the campaign coverage with women often being the major caregivers of house dengue prevention efforts but they are not adequately represented in the formal campaign delivery arrangements.

**Gaps in Existing Research**
Although the literature on dengue in Pakistan is on the increase, there is still a lot of evidence gaps. Most of the current Pakistani research involves cross-sectional KAP surveys in Lahore or Karachi, and little focus on the secondary cities such as Faisalabad where the epidemiological and socioeconomic surrounding may vary in a significant way (Messina et al., 2019). There are few longitudinal studies of the effectiveness of campaigns, and it is hard to determine whether the knowledge and practice improvements that are noted are maintained. Moreover, the Pakistani literature is practically silent on the cost-effectiveness of various campaign modalities, which limits the evidence-based allocation of resources to the health authorities. The research addresses these gaps directly by offering empirical and campaign-specific evidence on the

campaign efficacy and locating structural determinants of campaign reach and impact in Faisalabad.

**METHODOLOGY**
**Research Design**
In this paper, the authors have used quantitative and cross sectional survey design to evaluate the effectiveness of public health campaigns in managing the dengue fever in Faisalabad, Pakistan. The choice of a cross-sectional design was made due to the possibility to gather exposure (campaign awareness and engagement) and outcome (knowledge, attitudes, and preventive practices) data over a varied population of the sample over a specific time period. This design is very popular in community health studies due to its effectiveness, affordability, and its ability to produce population-wide approximations (Creswell, 2014).

**Study Setting**
This research was done in Faisalabad in Punjab Province, Pakistan. The third most populated city in Pakistan is Faisalabad with an approximated population of above 3.6 million. The rationale behind choosing the city as the study site is because it has been affected by the recurrent outbreaks of dengue with the government taking strong steps through anti-dengue programs; moreover, the city is representative of medium-to-large urban centers in Pakistan with mixed land use patterns of residential, commercial, and industrial activities.

**Sample Size and Sampling method**
The sample of 250 respondents was calculated in accordance with a proportional sampling formula presented by Yamane (1967) which gives a statistically sufficient size of a sample of such a population as Faisalabad, the levels of confidence (95 percent) and the margin of error (+-6.2 percent). Multi-stage stratified random sampling method was used. The city was first stratified into four geographic areas (North, South, East and West) in the first stage with distributions of sample proportions depending on population density estimates. In the second phase, sampling of respondents was done systematically by random selection of respondents among household lists maintained by Urban Unit Punjab. The participants were restricted to adult inhabitants (18 years and over) who have resided in Faisalabad not less than one year.

**Data Collection Instrument**
The main data collection tool was a developed structured questionnaire. The questionnaire was prepared in English language but translated into Urdu, which is the local language so that all levels of education people can understand it. The instrument had five parts namely: (1) sociodemographic profile of the respondent; (2) exposure to public health campaigns (media, school, community, health workers); (3) knowledge about dengue transmission, symptoms, and prevention; (4) attitudes towards

dengue and public health campaigns; and (5) self-reported preventive practices. The knowledge items were rated using a binary correct/incorrect scale with the attitude and practice items being rated using a five-point Likert scale. The questionnaire was tested among 25 respondents not represented in the final sample and the alpha value of Cronbach was found to be above 0.78 which was good evidence of internal reliability.

## Data Collection Procedure

The process of data collection took place in eight weeks between October and November 2024 when the season of dengue peaks due to the post monsoon in Faisalabad. The questionnaires were conducted by trained research enumerators who used face-to-face interview at the household of the respondents. The duration of every interview was about 20-25 minutes. The voluntary informed consent of all the participants was obtained verbally, and they were assured that their answers would be used within the framework of research and will not be disclosed to any third parties.

## Data Analysis

Data collected were then keyed in SPSS version 26 and analyzed. All the variables were subject to the computation of descriptive statistics such as frequencies, percentages, means, and standard deviations. Associations of categorical variables, especially between demographic characteristics and levels of campaign exposure and preventive practice, were determined by chi-square tests of independence. The binary logistic regression analysis was conducted to determine the predictors of a sufficient level of knowledge and good preventive practice

whereby campaign exposure, level of education, gender, and age were used as the independent variables. The level of statistical significance was established at 0.05 during analysis.

## Ethical Considerations

The study had been ethically approved by the Institutional Review Board of the associated academic institution. The research complied with the standards stipulated in the Declaration of Helsinki, whereby the research was voluntary, all data were kept confidential, and the participant was not subjected to withdrawal. There was no collected identity information on the questionnaire forms, with all the data being stored on a secure password-enabled server that was only accessible to the research members.

