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AWARENESS, PREVENTIVE PRACTICES AND COPING STRATEGIES REGARDING VECTOR-BORNE DISEASES IN THE CONTEXT OF CLIMATE CHANGE: A CROSS-SECTIONAL STUDY IN THE KAROL WAR COMMUNITY, LAHORE, PAKISTAN

Areesha Rasheed[1], Javeria Ghulam Rasool[2], Umme Habiba[3], Muhammad Younis[4], Amjad Ali[*5],

[1,2,3,4]*BSN Nursing Student, Lahore,*
[*5]*Assistant Professor, Shalamar Nursing College, Lahore,*

[1]rishiirishii444@gmail.com, [2]javariaghulamrasool@gmail.com, [3]ummeumme141@gmail.com
[4]khosayounis51@gmail.com, [*5]amjadkmu233@gmail.com

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Corresponding Author: *
Amjad Ali

Abstract

Background: *Climate change is altering how vector-borne diseases spread, and Pakistan has seen repeated dengue and malaria surges after heavy monsoon rain and flooding. Very little is known about how people in the rural and semi-urban communities around Lahore understand these risks or what they do about them.*
Objective: *To assess awareness of vector-borne diseases, preventive practices, and coping strategies among residents of the Karol War community in the context of climate change.*
Methods: *We carried out a descriptive cross-sectional study among 273 adults selected by convenience sampling. Data were collected with an adapted, pre-tested questionnaire (content validity index 0.88; Cronbach's alpha 0.851) and analyzed in SPSS version 25 using frequencies and percentages.*
Results: *Most respondents were married (90.1%) and lived in rural areas (66.7%); half were housewives (50.5%). In total, 194 (71.1%) said they had noticed new or increasing diseases linked to weather changes, and 182 (66.7%) reported that they or a household member had had a mosquito-borne illness. Dengue was the disease most often named as having increased (34.8%) and the most common problem after floods (38.1%). Awareness of vector-borne diseases was average in 74.4% of respondents, poor in 16.9% and good in 8.8%. Preventive practice was poor in 57.9%, average in 29.3% and good in 12.8%. Seeking prompt medical treatment was the most frequently reported coping strategy (69.2%), followed by removing stagnant water (64.5%) and using mosquito nets (61.5%); only 30.0% took part in community awareness programmers.*

Conclusion: *People in this community recognize that weather and disease are connected, but their knowledge is mostly basic and their preventive practice is inconsistent. Prevention programmers here need to move past awareness messages and toward behavior change, supported by practical resources and coordinated vector control around the monsoon season.*

INTRODUCTION

Climate change is now widely treated as one of the main threats to public health. Rising temperatures, heavier and less predictable rainfall, and more frequent floods change where pathogens and their vectors can survive, and how quickly they multiply (Gkouliaveras et al., 2025). Mosquito-borne diseases such as dengue, malaria and chikungunya are especially sensitive to these shifts. Warmer conditions shorten the time a pathogen needs to develop inside the mosquito and increase biting frequency, while flooding and poor drainage leave standing water where mosquitoes breed (Hiscox et al., 2025).

Pakistan carries a heavy share of this burden. Arboviral infections now recur as seasonal epidemics, and recent reviews describe them as a growing strain on the health system (Khan et al., 2025). A World Bank assessment cited in the literature estimates that more than 62 million people in the country are vulnerable to dengue, with a large proportion of land in Punjab and Islamabad suitable for the vector (Carbone et al., 2025). Flood-related dengue outbreaks in Pakistan have also been documented (Ammar et al., 2025). In Sindh, dengue cases in the first seven months of 2024 rose by 135% compared with the same period of 2023, and malaria cases in the province exceeded 149,000 (Anjum & Aziz, 2025).

