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Knowledge, Attitude and Practices towards Dengue Fever among the Communities Living in Slums of Islamabad, Pakistan; A Cross-sectional Survey

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Abstract— *A cross-sectional survey was conducted with 457 respondents to assess their knowledge, attitude, and practices regarding dengue in the two selected slums of Islamabad. Convenient sampling technique was applied to select one adult per household using a previously validated questionnaire. The knowledge of dengue vector, transmission, and symptoms was sub-optimal in the target communities, however they showed better awareness on breeding sites and mosquito prevention methods. Most of the respondents (90.4%) have heard of dengue disease. More than half (61.1%) knew that dengue is caused by mosquito, but only 15.3% knew that Aedes mosquito causes dengue fever. Nearly half (46.6%) of them incorrectly believed that dengue mosquito bites during the nighttime. Multivariate model revealed education as main predictor of knowledge regarding dengue transmission. Based on the total attitude score, 49.7% of respondents have good attitudes towards dengue disease, while 50.3% of them have moderate to poor attitudes. Gender and occupation were main predictors of good attitudes towards dengue where females had 76% higher odds and employed respondents had two times the odds of having good attitudes towards dengue disease.*

Keywords— *Knowledge, Attitude, Practices; Dengue; Pakistan.*

I. INTRODUCTION

Dengue has emerged as a global health concern with the four dengue serotypes (DENV) [1,2]. The dengue disease has increased more than 30-times over the last 50 years [1, 3]. The disease is now prevalent in 128 countries around the world [4]. Dengue cases have been significantly increasing globally with an estimated 390 million dengue infections per year [5]. Population growth, urbanization which provides a conducive environment for the dengue vector to grow, and international travel has contributed to the rapid increase of dengue disease [6, 7].

Dengue has been dramatically expanding in Pakistan in the recent years [7, 8]. The first confirmed dengue outbreak was reported in the economic hub of Pakistan, Karachi, in 1994[9]. Pakistan suffered the major dengue outbreaks during 2006, 2007, 2008, 2010 and 2011 which severely affected thousands of individuals and claimed hundreds of lives [10]. An estimated 24,938 dengue virus infections were recorded from 15 districts of KPK in 2017 [11]. However, the worst dengue outbreak was recorded in 2019 which caused 56000 dengue cases and claimed 95 deaths in Pakistan. An estimated 43% cases were reported from Islamabad and Rawalpindi [12].

The aim of the study was to assess the knowledge, attitude and practices regarding dengue prevention and control among in the high-risk dengue slums in Islamabad.

II. METHODS

A. Study setting

Two most dengue-affected slums, Faisal Colony and France Colony were purposively selected for the survey. The population of the selected slums was predominantly Christians. The survey was conducted during 24-29 June 2020. The survey mainly served two purposes; 1) to establish the benchmark for the Positive Deviance (PD), a behaviour change intervention to be conducted in these slums; and 2) to screen the community members for their willingness to participate in the PD intervention.

B. Design and Instrument

A cross-sectional survey was conducted using convenient sampling method to interview 457 adult respondents of 18 years and above. Face-to-face interviews were carried out in Urdu language. The Knowledge, Attitude and Practices (KAP) questionnaire formerly used in Cambodia was modified for this study [13]. The survey tool included questions about;1) demographic and socio-economic information which included age, gender, religion, marital status, education level, and family's monthly income of the respondents; 2) knowledge about dengue transmission and symptoms; 3) health seeking behaviors 4) attitude towards dengue; 5) personal protection measures and methods to avoid breeding sites; and 6) preferred channels of communication. The questionnaire was pretested with 30 participants for internal consistency and to refine the tool. Local college students with some previous experience in surveys were recruited and trained for data collection.

C. Data Entry and Analysis

The data were entered in the Epi Data 3.1 software (Epi

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Data Association, Denmark), cleaned, and then exported to the Statistical Package for Social Science (IBM SPSS Statistics 22) for the detailed analysis. During the statistical processing of data, standard methods of descriptive statistics were used. Variables of interest were tested for normality, mean and median were used to describe continuous data and frequencies and percentages were used to describe categorical data. To examine knowledge about dengue Chi square ($\chi 2$) and logistic regressions tests were performed, univariate followed by multivariate analysis conducted using a backward elimination approach where variables found to have a p-value ≤ 0.20 were kept in the model. To the options for the attitude statement answers, 'Strongly agree', 'Agree', 'Disagree' and 'Strongly disagree' were assigned to points of 4, 3, 2 and 1, respectively. Based on achieving more than 75% of total attitude score, two groups were created, 'Good attitudes' for total attitude score of 24-32 and 'Poor to moderate attitudes' for total attitude score of 0-23. Logistic regression was performed to examine factors influencing dengue attitudes.

