



## Original Research

## Community knowledge, attitude and practices towards dengue in urban and suburban populations of Okara (Punjab, Pakistan)

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### Abstract

Dengue fever is a viral disease transmitted by biting female *Aedes aegypti* and *A. albopictus* mosquitoes, which breed in small, ponded water. The present work aimed to analyse the knowledge, attitudes, and practices towards dengue fever and its control in the local population of the Okara district, Punjab, Pakistan. A cross-sectional survey based on 2279 randomly selected volunteers of both sexes (male 1149, female 1130) from 08 towns of the district Okara (Pakistan), ages (15-70 years) from urban/suburban areas during 2016-17 through questionnaire-based interviews. Educational attainment was moderate, with 57.3 % having 10 or fewer years of schooling in the study population. The results suggested that the general public has a high level of knowledge, and 87.8% correctly identified the route of transmission. 85.7% recognized man-made containers as breeding sites. Females had higher knowledge accuracy (81.35%) than males (79.6). Further, most respondents (84.9%) did not have leaky water taps, 86.3% managed household junk, and 91.1% disposed of rainwater. Respondents used strong preventive practices such as repellents (64.6%), checking water reservoirs (83.6%), and drain coolers (85.6%). In conclusion, the masses in the area have a high level of knowledge about dengue fever, its vector and its breeding. The majority of the respondents have a positive attitude towards preventive measures against vector and mosquito bites. A very large segment of the community generally has good practices related to dengue fever and its vectors.

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**Introduction:** Dengue virus (a flavivirus) infection is an escalating health problem with 50-100 million cases annually in over 125 countries<sup>1,2</sup>. According to WHO, over 7.6 million incidents of dengue infections, with 3.4 million cases, over 16000 severe cases and more than 3000 deaths were reported as of 30th April 2024<sup>3,4</sup>. In Asia, the dengue virus spread from Southeast Asian countries and travelled westward with multiple outbreaks in India, Sri Lanka and Pakistan<sup>5,6</sup>. Pakistan experienced DHF outbreaks in 1994 - 1995 in its southern parts<sup>7</sup> and in 2005-2006, with 3,649 diagnosed cases and 40 deaths. DEN-2 and DEN-3 strains were identified in the Aga Khan University Hospital, Karachi<sup>8</sup>. Since then, Pakistan has experienced multiple outbreaks with notable cases in 2005, 2011 and 2019. In 2011, the epidemic became severe with over 16000 confirmed cases and 257 deaths reported in Lahore alone<sup>9-11</sup>. In 2019, another major outbreak occurred with 47,000 cases nationwide<sup>12</sup>. These severe outbreaks in Pakistan are due to several factors, such as the monsoon, which leads to water stagnation. This provides the breeding sites for mosquitoes<sup>13,14</sup>. Poor sanitation and waste disposal further exacerbate the problem. Further, climatic conditions in Pakistan favour the outbreaks<sup>13,15</sup>.

Dengue virus is transmitted from one human individual to another through the bite of female *Aedes aegypti*, biting in the morning and evening hours of the day. Control of the DHF epidemic mainly rests on checking of breeding of mosquitoes and saving human individuals from the bite of infected mosquitoes, requiring wholehearted participation of the masses. This requires an effective mass awareness campaign. The target message for the mass awareness campaign needs to be designed according to the present knowledge, attitudes and practices in the target community.

Knowledge, attitude and practices studies (KAP) are important tools in fighting against epidemics in Pakistan<sup>16,17</sup>. These studies provide insights about the knowledge of communities related to dengue transmission, how they perceive the disease and what prevention measures they take against the disease. The KAP studies also identified the behavioural gaps, misconceptions and socio-cultural barriers that can hinder the effective control measures. Dengue prevention largely depends on community behaviour, such as eliminating mosquito breeding sites, using personal protection, and timely medical care. KAP studies will help the authorities assess the level of awareness in the community and identify deficiencies in knowledge. A study by Khan, Qureshi, Anwar, Ashraf, Fatima and Fawad<sup>18</sup> highlights that while a large percentage of people know about dengue, only a few correctly identify prevention and breeding sites. The present KAP study is based on the hypothesis that masses of different geographical areas have different levels of access to knowledge, and have different attitudes and practices, determined by their socio-cultural and economic background. The studies can be

used in the planning of future DF /DHF-related awareness campaigns.