Communities are not passive in this picture. Households decide whether to cover water containers, clear stagnant water, sleep under nets or seek early treatment, and these decisions strongly shape local transmission (Mehran & Ashraf, 2025). Knowledge, attitude and practice (KAP) surveys are the usual way of finding out where a community's understanding falls short and why knowledge does not always turn into action [8]. Studies from several settings suggest that people often know the main diseases and symptoms but apply preventive measures only occasionally (de Brito et al., 2025).

Karol War is a densely settled community in Lahore with a mix of rural and semi-urban living. Limited drainage, uneven waste disposal and seasonal flooding create conditions that favour mosquito breeding. Despite this, we found no published data on what residents know about vector-borne diseases, how they protect themselves, or how they cope with weather-related health risks. This study set out to fill that gap. Its objectives were to assess awareness of common vector-borne diseases, to describe the preventive practices households follow, and to identify the strategies used to cope with climate change and its health effects.

Methods

Study design and setting

A descriptive cross-sectional design, which suited our aim of capturing awareness, practice and coping strategies at a single point in time. The study took place in the Karol War community in Lahore, Punjab, about 4.5 km from the Ring Road.

Participants and sampling

The target population was adult residents of Karol War. Sample size was calculated with Cochran's formula for an unknown population, using a 95% confidence level (Z = 1.96), an expected proportion of 77% based on earlier dengue data, and a 5% margin of error. This gave 273 participants. Recruited by convenience sampling, approaching people who were available and willing to take part.

Included residents who had lived in the area for at least six months, were aged 18 to 50 years, were of either sex, and gave informed consent. Excluded people with communication barriers that prevented participation, people with very limited exposure to information sources (little or no access to social media, newspapers or news broadcasts), and anyone working or studying in the medical field, because professional knowledge could bias their answers.

Instrument

An adapted structured questionnaire Samsudin et al. (2025) with four parts: (1) demographic characteristics; (2) perception of climate change and disease trends; (3) knowledge of vector-borne diseases, including common diseases, breeding sites, transmission, symptoms and attitudes to prevention; and (4) preventive practices and personal or family experience of mosquito-borne illness. Items were multiple choice, checkbox and Likert type. The tool was pre-tested for clarity and showed a content validity index of 0.88 and a Cronbach's alpha of 0.851. Consent forms and the questionnaire were available in English and Urdu.

Awareness was scored from nine items (correct = 1, incorrect = 0; range 0–9) and grouped as poor (0–3), average (4–6) or good (7–9). Practice was scored from four items (always = 3, sometimes = 2, never = 1; range 4–12) and grouped as poor, average (5–7) or good (8–12).

Data collection

Participants received an explanation of the purpose, procedures, risks and benefits and signed a written consent form. They then completed the questionnaire in a quiet place, and the researcher was present to clarify questions without steering answers. About 45 minutes were allowed. Completed forms were checked for completeness, then entered twice into Microsoft Excel (double entry) to reduce typing errors, cleaned, and exported for analysis.

Data analysis

Data analyzed through SPSS version 25. Categorical variables are reported as frequencies and percentages. Coping strategies could be selected in combination, so their percentages are calculated on the full sample.

Ethical considerations

The protocol was reviewed and approved by Shalamar Nursing College, approval number [SNC-00-23-25]. Participation was voluntary, participants could withdraw at any time without penalty, and no names were recorded. Codes were used in place of identities and all data were used only for research.

Results

Characteristics of respondents

Of the 273 respondents, 147 (53.8%) were women and 126 (46.2%) were men. Two thirds were aged 21 to 40 years. Nearly all were married (90.1%), and about half were housewives (50.5%). Most had no more than secondary schooling (81.0%), and two thirds lived in rural areas (Table 1).