D. Ethical Consideration

The study protocol was approved by the National Bioethics Committee, Pakistan in April 2020 (Ref: No.4-87/NBC-451/20/ 2037). All the respondents were informed about the voluntary nature of the participation, possible risks and benefits, and the expected duration of interview. A written informed consent was taken from each participant. The Government of Pakistan's Standard Operating Procedures (SOPs) for COVID-19 were carefully followed during the interviews.

III. RESULTS

A. Socio-demographics

A total of 457 respondents participated in the study where 53.6% respondents were female. The age of the respondents was between18-76 years with a median of 30. The largest number of respondents, 72.9% were married. Many respondents, 27.6% have completed their high school, while 28.7% of respondents did not have any formal education. The survey revealed that 30.4% of respondents were engaged in private jobs, 28.7% were housewives, while19.9% respondents were unemployed. In the observed households, 1 to 20 persons were living with a median of 6. Approximately half of the respondents (48.6%) have an average monthly income of less than 25,000 rupees (163 USD).

B. Knowledge about Dengue

The knowledge of dengue transmission, vector and dengue symptoms was sub-optimal in the target communities. However, they demonstrated better knowledge regarding breeding sites, mosquito breeding prevention methods and personal protection methods. Most respondents (90.4%) have heard of dengue disease while 14.4% of them said that they or their relatives have had dengue last year. The knowledge of dengue vector that *'Aedes'* causes dengue fever was known to only 15.3% of respondents. The respondents generally knew that dengue is transmitted by mosquito bites (61.1%), however, 46.6% incorrectly believed that dengue mosquito most often bites during the night-time. The knowledge of dengue symptoms was very low where only 29.3% respondents knew 3 or more symptoms. Most (65.9%) cited that high fever is a dengue symptom followed by headache (18.2%) and joint pain (16.4%). Majority of respondents (82.3%) knew one or more breeding sites inside the house. Water containers and open water tanks were the most cited breeding sites for *Aedes* mosquitoes inside the house (51.4% and 27.1% respectively). Similarly, most of the respondents (77.7%) were able to identify one or more breeding sites outside the house. Empty cans and shells (45.5%) were the most mentioned dengue mosquito breeding sites outside the house. Most respondents (87.7%) knew one or more mosquito breeding prevention methods. Putting covers on water jars (37.6%) and changing stored water frequently (21.9%) were the most mentioned mosquito breeding preventive methods.

Table 1. Knowledge about dengue transmission, prevention practice and symptoms

	n (N=457)	% (95% C.I.)
How is dengue transmitted?		
Mosquito	279	61.1 (57.1–64.8)
When do dengue mosquito most often bite?		
Bite during the day	97	21.2 (17.5–24.9)
Bite during the night time	213	46.6 (42.6–50.8)
Don't know	142	31.1 (27.1–35.4)
Where *Aedes* mosquito usually breed inside the house?		
In the water containers	235	51.4 (46.8–56.2)
In the open water tanks	124	27.1 (23.0–31.3)
Don't know	60	13.1 (10.3–16.2)
Knows 1 or more breeding sites inside the house	376	82.3 (78.8–85.3)
Where *Aedes* mosquito usually breed outside the house?		
In the flower leaves	97	21.2 (17.7–24.7)
In the roof gutter	57	12.5 (9.8–15.3)
In the empty cans, shells	208	45.5 (41.2–49.9)
Don't know	89	19.5 (16.0–23.4)
Knows 1 or more breeding sites outside the house	355	77.7 (74.0–81.2)
How can you prevent mosquitoes from breeding?		
Changing stored water frequently	100	21.9 (18.4–25.4)
Turning containers upside down	93	20.4 (17.1–23.8)
Putting covers on water jars	172	37.6 (33.5–41.8)
Spraying insecticide	71	15.5 (12.7–18.6)
Clean the household	49	10.7 (8.1–13.3)
Don't know	54	11.8 (9.2–14.6)
Knows 1 or more mosquito breeding prevention methods	401	87.7 (84.9–90.6)
How can you prevent dengue?		
Use mosquito net during the day	50	10.9 (8.3–13.6)
Wear long sleeves/long pants	151	33.0 (29.1–37.0)
Use mosquito repellent	116	25.4 (21.9–29.1)
Use insecticide spray	285	62.4 (58.0–66.5)
Use mosquito coils during the day	27	5.9 (4.2–8.1)
Don't know	35	7.7 (5.5–10.1)
Knows 1 or more dengue prevention methods	415	90.8 (88.2–93.2)
What are the symptoms of dengue?		
High fever	301	65.9 (61.5–69.8)
Headache	83	18.2 (14.9–21.4)
Chills	16	3.5 (2.2–4.8)
Nausea/Vomiting	41	9.0 (6.6–11.4)
Rash	39	8.5 (6.3–10.9)
Muscle and joint pain	75	16.4 (13.3–19.5)
Bleeding	21	4.6 (3.1–6.3)
Diarrhea	1	0.2 (0.0–0.7)