#### Materials and Methods

**Study Area:** Okara district (30°.48'N; 73° .27'E: 7,044 km<sup>2</sup>) has a rapidly growing economy, very fertile irrigated agricultural lands and high milk production. It has 8 main towns (Okara, Gogera, Renala Khurd, Depalpur, Haveli Lakha, Hujra Shah Moqeem, Basirpur, Mandi Ahmadabad). There is a rapid increase in urbanization with the development of suburban settlements with limited civic facilities.

**Sampling:** This descriptive cross-sectional study was carried out in urban and suburban parts of 8 towns of the district, viz. Okara, Gogera, Renala Khurd, Depalpur, Haveli Lakha, Hujra Shah Moqeem, Basirpur, Mandi Ahmadabad, between July 2023 and June 2024. A sample of 2,279 individuals of both sexes, aged 15-70 years, was randomly selected, depending upon their willingness and after obtaining their written consent to participate in the study, after assuring confidentiality of the information thus collected. Structured interview of each individual was conducted using a questionnaire (facsimile as Appendix I; pretested on a selected sample of 50 respondents and suitably adjusted for its workability) containing closed-ended questions regarding knowledge (6 questions), attitudes (6) and practices (6) about dengue fever, its symptoms and preventive measures. Questions on general information about the gender, age group and level of education were also included in the questionnaire.

**Analysis:** Responses of respondents to each question were separately analysed, and frequencies/ relative frequencies (%) of responses for different categories were calculated using Microsoft Excel version 20. Overall average scores and standard error of means (SEM) were calculated for each group.

**Results:** There were 1,149 (50.4%) males and 1,130 (49.6%) females, suggesting equal representation of the two sexes. A higher number of respondents came from Okara (n= 626; 27.50 %) and Depalpur (n = 404, 17.73 %), while other towns had a lower representation (around 200 each) (Table 1). The age of the respondents ranged between 15 and 70 years, the majority (88.9%) falling in adult (15-34 years) or elder (35-44 years) age classes, while older (>44 years) individuals were few (11.1%) (Table 2). Table 3 suggests a high literacy rate (94.6%) among respondents. The majority of the respondents (57.3%) had 10 years (32.6%) or less than 10 years (24.7%) of schooling. Frequencies of respondents having higher qualifications gradually decreased, and 16.7% had 12 years, 12.8% had 14 years, and 7.8% had >14 years of education.

**Knowledge:** Table 4 summarizes the frequencies of correct responses to different knowledge-related questions. A very high frequency (87.8%) correctly knew that the dengue virus is transmitted through the bite of a specific mosquito. Frequencies of correct responses were not significantly (p< 0.05) different

between the two sexes and between different towns. Man-made containers placed in houses were regarded as the main breeding sites of the dengue mosquito by 85.7%. The majority (81.6%) correctly stated the major symptoms of dengue fever. Dawn and dusk were correctly regarded as a preferred time for biting of dengue mosquitoes by 78.6%. A very high number (83.6%) considered the Health Department and electronic/ print media as the source of their knowledge about Dengue. The majority (70.8%), including females (74.6%) and males (67.0%), believed that they could differentiate dengue mosquitoes from other mosquitoes. Overall knowledge level was very good, with 81.35% of the correct responses. The knowledge level was higher in females (83.1%) than in males (79.60%).

**Attitudes:** Table 5 reflects a high proportion (84.9%) of respondents who did not have leaky water taps in their houses. Response in this respect was almost similar in different towns, except Hujra Shah Moqem, where leaky water taps were present in a higher proportion of the houses (51.0%). A high proportion disposes of the junk from their houses/premises (86.3%) and do not have open water containers in their houses (88.2%). The frequency of houses with open water containers was higher in Basirpur (32.0%) and lower in Mandi Ahmadabad (6.0%). The majority of the respondents (63.6%; range: 83.4% in Depalpur and 53.0% in Mandi Ahmadabad) claimed having screens on the windows and doors of their houses. A very high frequency of respondents (88.4%) expressed their preference for a government hospital for dengue fever treatment, while 91.1% of respondents claimed disposing of the rainwater from their houses/premises.