## DATA ANALYSIS AND RESULTS

### Sociodemographic Characteristics of the Respondents

The total number of questionnaires was 250 which were all returned with the response rate being 100 percent. The sociodemographic variables of the respondents are provided as in table 1. The sample included 148 male respondents (59.2) and 102 female respondents (40.8) responding to the sample, and this is the gender equilibrium in terms of participation of people in Faisalabad residential areas. Most of the respondents (38.4%) were aged between 26-35 years and the mean sample age was 32.7 years (SD = 9.4). Educational levels were also very diverse with 28.8% having completed matriculation, 34.0% had reached an intermediate or diploma level, 24.0% having a bachelors degree, and 13.2% having no formal education or primary level schooling.

**Table 1: Sociodemographic Profile of Respondents (N=250)**

| Variable | Category | Frequency | Percentage (%) |
|---|---|---|---|
| Gender | Male | 148 | 59.2 |
| | Female | 102 | 40.8 |
| Age Group | 18–25 years | 58 | 23.2 |
| | 26–35 years | 96 | 38.4 |
| | 36–45 years | 62 | 24.8 |
| | 46+ years | 34 | 13.6 |
| Education | No formal / Primary | 33 | 13.2 |
| | Matriculation | 72 | 28.8 |
| | Intermediate/Diploma | 85 | 34.0 |
| | Bachelor's or above | 60 | 24.0 |
| Residential Zone | North Faisalabad | 64 | 25.6 |
| | South Faisalabad | 63 | 25.2 |
| | East Faisalabad | 62 | 24.8 |
| | West Faisalabad | 61 | 24.4 |
| Monthly Income | Below PKR 30,000 | 78 | 31.2 |
| | PKR 30,001–60,000 | 102 | 40.8 |
| | PKR 60,001–100,000 | 52 | 20.8 |
| | Above PKR 100,000 | 18 | 7.2 |

## Exposure to Public Health Campaigns

The respondents were questioned about their exposure to the anti-dengue public health messages through five channels namely: television, radio, print media, social media and community/health worker

outreach. As illustrated in Table 2, television was the most common source of dengue health information, which was reported by 74.0 percent of the respondents, and social media and visits to community health workers were ranked as 61.6 and

54.0 percent respectively. Lower percentage (38.4) reported radio exposure and 43.2 percent was reported to have tried the print media (newspaper/pamphlets). It is worth noting that respondents were asked to respond to whether they attended any community-level dengue awareness campaign, including a health walk, school campaign, or mosque announcement and only 41.6% stated that they did. All in all, 68.4 percent of the respondents stated that they were exposed to three or more of the five campaign channels with 11.6 percent indicating that they were exposed to one or no one of the channels, which means that campaign penetration was significant although with a skewed distribution among the population.

**Table 2: Respondents' Exposure to Dengue Public Health Campaign Channels (N=250)**

| Campaign Channel | Exposed (n) | Not Exposed (n) | Exposure Rate (%) |
|---|---|---|---|
| Television | 185 | 65 | 74.0 |
| Social Media (Facebook/WhatsApp/Twitter) | 154 | 96 | 61.6 |
| Community Health Worker Visit | 135 | 115 | 54.0 |
| Print Media (Newspaper/Pamphlets) | 108 | 142 | 43.2 |
| Radio | 96 | 154 | 38.4 |
| Community Event (Health Walk / Mosque / School) | 104 | 146 | 41.6 |

**Knowledge About Dengue Fever**

The ten items that were used to measure knowledge were on transmission, symptoms, breeding sites, and prevention. The respondents who scored 7 and above were considered to have adequate knowledge. The findings showed that 62.4% (n=156) of the respondents were knowledgeable enough. Perception on the transmission of dengue through mosquito bites was almost universal (94.8%), and majority of the respondents were accurate on the symptoms of fever (88.4%). Nevertheless, the lack of knowledge was observed in more specific fields: only 48.4% of the respondents correctly identified platelet count reduction as a severe complication, and only 52.0% were able to name at least three types of domestic water containers as possible breeding sites. The adequate knowledge rates were significantly greater in respondents who were exposed to three or more campaign channels (76.3) than in respondents who were exposed to one or no campaign channels (34.5%), a result that was statistically confirmed using chi-square analysis (kh2=28.4, df=1, p<0.001).