Most respondents (90.8%) knew one or more personal protection methods. Insecticide sprays (62.4%), wearing long

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sleeves/long pants (33%) and using mosquito repellents (25.4%) were the most mentioned personal protection methods. Respondents with 10 and more years of education were more likely to know that dengue is mosquito transmitted, 75.4% of them, compared to 51.5% of respondents with less than 10 years of education ($\chi 2$ test, $p<0.001$). Respondents with 10 and more years of education were also more likely to know 3 or more dengue symptoms ($\chi 2$ test, $p<0.05$) as well as 36.9% of single respondents compared to 26.1% of those who are married ($\chi 2$ test, $p<0.05$) and those with monthly income higher than 25,000 Rupees compared to respondents with lower monthly income ($\chi 2$ test, $p<0.05$). Statistically significant differences according to socio-demographic characteristics were not found in terms of knowledge about mosquito breeding sites or mosquito breeding/dengue prevention methods.

Factors associated with knowledge that dengue is mosquito transmitted were gender, age, education, and average monthly income. Males, younger respondents, those with 10 or more years of education and respondents with higher monthly income have better knowledge that dengue is mosquito transmitted. Multivariate model with significant factors included ($p\leq0.20$) revealed education as main predictor of knowledge regarding dengue transmission. Respondents with 10 or more years of education were 3 times more likely to know that dengue is mosquito transmitted compared to those with less years of education. Singles, unemployed and respondents with higher monthly income were more likely to know one or more mosquito breeding sites inside the house. Females married respondents and housewives were less likely to know one or more mosquito breeding sites outside the house.

Multivariate analysis did not reveal statistically significant predictors of knowledge about mosquito breeding sites inside the house while statistically significant predictor of knowledge about mosquito breeding sites outside the house was occupation where housewives were less likely to know one or more mosquito breeding sites outside the house.

Although not statistically significant, singles have better knowledge of mosquito breeding sites, but knowledge of mosquito breeding prevention methods was higher with married respondents. Significant predictors of knowledge about mosquito breeding prevention methods were marital status and occupation, singles and employed respondents were less likely to know one or more mosquito breeding prevention methods. Housewives had more than three times the odds of knowing one or more dengue prevention methods.

Multivariate model with significant factors included ($p\leq0.20$) revealed average monthly income as main predictor of knowing three or more dengue symptoms where respondents with monthly income higher than 25,000 Rupees had 63% higher odds knowing three or more dengue symptoms.