**Practices:** Table 6 shows that a majority of respondents (64.6%) were using mosquito repellent to save themselves from mosquito bites. A very high proportion of respondents (85.6%) use to drain water from their room coolers when not in use. A very large part (83.6%) regularly checked the lids of the overhead water reservoir. A large proportion (91.3%) indicated removing excessive water from flower pots/ flower beds. A fairly higher proportion (74.7%) care to wear full-sleeved clothes to avoid mosquito bites. Such a practice was followed by a very high proportion (92.0%) in Depalpur, followed by Basirpur (63.0%), Renala Khurd (61.2%) and Haveli Lakha (59.1%) populations. A reasonable proportion (49.6%) uses anti-mosquito spray to get rid of mosquitoes. Use of anti-mosquito spray was the highest in Mandi Ahmadabad (60.0%), followed by Renala Khurd and Haveli Lakha (59.5%), Depalpur (56.0%), Hujra Shah Moqem (54.5%), Gogera (51.7 %), Okara (38.2%) and the lowest in Basirpur (37.0%)

**Discussion:** KAP studies are very important to assess the baseline knowledge, attitudes and practices of respondents towards a particular disease in the study area<sup>19,20</sup>. The present KAP study is the first attempt undertaken in the Okara district. The study was based upon 2,279 respondents, almost equally represented by

both sexes (male 1149, female 1130) from all major towns of the district. The results suggested a good knowledge base about dengue virus transmission, both about the vector (87.8 %) and its breeding places (85.7%). Arif, Ali and Arif<sup>21</sup> reported a much lower (59.8%) knowledge base of the general population of the central Punjab (Pakistan) about the preferred dengue mosquito breeding. A high proportion of the Okara population (81.6%) knew common symptoms of dengue fever. Predominant proportion (78.6%) of the Okara population was aware of the preferred biting timings of dengue mosquitoes, as compared with 8.6% recorded for the population of the central Punjab, Pakistan<sup>21</sup>. Field teams of the Health Department and mass media have been successful in raising dengue-related awareness among the masses. Radio and television were indicated as powerful media for conveying dengue-related knowledge to 83.6% respondents, 72.6% of the people in Kuala Kangsar District, Malaysia<sup>22</sup>. A reasonably high (70.8%) frequency claimed to be able to distinguish the dengue mosquito from other mosquitoes. A study conducted by Mohamed, Khan, Alzahrani, Alzahrani, Alsharif, Khan, Noor, Qadeer, Lin and Chen<sup>23</sup> on health professionals indicated that 65.1% of surveyed health professionals possessed moderate knowledge about dengue, while 19.6% exhibited high knowledge and 15.3% showed low knowledge.

The attitude of the masses of the Okara district regarding control of the dengue mosquito was encouraging. Some 84.9% recorded not having leaky water taps, 86.3% disposed of junks properly, 88.2% maintained protected water containers, 63.6% had screens on windows/doors, 88.4% preferred going to recognized government hospitals for treatment of dengue fever and 91.1% disposed of rainwater properly. Similarly, the majority of the masses of Okara had good practices related to dengue fever. Some 64.6% used mosquito repellents, 85.6% practised draining of water from room coolers when not in use, 83.6% regularly checked the lid of overhead water reservoirs, 91.3% removed excessive water from flower pots/flower beds, 74.7% used full sleeve shirts, and 49.6% used the anti-mosquito spray. A similar study conducted by Valentine et al (2017) in Pondicherry (India) showed that 62.0% of respondents used insect repellents, and 58 % in Nepal used anti-mosquito spray<sup>24</sup>.

**Conclusion:** In conclusion, the masses in the area have a high level of knowledge about dengue fever, its vector and its breeding. The majority of the respondents have a positive attitude towards preventive measures against vector and mosquito bites. A very large segment of the community generally has good practices towards controlling the spread of the dengue virus and/ or its vector, and in the treatment of dengue patients. Health Department staff and electronic media are effective in conveying dengue control and prevention awareness.

