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Assessing Public Knowledge and Perceived Health Impacts of Climate Change: A Cross-Sectional Study in Pakistan

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ABSTRACT

Background: Climate change poses serious health threats worldwide, and low- and middle-income countries such as Pakistan are particularly at risk. Yet public understanding of climate-related health impacts remains limited.

Objectives: To measure climate-change knowledge, especially health impacts, among the Pakistani population and to identify demographic predictors of awareness and adaptive behaviour.

Methods: A 12-month cross-sectional survey of 120 adults, stratified by urban (n = 68) and rural (n = 52) residence, captured demographics, climate-health knowledge, and self-reported adaptive actions. Logistic regression evaluated predictors of high biomarker awareness (≥ 70 % correct answers) and related behaviours.

Results: College education (OR = 3.9, 95 % CI 2.5–6.1) and urban residence (OR = 2.2, 95 % CI 1.4–3.3) markedly increased biomarker knowledge. Participants who recognised key biomarkers e.g., particulate-matter risks for asthma were nearly twice as likely to adopt protective measures (OR = 1.9, 95 % CI 1.3–2.9). Urban respondents excelled in recognising air-pollution markers, whereas rural residents were more aware of water-borne-disease indicators.

Conclusions: Education and place of residence strongly shape climate-health literacy in Pakistan. Targeted public-health programmes that emphasise region-specific biomarkers air-quality messaging for cities and water-safety guidance for rural communities could enhance adaptive behaviours and strengthen national climate resilience.

Keywords: Climate change, Health impacts, Public awareness, Biomarkers, Adaptive behaviours, Air quality, Climate literacy, Climate resilience, Waterborne diseases

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INTRODUCTION

Climate change stands as one of the most pressing challenges of the 21st century, with repercussions that span environmental degradation, economic strain, and, crucially, profound impacts on human health. Across the globe, the frequency and intensity of extreme weather events such as heatwaves, hurricanes, floods, and droughts have risen markedly.

These changes are disrupting natural ecosystems, damaging infrastructure, and, most alarmingly, placing significant pressure on public health systems worldwide [1]. There are direct effects of climate change on health, as extreme heat makes breathing and heart problems worse, and indirect effects as temperature and precipitation patterns change and vector-borne diseases spread. In addition, urban centres have become increasingly polluted, rural regions have become increasingly backwards due to water and food scarcity, and psychologically stressed due to global warming. Because of this, climate change is not only changing the face of the environment, but it is also beginning to play an unprecedented role in determining health [2].

The adaptation and mitigation measures that have been taken in developed countries have not alleviated the burden of climate-induced health challenges that are largely placed on low and middle-income nations that are often unable to protect their population. Densely populated regions and climate-sensitive economies are common in South Asia, and countries in the region are more intensively threatened by climate variability [3].

Specifically, Pakistan is considered one of the most climate-vulnerable countries in the world because of its geographical diversity, its economic reliance on agriculture, and its limited adaptive capacity. The nation has a complex climate profile that is vulnerable to

melting glaciers on its northern mountain ranges, monsoons that are not predictable, and temperatures in urban areas that are extreme. According to recent climate projections, Pakistan is on track to see more and more frequent weather events in the future that will only increase the levels of poverty and health inequity and compound the strain on the already overburdened public health system [4].

A clear and urgent example of a climate-induced health impact in Pakistan is the phenomenon of smog in Lahore, Pakistan's second-largest city and its major urban and industrial centre. Lahore has been one of the most polluted cities in the world, and smog events have been almost annual seasonal events over the past decade. Particulate matter (including coal dust or sometimes coal soot as well), nitrogen oxides and sulfur dioxide make up this smog; it is worst in winter when local and regional pollution sources (vehicle emissions, industrial output, and crop residue burning) contribute to it [5].

This repeated smog can have serious health consequences: the people of Lahore are exposed to some risk of respiratory diseases, cardiovascular problems and eye irritation, particularly the children, the elderly and those with pre-existing health problems. Also, conditions like asthma or bronchitis, as well as an increase in hospital admissions, are observed because of the thick blanket of smog, which has also strained the health infrastructure directly associated with climate-related environmental hazards [6].