Table 2. Predictors of dengue knowledge

	Univariate			Multivariate		
	Crude OR	95% C.I.	p	Adjusted OR	95% C.I.	p
Dengue is mosquito transmitted						
Female	0.76	0.52–1.10	0.146	-	-	-
Male	1.00	-	-	-	-	-
<30 years old	1.40	0.96–2.04	0.082	-	-	-
≥30 years old	1.00	-	-	-	-	-
Single	1.28	0.83–1.98	0.260	-	-	-
Married	1.00	-	-	-	-	-
<10 years of education	1.00	-	-	1.00	-	-
≥10 years of education	2.89	1.92–4.37	p<0.001	3.04	1.92–4.80	p<0.001
Unemployed	1.00	-	-	-	-	-
Employed	1.02	0.62–1.68	0.949	-	-	-
Housewife	0.89	0.52–1.54	0.680	-	-	-
<25,000 Rupees	1.00	-	-	-	-	-
≥25,000 Rupees	1.38	0.90–2.09	0.137	-	-	-
Knows one or more mosquito breeding sites inside the house						
Female	0.81	0.50–1.31	0.380	-	-	-
Male	1.00	-	-	-	-	-
<30 years old	1.07	0.66–1.74	0.774	-	-	-
≥30 years old	1.00	-	-	-	-	-
Single	1.58	0.87–2.85	0.132	-	-	-
Married	1.00	-	-	-	-	-
<10 years of education	1.00	-	-	-	-	-
≥10 years of education	1.03	0.63–1.68	0.913	-	-	-
Unemployed	1.00	-	-	-	-	-
Employed	0.59	0.29–1.22	0.153	-	-	-
Housewife	0.51	0.24–1.08	0.077	-	-	-
<25,000 Rupees	1.00	-	-	-	-	-
≥25,000 Rupees	1.63	0.92–2.86	0.093	-	-	-
Knows one or more mosquito breeding sites outside the house						
Female	0.72	0.46–1.13	0.156	-	-	-
Male	1.00	-	-	-	-	-
<30 years old	1.07	0.69–1.66	0.766	-	-	-
≥30 years old	1.00	-	-	-	-	-
Single	1.67	0.97–2.86	0.064	-	-	-
Married	1.00	-	-	-	-	-
<10 years of education	1.00	-	-	-	-	-
≥10 years of education	1.10	0.70–1.73	0.672	-	-	-
Unemployed	1.00	-	-	1.00	-	-
Employed	0.72	0.38–1.36	0.311	0.71	0.38–1.36	0.303
Housewife	0.47	0.24–0.91	0.025	0.46	0.24–0.90	0.023
<25,000 Rupees	1.00	-	-	-	-	-
≥25,000 Rupees	0.95	0.59–1.54	0.833	-	-	-
Knows 1 or more mosquito breeding prevention methods						
Female	1.64	0.93–2.88	0.087	-	-	-
Male	1.00	-	-	-	-	-
<30 years old	0.73	0.41–1.27	0.265	-	-	-
≥30 years old	1.00	-	-	-	-	-
Single	0.62	0.34–1.12	0.111	0.46	0.23–0.92	0.028
Married	1.00	-	-	1.00	-	-
<10 years of education	1.00	-	-	-	-	-
≥10 years of education	1.23	0.69–2.21	0.481	-	-	-
Unemployed	1.00	-	-	1.00	-	-
Employed	0.45	0.19–1.06	0.067	0.35	0.14–0.84	0.020
Housewife	0.70	0.27–1.80	0.455	0.43	0.15–1.23	0.116
<25,000 Rupees	1.00	-	-	-	-	-
≥25,000 Rupees	0.96	0.52–1.79	0.903	-	-	-
Knows 1 or more dengue prevention methods						
Female	1.45	0.76–2.74	0.256	-	-	-
Male	1.00	-	-	-	-	-
<30 years old	1.30	0.87–1.95	0.203	-	-	-
≥30 years old	1.00	-	-	-	-	-
Single	0.80	0.40–1.59	0.526	-	-	-
Married	1.00	-	-	-	-	-
<10 years of education	1.00	-	-	-	-	-
≥10 years of education	0.98	0.51–1.87	0.952	-	-	-
Unemployed	1.00	-	-	-	-	-
Employed	1.05	0.48–2.30	0.909	-	-	-
Housewife	3.11	1.03–9.43	0.045	-	-	-
<25,000 Rupees	1.00	-	-	-	-	-
≥25,000 Rupees	1.08	0.53–2.12	0.827	-	-	-
Knows 3 or more dengue symptoms						
Female	1.30	0.87–1.95	0.205	-	-	-
Male	1.00	-	-	-	-	-
<30 years old	1.22	0.62–2.40	0.570	-	-	-
≥30 years old	0.92	0.46–1.85	0.814	-	-	-
Single	1.65	1.06–2.57	0.026	1.61	0.98–2.66	0.062
Married	1.00	-	-	1.00	-	-
<10 years of education	1.00	-	-	-	-	-
≥10 years of education	1.57	1.04–2.37	0.031	-	-	-
Unemployed	1.00	-	-	-	-	-
Employed	0.79	0.47–1.34	0.381	-	-	-
Housewife	0.80	0.45–1.43	0.451	-	-	-
<25,000 Rupees	1.00	-	-	1.00	-	-
≥25,000 Rupees	1.65	1.05–2.58	0.029	1.63	1.03–2.56	0.037