**Limitations of the study:** The study was limited to the urban population and did not study the rural population.

**Ethical Approval:** All procedures and methodologies used were in agreement with ethical standards in research of the university.

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**Consent for publication:** Consent was taken from each author.

**Conflicts of Interest:** The authors declare that they have no conflict of interest.

**Availability of data and material:** Not applicable

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**Table 1.** Gender distribution among respondents (n) of KAP studies on dengue from different towns

Gender	OK	Gog	RK	DP	HL	HSM	BP	MA	Total
Male	317 (50.6)	111 (52.4)	116 (50.0)	203 (50.2)	101 (49.8)	101 (50.0)	100 (50.0)	100 (50.0)	1149 (50.4)
Female	309 (49.4)	101 (47.6)	116 (50.0)	201 (49.8)	102 (50.2)	101 (50.0)	100 (50.0)	100 (50.0)	1130 (49.6)
Total	626	212	232	404	203	202	200	200	2279

Ok-Okara, Gog-Gogera, RK-Renala Khurd, DP-Depalpur, HL-Haveli Lakha, HSM-Hujra Shah Moqeem, BP-Basirpur, MA-Mandi Ahmadabad

**Table 2.** Frequencies of the respondents in different age classes in different towns and the general population of District Okara

Age class (years)	OK	Gog	RK	DP	HL	HSM	BP	MA	Total	%
15-24	104	151	58	126	58	26	47	31	601	26.4
25-34	242	43	73	148	77	84	90	98	855	37.5
35-44	199	9	70	73	54	73	45	47	570	25.0
45-54	62	7	19	41	13	16	16	18	192	8.4
>54	19	2	12	16	1	3	2	6	61	2.7

Ok-Okara, Gog-Gogera, RK-Renala Khurd, DP-Depalpur, HL-Haveli Lakha, HSM-Hujra Shah Moqeem, BP-Basirpur, MA-Mandi Ahmadabad

**Table 3.** Frequency of respondents having different years of schooling in different towns

Year of Education	OK	Gog	RK	DP	HL	HSM	BP	MA	Total	%
0	16	2	0	33	13	5	19	35	123	5.4
<10	128	9	64	110	60	68	47	78	564	24.7
10	188	139	82	117	57	73	51	35	742	32.6
12	127	51	41	52	35	22	29	20	380	16.7

14	108	9	28	59	24	18	23	22	291	12.8
>14	59	2	17	33	14	13	31	10	179	7.8

Ok-Okara, Gog-Gogera, RK-Renala Khurd, DP-Depalpur, HL-Haveli Lakha, HSM-Hujra Shah Moqeeem, BP-Basirpur, MA-Mandi Ahmadabad

**Table 4.** Frequency of responses from different towns of District Okara and from two sexes regarding Knowledge of dengue fever