Table 1. Socio-demographic characteristics of respondents (N = 273)

Characteristic	n	%
Gender		
Male	126	46.2
Female	147	53.8
Age (years)		
15–20	20	7.3
21–30	86	31.5
31–40	96	35.2
41–50	41	15.0
51–60	30	11.0
Marital status		
Single	23	8.4
Married	246	90.1
Divorced	4	1.5
Education		
No formal education	37	13.6

Primary	87	31.9
Secondary	97	35.5
Intermediate	26	9.5
Bachelor's degree	26	9.5
Occupation		
Student	6	2.2
Housewife	138	50.5
Laborer	23	8.4
Farmer	24	8.8
Government/private job	34	12.5
Business	48	17.6
Residence		
Urban	32	11.7
Semi-urban	59	21.6
Rural	182	66.7

Perceived link between weather and disease

When asked whether they had noticed new or increasing diseases in their area in recent years because of changes in weather such as heat, heavy rain or flooding, 194 respondents (71.1%) said yes, 32 (11.7%) said no and 47 (17.2%) were not sure. Among the diseases people thought had increased, dengue fever was named most often (34.8%), followed by skin diseases after floods (15.4%) and diarrheal diseases from unsafe water (15.0%). Another 12.8% named dengue, malaria and chikungunya together, 9.5% named malaria alone and 8.1% named respiratory disease. Taken together, the answers point to vector-borne and water-related illness as the main concern.

Asked which health problem people suffered from most after floods or heavy rain, respondents most often chose dengue and other mosquito-borne diseases (38.1%), then chest infections (27.8%), skin diseases (15.0%), malaria (13.2%) and diarrhea or stomach infections (5.9%) (Table 2). Dengue and malaria combined accounted for 51.3% of responses.

Table 2. Most common health problem reported after floods or heavy rain

Health problem	%
Dengue / mosquito-borne diseases	38.1
Chest infections (cough, asthma, pneumonia)	27.8
Skin diseases	15.0
Malaria	13.2
Diarrhea / stomach infections	5.9

Mosquito-borne disease in households

A total of 182 respondents (66.7%) said that they or someone in their household had suffered from a mosquito-borne disease such as dengue, malaria or chikungunya; 91 (33.3%) had not. Among the diseases reported, dengue accounted for 47.25%, malaria for 32.60% and other diseases for 20.15%.

Awareness and preventive practice

Awareness of vector-borne diseases was mostly average: 74.4% scored in the average range, 16.9% scored poor and only 8.8% scored good. Practice was weaker. More than half of respondents (57.9%) fell in the poor category, 29.3% were average and 12.8% were good (Table 3).

Table 3. Awareness and practice levels

Level	Awareness (%)	Practice (%)
Poor	16.9	57.9
Average	74.4	29.3
Good	8.8	12.8

Coping strategies

The most common strategy was seeking medical treatment promptly (69.2%), followed by removing stagnant water around the house (64.5%) and using mosquito nets (61.5%). More than half covered water storage containers (55.3%) or used insecticide sprays and repellents (52.0%). Improving household sanitation was reported by 49.1%. Protective clothing (35.5%) and participation in community awareness programs (30.0%) were less common, and temporary relocation during extreme weather was the least used (10.3%) (Table 4).

Table 4. Strategies used to cope with climate change and its health effects (multiple responses, % of 273)

Strategy	n	%
Seeking medical treatment promptly	189	69.2
Removing stagnant water around the house	176	64.5
Using mosquito nets	168	61.5
Covering water storage containers	151	55.3
Insecticide sprays or repellents	142	52.0
Improving household sanitation	134	49.1
Protective clothing (long sleeves, etc.)	97	35.5
Community awareness programs	82	30.0
Migration or temporary relocation	28	10.3

Discussion

This study describes what residents of a Lahore community know and do about vector-borne diseases in a period of changing weather. The main finding is a gap between what people recognize and what they do. Most respondents linked weather changes to disease, and dengue stood out as the leading concern, but knowledge was mostly basic and good preventive practice was uncommon.