C. Health Seeking Behavior

In case the respondent or someone in their family had a fever, 45.3% of them would go to the government hospital

while 28.7% would stay at home and wait for recovery. Those with an average monthly income greater than 25,000 rupees were more likely to seek medical care from a private hospital or private care provider in case of getting fever (65.4%) compared to those with an average monthly income lower than 25,000 rupees (54.1%) ($\chi 2$ test, $p<0.05$). Interestingly, respondents with less than 10 years of education were more likely to seek medical care from a hospital or private provider first in case of getting fever (60.6%) compared to those with 10 or more years of education (47%) ($\chi 2$ test, $p<0.05$). Many respondents (68.3%) would seek care on the same day after a member of their family developed a fever while 12.7% reported that they would wait a day and 14.9% would wait for two days before seeking the care. If their family member gets fever, female respondents would wait less time (0.42 days in average) to seek care compared to male respondents (0.74 days in average) (Mann-Whitney test, $p<0.05$). Housewives would also wait less time to seek care (0.37 in average) compared to others (Kruskal-Wallis test, $p<0.05$).

D. Attitude

Most respondents agreed that dengue is a serious (91.5%) and transmissible disease through mosquitoes (75.9%) and that they were at risk of getting dengue (63%). Also, 61.3% of respondents believed that dengue can be easily prevented, 82.1% believed that removing empty containers can protect them from dengue infection. Majority (94.7%) believed that using bed nets, repellents and long sleeves can protect against mosquito bite. Most respondents believed that communities should participate in controlling dengue (96.3%). Based on the total attitude score, 49.7% of respondents have good attitudes towards dengue disease, while 50.3% of them have moderate to poor attitudes. Factors associated with attitude towards dengue disease were gender and occupation. After adjusting for occupation, female respondents had 76% higher odds of having good attitude towards dengue disease. Statistically significant differences according to socio-demographic characteristics were not found in terms of attitude towards dengue disease.

Table 3. Dengue attitudes according to the socio-demographic data

	n	%	n	%	p*
	Poor to moderate attitudes (0-23)		Good attitudes (24-32)		
Female	114	46.5	131	53.5	0.091
Male	116	54.7	96	45.3	
<30 years old	110	49.8	111	50.2	0.852
≥30 years old	120	50.8	116	49.2	
Single	63	51.6	59	48.4	0.833
Married	167	50.2	166	49.8	
<10 years of education	141	51.5	133	48.5	0.568
≥10 years of education	89	48.6	94	51.4	
Unemployed	55	60.4	36	39.6	
Employed	106	48.6	112	51.4	0.066
Housewife	59	45.0	72	55.0	
<25,000 Rupees	115	51.8	107	48.2	0.939
≥25,000 Rupees	83	52.0	76	47.8	

**χ2 test*

Multivariate model with significant factors included ($p\leq0.20$) revealed gender and occupation as main predictors of good attitudes towards dengue disease where female respondents had 76% higher odds to have good attitudes towards dengue disease and employed respondents had two times the odds of having good attitudes towards dengue disease compared to unemployed respondents.

E. Dengue Prevention Practices

To prevent dengue, most respondents used insecticide spray (70.7%), mosquito coil (45.7%) and mosquito repellent (44.6%). Most respondents reported that they keep covers on the water containers in the house (95.2%). When observed, covers were found on all containers in 79% of households.

Significant association was found between self-reported and observed covers on the water containers in households (Fisher's exact test, $p<0.001$), in 98.9% of households of respondents who said they keep covers on the water containers, covers were found on all water containers when observed. Respondents generally change the storage water once a week (33.9%) and more than once a week (59.7%). Most respondents reported that they clean water containers every day (80.1%). When observed, 89.1% of containers looked very clean. Significant association was found between self-reported and observed cleanliness of water containers (Fisher's exact test, $p<0.001$), 92.3% of containers that respondents said they cleaned every day looked very clean when observed. Waste such as old shells, cans, tires, plastic bottles, and other small containers majority of respondents move outside (93.7%) while 5% of them sell or recycle.

F. Health Education Exposure

Only 12 respondents (2.6%) were involved in health education activities in the last 3 months. As a source of information 291 respondents (63.7%) preferred TV, 161 respondents (35.2%) preferred social media, 66 (14.4%) mentioned health facility staff, 51 respondents (11.2%) preferred lady health worker, 43 (9.4%) friends/neighbors and 25 (5.5%) health education sessions. Interestingly a very few respondents mentioned religious leaders, radio, posters, and leaflets as a preferred source of information.