N	Okara		Gogera		Renala Khurd		Depalpur		Haveli Lakha		Hujra Shah Moqeeem		Basirpur		Mandi Ahmadabad		Total		Overall
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
	317	309	111	101	116	116	203	201	101	102	101	101	100	100	100	100	1149	1130	
The virus is transmitted by a specific mosquito	90.5 (287)	85.8 (265)	79.3 (88)	75.2 (76)	89.7 (104)	88.8 (103)	83.3 (169)	85.1 (171)	95.0 (96)	98.0 (100)	93.1 (94)	91.1 (92)	97.0 (97)	86.0 (86)	84.0 (84)	88.0 (88)	88.7 (1019)	86.8 (981)	87.8 (2000)
Man-made water containers/junkyards as mosquito breeding places.	85.2 (270)	86.1 (266)	85.6 (95)	90.1 (91)	88.8 (103)	75.9 (88)	75.9 (154)	80.1 (161)	88.1 (89)	97.1 (99)	82.2 (83)	88.1 (89)	85.0 (85)	86.0 (83)	97.0 (97)	99.0 (99)	84.9 (976)	86.4 (976)	85.7 (1952)
Dengue fever symptoms	58.4 (185)	83.2 (257)	83.8 (93)	82.2 (83)	81.9 (95)	75.0 (87)	84.7 (172)	91.5 (184)	84.2 (85)	90.2 (92)	80.2 (81)	81.2 (82)	82.0 (82)	91.0 (91)	96.0 (96)	94.0 (94)	77.4 (889)	85.8 (970)	81.6 (1859)
Dengue mosquito biting timings	77.6 (246)	70.2 (217)	80.2 (89)	76.2 (77)	81.0 (94)	82.8 (96)	83.3 (169)	83.1(167)	77.2 (78)	83.3 (85)	66.3 (67)	73.3 (74)	78.0 (78)	65.0 (65)	90.0 (90)	99.0 (99)	79.3 (911)	77.9 (880)	78.6 (1791)
Health Department/electronic/ print media as a major source of information	73.5 (233)	83.5 (258)	79.3 (88)	88.1 (89)	71.6 (83)	94.8 (110)	85.7 (174)	84.6 (170)	84.2 (85)	93.1 (95)	67.3 (68)	72.3 (73)	95.0 (95)	93.0 (93)	94.0 (94)	97.0 (97)	80.1 (920)	87.2 (985)	83.6 (1905)
Differentiating the dengue mosquito from other mosquitoes	41.6 (132)	59.2 (183)	85.6 (95)	81.2 (82)	84.5 (98)	86.2 (100)	79.8 (162)	74.6 (150)	60.4 (61)	86.3 (88)	67.3 (68)	72.3 (73)	61.0 (61)	71.0 (71)	93.0 (93)	96.0 (96)	67.0 (770)	74.6 (843)	70.8 (1613)

Average	71.1%	78.9 %	82.3 %	82.2 %	82.9 %	83.9 %	82.1%	83.2 %	81.5 %	91.3 %	76.1 %	79.7 %	83.0 %	82.0 %	92.3%	95.5 %	79.6 %	83.1 %	81.4 %
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**Table 5.** Frequency of responses from different towns of District Okara and two sexes regarding attitude about control of dengue fever

N	Okara		Gogera		RenalaKhurd		Depalpur		Haveli Lakha		Hujra Shah Moqem		Basirpur		Mandi Ahmadabad		Total		Total
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
	317	309	111	101	116	116	203	201	101	102	101	101	100	100	100	100	1149	1130	2279
Presence of leaky water, taps in houses	12.6 (40)	7.8 (24)	17.1 (19)	12.9 (13)	9.5 (11)	12.9 (15)	11.3 (23)	18.9 (38)	13.9 (14)	10.8 (11)	56.4 (57)	44.6 (45)	8.0 (8)	6.0 (6)	11.0 (11)	10.0 (10)	15.9 (183)	14.3 (162)	15.1 (345)
Proper disposal of junk	78.2 (248)	88.3 (273)	74.8 (83)	71.3 (72)	91.4 (106)	94.8 (110)	84.7 (172)	83.1 (167)	90.1 (91)	92.2 (94)	86.1 (87)	89.1 (90)	93.0 (93)	95.0 (95)	98.0 (98)	87.0 (87)	85.1 (978)	87.4 (988)	86.3 (1966)
Presence of open water containers in houses	8.2 (26)	6.8 (21)	9.0 (10)	5.9 (6)	11.2 (13)	7.8 (9)	11.3 (23)	14.9 (30)	16.8 (17)	13.7 (14)	14.9 (15)	10.9 (11)	40.0 (40)	24.0 (24)	7.0 (7)	4.0 (4)	13.1 (151)	10.5 (119)	11.8 (270)
Screen on windows and doors.	61.2 (194)	50.2 (155)	63.1 (70)	54.5 (55)	69.8 (81)	65.5 (76)	84.7 (172)	82.1 (165)	62.4 (63)	66.7 (68)	56.4 (57)	60.4 (61)	55.0 (55)	71.0 (71)	44.0 (44)	62.0 (62)	64.1 (736)	63.1 (713)	63.6 (1449)
Preference of the Govt. Hospital for dengue fever treatment	89.3 (283)	92.9 (287)	91.9 (102)	92.1 (93)	90.5 (105)	90.5 (105)	77.8 (158)	73.1 (147)	87.1 (88)	95.1 (97)	68.3 (69)	91.1 (92)	97.0 (97)	96.0 (96)	98.0(98)	97.0 (97)	87.0 (1000)	89.7 (1014)	88.4 (2014)
Disposal of rainwater	83.0 (263)	93.2 (288)	91.0 (101)	97.0 (98)	85.3 (99)	92.2 (107)	88.7 (180)	79.1 (159)	97.0 (98)	98.0 (99)	93.1 (94)	95.0 (96)	97.0 (97)	98.0 (98)	100 (100)	100 (100)	89.8 (1032)	92.5 (1045)	91.1 (2077)
Average	83.8 %	86.7%	83.6%	84.7 %	87.0 %	87.8 %	86.4 %	81.3 %	84.4 %	87.9 %	70.2 %	78.1 %	80.8%	87.5 %	88.0 %	89.8 %	83.5 %	85.4 %	84.5 %