Perceived weather–disease link and the dengue burden

About seven in ten respondents had noticed more disease alongside changes in weather, and two thirds reported mosquito-borne illness in their households. This fits with what is known about Pakistan, where dengue outbreaks follow monsoon rains and floods that create breeding sites (Anjum & Aziz, 2025). Portuguese residents surveyed about vector-borne zoonoses gave a similar picture: most reported hotter summers and more vectors in recent years (Mm et al., 2025). These are perceptions, though, and our data cannot show that weather caused any of the illnesses people reported. Household disease was also self-reported without laboratory confirmation, so some of what respondents called dengue or malaria may have been other febrile illness.

Diarrheal disease was named far less often than mosquito-borne illness after floods (5.9%). Post-disaster studies often find water-borne disease to be a major problem, so this deserves a careful reading (Mateus et al., 2023). Our question asked respondents to choose the problem people suffer from most, which may have pushed answers toward the most visible and feared disease. It is also possible that dengue really is the dominant post-flood problem in this community. The present data cannot separate these explanations.

Who is exposed

Half of the sample were housewives, and women made up 53.8% of respondents. Women who spend most of the day at home are plausibly more exposed to breeding sites such as storage drums and flowerpots, and a systematic review has described how gender roles shape women's vulnerability to climate-related health risks supported by Abdel Nabi et al., 2023 and Pontes et al., 2024. Test for differences by sex or occupation, so this remains a reasonable hypothesis rather than a finding. It does suggest that education aimed at women who manage household water would reach the people best placed to remove breeding sites.

Knowledge and practice

Only 8.8% of respondents had good awareness, and almost three quarters had average awareness. Practice was lower still, with 57.9% in the poor category. This pattern, in which knowledge outruns action, has been reported in other settings. Surveys of university students in Afghanistan and Egypt found that most knew about climate change and its health effects but reported weak practices Sherzad et al. (2024), and a study of nursing students in Egypt reported inadequate practices even among those with satisfactory knowledge (Elsharkawy et al., 2024). In Thailand and Lao PDR, knowledge, attitudes and practices on climate change and dengue were largely low and were related to education and socioeconomic status (Mateus et al., 2023). A tick-borne disease survey in Rwanda found that fewer than half of participants had good knowledge, while 56% reported good preventive practices (Gabriel et al., 2025).

Why knowledge does not become action cannot be answered from our data. Cost of nets and repellents, water storage habits that are hard to change when supply is irregular, and the lack of organized community drainage and waste collection are all plausible barriers and need direct study (Rahman et al., 2021). Our finding that only 30.0% joined community awareness programs suggests that collective action is weak, and household effort alone cannot remove breeding sites in shared drains and open ground.

Coping strategies

The most common response to disease risk was seeking prompt treatment (69.2%). It would be wrong to read this as a failing. Early care matters in dengue and malaria, and it is good that most respondents say they would seek it. The concern is that it is used more often than prevention. Removing stagnant water (64.5%) and using nets (61.5%) were reported by roughly two thirds, but with 57.9% in the poor practice category, these measures appear to be applied inconsistently. Very few people considered relocating during extreme weather (10.3%), which is realistic for a mostly rural, low-income population with limited alternatives.

Strengths and limitations

The sample size was calculated rather than assumed, the instrument was pre-tested with acceptable validity and reliability, questionnaires were available. There are also limits. Convenience sampling from a single community restricts generalizability. Data were self-reported and may be affected by recall and social desirability bias. The cross-sectional design captures one point in time and cannot establish cause. This study reported descriptive results only and did not test associations between demographic factors and awareness or practice.

Recommendations

First, community-based efforts, such as village or neighborhood task forces and peer monitoring of household water storage, may help turn average knowledge into regular practice. Second, education should be designed with women in mind, since they manage most household because most were housewife. Finally, future studies should use longitudinal designs, test the factors linked to good practice.

Conclusion

Residents of Karol War widely associate changing weather with illness, and dengue is the disease they worry about most. Their knowledge of vector-borne diseases is mostly basic and their preventive practice is often poor, even though many seek treatment early and take some household measures. Public health

programs in similar communities should aim at sustained behavior change, backed by practical supplies and organized vector control before and after the monsoon.

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