IV. DISCUSSION

This study aimed to assess the knowledge, attitude, and practices of the target communities regarding dengue prevention and control. The results suggest that the community possess an overall sub-optimal knowledge on dengue transmission and signs and symptoms, which is quite consistent with the previous studies conducted in different settings in Pakistan[14-17]. The studies conducted in Vietnam, Nepal, and Jamaica also reported low level of dengue knowledge[18], [19, 20]. Only 29.3% of respondents knew three or more dengue symptoms, while almost one-third of the respondents (29.1%) were unaware of any symptoms of dengue. Most of the respondents (65.9%) mentioned high fever as the key sign of dengue fever which was quite consistent with the previous studies conducted in Jamaica, Thailand, Lao and Peru[20-23]. The poor knowledge of dengue signs and symptoms revealed that the past awareness campaigns might have focused more on the vector control than the dengue warning signs and health seeking behaviors. Therefore, future dengue related behavior change strategies should also focus on the key signs and symptoms so that

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people could seek early health care to avoid complications.

In the study, although, 61.1% participants correctly identified mosquito as the main cause of dengue infection, however, close to half (46.6%) respondents incorrectly believed dengue mosquito *(Aedes*) bites at night, suggesting a possible confusion with the night time biting malaria mosquito (*Anopheles*). Two studies conducted in Cambodia and Laos found similar confusion that Aedes bites during the night time [13, 22]. This misconception could be due to the mixed messaging or combined health education activities on dengue and malaria. The incorrect knowledge of dengue vector's biting time could lead to the inappropriate preventive measures which results in the disease. Therefore, there is a need to organize separate health education sessions and awareness campaigns on malaria and dengue to avoid the mixed messaging and encourage the communities to take the appropriate preventive measures against these diseases.

Multivariate model with significant factors included ($p \leq 0.20$) revealed education as main predictor of knowledge regarding dengue transmission which was quite consistent with the previous studies conducted in Malaysia and Indonesia [24-26]. Respondents with 10 or more years of education are three times more likely to know that dengue is mosquito transmitted compared to those with less years of education. The study findings were consistent with a KAP survey conducted in Karachi[15], however contrasted with the findings of another study conducted in Wah Cant [27]. There is a need to segment the audience base on their education, age, and gender in order to provide focused health education to improve their knowledge and practices.

Context specific and effective vector control measures are of the essence to eliminate the dengue breeding sites to prevent the dengue disease [7, 28]. The study showed that majority of the respondents (82.3%) knew one or more breeding sites inside the house. The most mentioned sites included water containers (51.4%) and open water tanks (27.1%), while 77.7% of the respondents knew one or more breeding sites outside the household. As the most common breeding site for Aedes mosquitoes outside the house, respondents cited empty cans, shells (45.5%). Putting covers on water jars (37.6%), change water (21.9%) and putting empty containers upside down (20.4%) were the key strategies used to avoid mosquito breeding in these communities. Use of insecticide spray (62.4%) and mosquito repellents (25.4%) were the most mentioned methods to avoid mosquito bites which are quite consistent with the study conducted in Karachi [14]. The respondents demonstrated high knowledge on dengue breeding sites which could be credited to the excellent vector control and fogging activities of the National Vector Borne Disease Control Program, Pakistan. Interestingly no one mentioned of any biological vector control methods such as guppy fish which are being used in many countries and could be explored as a cost-effective vector control method in Pakistan as well [29].

Significant predictors of knowledge about mosquito breeding prevention methods were marital status and occupation, singles and employed respondents were less likely to know one or more mosquito breeding prevention methods. Housewives had more than three times the odds of knowing one or more dengue prevention methods. This could be due to the leading role of women in the domestic and household affairs. Future health promotion campaigns should also engage men especially when they have an important economic role as breadwinner and could be instrumental to allocate money for the dengue prevention methods such as sprays, repellents and covers of the water containers. Television was the most preferred source of information on dengue which is quite consistent with the findings of previous studies [7, 16, 20, 30]. Social media including Facebook were also mentioned as key preferred channels of communication. Therefore, there is a need to tap on to these communication channels and disseminate tailored messages through them to better reach out to the communities.

V. Limitations

Possibility of interviewers' bias, lack of generalizability as the survey was conducted in slums, drawbacks of convenient sampling technique and community's hesitance to interact during the Covid-19, could be the key limitations of the study.

VI. Conclusion/Recommendations

The study suggests that a well-informed and multi-pronged Behavior Change Communication (BCC) strategy should be developed to improve the knowledge, attitude, and practices regarding dengue in these communities. The BCC strategy should engage the preferred channels of communication which include TV and social media and use interpersonal communication through community volunteers and health workers in order to reinforce the messages. Besides the tailored education campaigns, an enabling environment at the household and community is required through active community and stakeholders participation in dengue activities[31, 32].

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