**Table 6.** Frequency of responses received from different towns and two sexes regarding practices about control of dengue fever and its transmission

N	Okara		Gogera		RenalaKhurd		Depalpur		Haveli Lakha		Hujra Shah Moqem		Basirpur		Mandi Ahmadabad		Total		Overall
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
	317	309	111	101	116	116	203	201	101	102	101	101	100	100	100	100	1149	1130	
Use of multiple mosquito repellants as a preferred intervention to save from mosquito bites	67.2 (213)	67.0 (207)	62.2 (69)	60.4 (61)	58.6 (68)	53.4 (62)	59.1 (120)	48.3 (97)	75.2 (76)	80.4 (82)	60.4 (61)	54.5 (55)	89.0 (89)	86.0 (86)	50.0 (50)	76.0 (76)	64.9 (746)	64.2 (726)	64.6 (1472)
Drainage of water from room coolers to avoid breeding of dengue mosquitoes	75.7 (240)	75.7 (234)	71.2 (79)	85.1 (86)	87.9 (102)	93.1 (108)	89.7 (182)	90.5 (182)	93.1 (94)	89.2 (91)	85.1 (86)	91.1 (92)	86.0 (86)	93.0 (93)	97.0 (97)	98.0 (98)	84.1 (966)	87.1 (984)	85.6 (1950)
Regular checking of the lid of the overhead water reservoir	73.5 (233)	83.5 (258)	82.0 (91)	73.3 (74)	83.6 (97)	87.9 (102)	84.2 (171)	79.1 (159)	86.1 (87)	91.2 (93)	80.2 (81)	87.1 (88)	85.0 (85)	92.0 (92)	95.0 (95)	99.0 (99)	81.8 (940)	85.4 (965)	83.6 (1905)
Removal of excessive water from flower pots /flower beds	91.8 (291)	90.3 (279)	93.7 (104)	94.1 (95)	97.4 (113)	98.3 (114)	91.6 (186)	79.6 (160)	97.0 (98)	96.1 (98)	79.2 (80)	86.1 (87)	93.0 (93)	96.0 (96)	89.0 (89)	97.0 (97)	91.7 (1054)	90.8 (1026)	91.3 (2080)
Wearing full-sleeved clothes	79.5 (252)	82.5 (255)	66.7 (74)	65.3 (66)	59.5 (69)	62.9 (73)	94.1 (191)	90.0 (181)	56.4 (57)	61.8 (63)	72.3 (73)	76.2 (77)	57.0 (57)	69.0 (69)	71.0 (71)	75.0 (75)	73.5 (844)	76.0 (859)	74.7 (1703)
Use of anti-mosquito spray	35.6 (113)	40.8 (126)	45.9 (51)	57.4 (58)	55.2 (64)	63.8 (74)	50.2 (102)	61.7 (124)	46.5 (47)	72.5 (74)	40.6 (41)	68.3 (69)	38.0 (38)	36.0 (36)	56.0 (56)	64.0 (64)	47.4 (545)	51.9 (586)	49.6 (1131)
Average	70.5%	73.3 %	70.3 %	72.6 %	73.7 %	76.6 %	78.2 %	74.9%	75.7 %	81.9 %	69.6 %	77.2 %	74.7 %	78.7 %	76.3 %	84.8 %	73.9 %	75.9 %	74.9 %