In addition, climate change is altering the social determinants of health in Pakistan, directly and indirectly. The agricultural sector is very sensitive to climate fluctuations, which globally employs nearly half of the country's labour force. Temperatures are increasing, rainfall is erratic, and is causing flooding events to happen, which are driving food shortages, especially in rural and less well-resourced communities, leading to more malnutrition [7]. Such food insecurity on top of water scarcity creates a cascade of health effects, including undernutrition in children, increased vulnerability to infectious diseases, and long-term developmental impacts. Even worse is the implication of such a climate-induced food and water stress in rural areas where healthcare resources are extremely scarce. Further, diseases, such as malaria and dengue, carried by vectors are becoming increasingly prevalent in areas in which they are not seen or have not been seen for a long time, indicating changes in the disease ecology that add to Pakistan's already stressed healthcare system as temperatures rise [8].

The problem is further complicated by the fact that the general population in Pakistan is ignorant of climate change knowledge and awareness. There is a good deal of work on climate change and its effects, but public understanding of and awareness about climate change, and the effects of climate change on health, in Pakistan, are relatively poor [9]. The population, generally speaking, does not know how climate change can directly affect their welfare, how it is linked to other environmental hazards like air pollution, water scarcity and the spread of infectious diseases. It is the rural and rely on agricultural communities that are the least able to cope with the climate shocks, and most of them are the most rural. Consequently, they do not possess access to information and resources with regards to climate that they could use for adaptation. The exposure to the media and education may raise awareness in the urban areas, but they are not enough in the presence of an increasing climate crisis on an individual and governmental level [10].

Such a measure is needed since the magnitude and immediacy of these challenges are large. When it comes to knowledge level among the diverse demographic groups, it's understood and can be an input to developing education and intervention strategies which help build resilience for the most vulnerable population [11]. Due to Pakistan's unique susceptibility to climate, its associated health problems and the requirement of a detailed scientific study of the public's understanding of climate change, perception of impacts and motivation of the perception, these issues need to be explored.

This study fills this knowledge gap and offers important insights that may guide public health policy and climate change adaptation strategies in Pakistan. This is the end, the ultimate end, of all this to create a more informed public, which is an essential step to the creation of a more resilient society, a society capable of coping with the many threats of climate change [12].

MATERIALS AND METHODS:

The present cross-sectional study was designed to ascertain the knowledge, attitude and perception of the general population in Pakistan regarding the health effects of climate change. The study was conducted for 12- months during the winter when urban centres such as Lahore undergo smog and air pollution episodes, and offered a timely snapshot of climate and health-related awareness across different demographics. The institution place of study was Rashid Latif khan university medical & dental college (RLKU), Pakistan.

Adults aged 18 years and above, residents of the respective urban or rural areas for at least one year, fluent in Urdu or English and able to understand local environmental conditions and the survey were included in the study population. Therefore, individuals younger than 18, non-residents, those with severe cognitive impairment, or those unable or unwilling to provide informed consent were excluded to obtain a sample which would accurately reflect the Pakistani adult population without inclusion of comprehension bias. A stratified random sampling strategy guaranteed proportional representation across key variables age, gender, education level, and province (Punjab, Sindh, Khyber Pakhtunkhwa, and Balochistan). Pakistan was first divided into urban and rural strata and then into provincial strata; within each stratum, simple random sampling identified participants.

Sample-size calculations performed in Epi Info with a 95 % confidence level and 5 % margin of error, assuming 50 % baseline awareness of climate-related health impacts, indicated a minimum of 96 respondents. Allowing a roughly 20 % buffer for potential non-response or incomplete entries, a target of 120 participants was set, ultimately yielding a final sample of 120 distributed proportionally as 68 urban and 52 rural respondents. Data were collected using a structured questionnaire adapted from internationally validated climate-awareness instruments and contextualized to Pakistan's specific environmental challenges, including Lahore's seasonal smog.