**Prevention and Campaigns of Dengue Attitudes**

The attitudinal responses were mostly positive, 78.4% of all respondents felt that dengue is a major problem of community health in Faisalabad and 71.6% concurred that individual behavior is playing a significant role in prevention of dengue. Nonetheless, there was a high level of skepticism / fatalism: 38.0% believed the statement that dengue is unavoidable despite individual measures, and 29.2% was not very confident that the government could cope with dengue outbreaks. The campaign exposure was positively linked to trust in health authorities and high exposure campaign respondents were much more likely to express confidence on official dengue control measures (OR=2.84, 95% CI: 1.67-4.82, p<0.001). Such attitudinal results support the significance of open and ongoing communication in creating confidence in the community.

**Prevention measures taken by the respondents**

Table 3 shows the constancy of type of dengue prevention behaviors by the respondents. The most commonly practiced behaviors were source reduction activities, especially those involving covering the water storage containers (68.4%) and disposal of solid waste potentially holding water (62.8%). Mosquito nets were used moderately (58.4%), and repellents (52.0%). The respondents with 64.8% reported seeking early medical care when the symptoms first appeared, which is a promising result indicating that some health-seeking behavior campaigns would be effective. Nevertheless, only 44.4% of respondents stated that they regularly check and clean the household items that can hold water (flower pots, air coolers, old tires), which suggests that more active methods of activity are inconsistent. The regression analysis revealed that campaign exposure, education level, and income are independent factors that predict good preventive practice (adopting five or more behaviors), and campaign exposure has the most significant impact (b=0.41, p<0.001).

**Table 3: Self-Reported Dengue Preventive Practices Among Respondents (N=250)**

| Preventive Practice | Yes (n) | No (n) | % Adopted |
|---|---|---|---|
| Covering water storage containers | 171 | 79 | 68.4 |
| Proper disposal of solid waste | 157 | 93 | 62.8 |
| Seeking medical care at first symptoms | 162 | 88 | 64.8 |
| Using mosquito nets at night | 146 | 104 | 58.4 |
| Using mosquito repellents or coils | 130 | 120 | 52.0 |
| Regularly cleaning air coolers/flower pots | 111 | 139 | 44.4 |
| Wearing full-sleeve clothing outdoors | 98 | 152 | 39.2 |

| Participating in community cleanup drives | 87 | 163 | 34.8 |
|---|---|---|---|

**Logistic Regression — Predictors of Good Preventive Practice**

Table 4 is the report of binary logistic regression analysis investigating predictors of good preventive practice (adopting five or more preventive behaviors). The strongest predictor was the camp exposure (high vs. low) which had an OR=3.12 and p= <0.001 and then the education level of intermediate or above with OR=2.29 and p= <0.01 and thereafter monthly income above PKR 60,000 with OR=1.87 and p= <0.05 and finally the sex which is female with OR=1.54 and p= <0.05. The issue of age did not play a major foreteller when other variables were thoroughly held. The total model was statistically significant (kh2=61.3, df=5, p<0.001), and the model correctly classified 73.6 per cent of respondents which is good model fit. These results support this fact: campaign exposure is a strong and significant independent predictor of preventive behavior, despite adjustment of social demographic confounders.

**Table 4: Binary Logistic Regression — Predictors of Good Preventive Practice (N=250)**

| Predictor Variable | B | Odds Ratio (OR) | 95% CI | p-value |
|---|---|---|---|---|
| High Campaign Exposure (vs. Low) | 1.14 | 3.12 | 1.89–5.14 | <0.001 |
| Education: Intermediate+ (vs. Below) | 0.83 | 2.29 | 1.28–4.11 | 0.005 |
| Income: PKR 60,001+ (vs. Below) | 0.63 | 1.87 | 1.03–3.40 | 0.039 |
| Gender: Female (vs. Male) | 0.43 | 1.54 | 0.91–2.61 | 0.043 |
| Age (continuous) | 0.02 | 1.02 | 0.98–1.06 | 0.312 |
| Constant | -2.01 | — | — | <0.001 |

**Perceived Effectiveness of Public Health Campaigns**

On a scale of 1 (not effective) to 5 (very effective) in discussing how effective perceived dengue public health campaigns were, the mean was 3.21 (SD=0.98). About 54.4 percent of the respondents rated campaigns to be effective or very effective, whereas 22.8 percent rated campaigns as ineffective or very ineffective, and 22.8 percent was neutral. Perceived effectiveness was also identified to be significantly linked with increased campaign exposure (r=0.51, p<0.001), and increased knowledge scores (r=0.44, p<0.001). Qualitative observations made by enumerators indicated that the absence of follow-up activities on the activities conducted by the campaign once launched was mentioned by respondents as a major constraint. The most commonly raised grievances among the most negative campaign evaluators were the inconsistency of fumigation operations and infrequent visits of the health workers.

**DISCUSSION**

The results of this research confirm that the use of the public health campaigns plays a significant and statistically significant role in enhancing the level of knowledge and prevention against dengue in the population of Faisalabad residents. The high correlation between the exposure to multi-channel campaign and the sufficient levels of knowledge (76.3% among high-exposure respondents vs. 34.5% among low-exposure respondents) coincides with the rest of the literature in South and Southeast Asia since it similarly demonstrates that multi-modal health promotion strategies provide better results in terms of KAP development than single-channel strategies (Syed et al., 2010; Simmons et al., 2012). The most important channel of information was the television and social media as evidenced by the changing landscape of the media in Pakistan with the digital platforms providing a wide-spreading health communication coverage. Nonetheless, the relative low rate of community-based and interpersonal delivery systems, i.e. health worker visits and community events, is alarming, given that participation methods have been found to be especially effective in maintaining behavior change post-campaign period (Bandura, 1986; Gubler, 2011). The results of the logistic regression where female gender is identified as a positive predictor of preventive practice support the global evidence that women as the household managers play an important role as the primary agents of domestic vectors control, and that the campaigns should be tailored to empower women rather than to inform women members of the community. The enduring knowledge-practice gap in effort-intensive activities like regular washing of water containers and taking part in community clean-ups implies that motivational and structural factors that are not rooted in information deficit need to be tackled. The attitudinal aspect of the health behavior, as the high level of fatalism (almost 38 percent of the respondents thought that dengue was unavoidable) revealed in this study, supported the outcomes of similar LMICs environments and the necessity to conduct health campaigns to address the attitudinal aspects of the health behavior, rather than just the knowledge dispersion. All in all, this paper confirms that although the anti-dengue campaigns in Faisalabad have had a reasonable reach, and have led to some significant changes in community preparedness, their effectiveness is limited due to inconsistency, the lack of penetration of community activities, and in peri-urban areas. These structural gaps are critical to be addressed in order to translate campaign investments into long-term dengue burden reduction.

Conclusion and Recommendations

**CONCLUSION**

This paper was aimed to determine the role of dengue fever control through public health campaigns in Faisalabad, Pakistan, through primary survey data in 250 residents. The results indicate that effective knowledge, addressing a more positive attitude, and greater adherence to dengue preventive measures are considerably linked to health promotion campaigns, especially conducted via several methods and sustained. The best independent predictor of the good preventive behavior in the regression analysis was campaign exposure, which highlights the primary role of health communication in dengue control strategy. Simultaneously, the research indicates the existence of long-standing campaign coverage gaps, specifically in the peri-urban and low-income areas, and identifies the attitudinal barriers,, specifically, fatalism and low institutional trust as the factors that hinder the process of knowledge translation to sustainable action. The implications of these findings in the national health policy in Pakistan are significant since dengue remains a significant and preventable disease burden, and evidence-based optimization of campaign strategies may result in an immense change in the outcome.

## RECOMMENDATIONS

It is recommended to the policy makers, practitioners of public health and the stakeholders of the city of Faisalabad and similar situations in Pakistani urban set ups as follows: To start with, the Government of Punjab and the Faisalabad District Health Authority ought to institutionalize the multi-channel dengue awareness campaigns throughout the year, as opposed to the reactive mobilizations that are only done on the basis of an outbreaks to ensure health communication is done to the communities before the monsoon season and throughout the year. Second, community health workers and lady health workers must have the standardized dengue education resource material and regular refresher training and the household visit quotas must be clearly increased to include dengue KAP monitoring to make interpersonal health communication a primary campaign channel rather than a supplementary one. Third, healthcare officials must create gender-sensitive campaign messages that directly target women as the main household agents of controlling vectors by including hands-on skills training on source reduction, symptom identification, and care navigation into the existing maternal and child health systems. Fourth, the local religious leaders, school principals and community council representatives must be formally integrated into the dengue communication systems via formal engagement arrangements and use their social power to normalize preventive practices and counter the fatalistic mindsets among their constituencies. Fifth, the government ought to invest in digital health communication approaches especially WhatsApp and SMS-based communication to reach a larger number of younger populations in the campaign as well as to

have the ability to provide timely, geographically-focused outbreak warnings. Sixth, inter-agency coordination between the health, municipal and environmental departments must be institutionalized by a specific district-level dengue control task force encompassing accountable structures and performance indicators and a common operational budget to overcome the frustrating situation of fragmentation that continues to hamper integrated vector management. Seventh, a regular independent assessment of dengue campaign effectiveness, based on standardized KAP survey instruments should be required and published annually to provide an evidence base to adaptive management and improve the peoples trust in health governance.

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