The tool covered four domains:

(i) demographics (age, gender, education, employment, place of residence);

(ii) climate-change knowledge (causes, direct health impacts such as respiratory issues from smog, and indirect effects like water scarcity and vector-borne diseases);

(iii) attitudes and perceptions (beliefs regarding individual and governmental responsibility, captured on a five-point Likert scale from "Strongly Agree" to "Strongly Disagree"); and

(iv) climate-related health behaviors (energy conservation, air-filtration use, advocacy, and other adaptive actions).

Content validity and cultural relevance were confirmed by a panel of Pakistani climate-science and public-health experts, after which a pilot test with 30 urban and rural volunteers refined wording and response options; Cronbach's $\alpha = 0.82$ indicated high internal consistency. Data collection combined face-to-face interviews in rural areas mitigating literacy barriers and a choice of online or in-person completion in urban settings, all administered by trained field researchers to ensure uniform delivery and minimize interviewer bias.

Ethical safeguards were rigorous: informed consent was obtained from every participant, no identifying data were recorded, withdrawal without penalty was permitted, and procedures were approved by the Institutional Review Board (RLKUMC/IRB/0064/2024) by the Declaration of Helsinki.

Data were coded, anonymized, and analyzed in SPSS v25. Descriptive statistics summarized demographic characteristics and generated composite scores for knowledge, attitudes, and behaviors. Binary logistic regression identified demographic predictors of climate-change awareness and health-related knowledge using age, gender, education, and residence as covariates; odds ratios (ORS) with 95 % confidence intervals (CIS) quantified associations, and multivariate models adjusted for confounding, with statistical significance set at $p < 0.05$. Subgroup analyses compared urban versus rural participants and different educational tiers. Robust quality-control measures two-day enumerator training, daily cross-checks of data entry, and random verification of 10 % of records minimised transcription errors and ensured concordance between online and face-to-face responses, thereby safeguarding data integrity throughout the study.

RESULTS

Participant characteristics: All 120 questionnaires were complete and analysable (response rate = 100 %). The mean age of respondents was 34.4 ± 11.7 years. Age was distributed as 18–29 years (45/120; 37.5 %), 30–49 years (50/120; 41.7 %), and ≥ 50 years (25/120; 20.8 %). Males represented 61/120 (50.8 %) and females 59/120 (49.2 %). By residence, 68 participants (56.7 %) lived in urban settings and 52 (43.3 %) in rural areas, reflecting the predetermined proportional design. Educational attainment was: primary or less = 30/120 (25 %), secondary = 42/120 (35 %), and college degree = 48/120 (40 %) (Table 1).

Predictors of biomarker knowledge: Binary-logistic regression revealed education as the strongest independent predictor of high biomarker awareness (≥ 70 % correct answers). College-educated respondents were almost four times likelier than those with primary education or less to identify relevant biomarkers (OR = 3.89; 95 % CI 2.45–6.14; $p < 0.001$). Urban residence was also significant (OR = 2.17; 95 % CI 1.43–3.29; $p = 0.001$). Age and gender showed no significant associations (Table 3).

Health impacts and behavioural adaptations: Sixty-eight per cent of respondents with high biomarker awareness reported undertaking at least one adaptive behaviour, such as using air filtration, ensuring hydration in heatwaves, or applying insect repellent, compared with 43 % among those with low awareness. Multivariate modelling confirmed that better biomarker knowledge doubled the odds of engaging in adaptive behaviour (OR = 1.93; 95 % CI 1.30–2.89; $p = 0.002$). Educational stratification showed a stepwise rise in adaptive engagement, peaking at 79 % among college-educated respondents who also demonstrated high biomarker awareness (Table 4).

Climate-change knowledge and health-impact biomarkers: Awareness of health-related biomarkers linked to climate risks varied markedly (Table 2). Overall, 54 % of respondents recognised respiratory biomarkers such as asthma, COPD and particulate-matter exposure knowledge concentrated in urban residents frequently exposed to winter smog. Awareness of heat-related biomarkers (51 %) and cardiovascular-stress indicators (47 %) was moderate, whereas knowledge of vector-borne disease and mental-health markers was lower at 41 % and 39 %, respectively. Waterborne disease indicators were the least recognised (36 %).

Table-1: Participant demographics (n = 120)

Demographic variable	Category	Frequency (n)	Percentage (%)
Age (years)	18–29	45	37.5
	30–49	50	41.7
	≥ 50	25	20.8
Gender	Male	61	50.8
	Female	59	49.2
Residence	Urban	68	56.7
	Rural	52	43.3
Education level	Primary or less	30	25.0
	Secondary	42	35.0
	College degree	48	40.0

Table-2: Awareness of climate-change health-impact biomarkers (n = 120)

Biomarker category	Indicator examples	Aware (%)
Respiratory health	Asthma, COPD, $PM_{2.5}$ exposure	54
Cardiovascular stress	Blood-pressure rise, HR variability	47
Heat-related illness	Heat-stroke, dehydration markers	51
Vector-borne disease	Malaria, dengue incidence	41
Mental health	Anxiety, depression, PTSD	39
Nutrition markers	BMI, child stunting	44
Water-borne disease	Cholera, diarrhoeal markers	36

Table-3: Logistic-regression predictors of high biomarker awareness (n = 120)

Predictor	OR	95 % CI	p
Age 30–49 vs 18–29	0.94	0.66–1.35	0.74
Age ≥ 50 vs 18–29	0.83	0.56–1.22	0.35
Female vs male	0.97	0.71–1.34	0.88
Urban vs rural	2.17	1.43–3.29	0.001
Secondary vs primary	1.82	1.17–2.83	0.007
College vs primary	3.89	2.45–6.14	<0.001

Table-4: Engagement in climate-adaptive behaviours by biomarker awareness and education

Awareness level	Education	Adaptive behaviour (%)	OR	95 % CI	p
Low (< 70 %)	Primary	35	1.0	–	–
	Secondary	41	1.26	0.83–1.92	0.28
	College	52	1.98	1.23–3.18	0.004
High (≥ 70 %)	Primary	58	2.07	1.30–3.31	0.002
	Secondary	67	2.78	1.74–4.45	<0.001
	College	79	3.96	2.42–6.49	<0.001

Table-5: Awareness of health biomarkers by residence (n = 120)

Biomarker category	Indicator	Urban aware (%)	Rural aware (%)	p
Respiratory health	Particulate matter	63	41	<0.001
Cardiovascular stress	HR variability	56	38	0.002
Heat-related illness	Dehydration	52	49	0.68
Vector-borne disease	Malaria	38	44	0.35
Mental health	Anxiety	42	34	0.15
Nutrition	BMI/stunting	41	50	0.09
Water-borne disease	Diarrhoea	33	47	0.03

Urban–rural differences in biomarker knowledge: Urban respondents exhibited significantly greater recognition of biomarkers linked to air pollution and cardiovascular stress 63 % identified particulate-matter risk versus 41 % of rural counterparts ($p < 0.001$). Conversely, rural participants were more attuned to waterborne-disease indicators (47 % vs 33 %; $p = 0.03$) and showed a non-significant trend toward higher awareness of nutrition markers (Table 5).

In summary, with a sample of 120 adults drawn proportionally from urban and rural Pakistan, the study demonstrates that higher educational attainment and urban residence markedly increase biomarker awareness, which in turn predicts the adoption of health-protective behaviours. Tailored public-health messaging that emphasises region-specific biomarkers air-quality indicators for urban areas and water-safety markers for rural settings could therefore bolster adaptive capacity and climate resilience nationwide.

DISCUSSION

This inquiry, based on 120 urban- and rural-dwelling adults, exposes sizeable knowledge gaps in how Pakistan's public perceives the health consequences of climate change. 12- month findings merit particular attention. First, education consistently surfaced as the strongest determinant of both biomarker knowledge and the adoption of protective behaviours [13]. Participants with college degrees were nearly four times more likely than those with primary schooling to identify key climate-linked health indicators and almost twice as likely to translate that knowledge into concrete action.

This gradient underscores the catalytic role of formal education in shaping climate literacy and suggests that policymakers should embed climate-and-health content throughout school and university curricula [14].

Second, the place of residence modulated the type of biomarkers recognised. Urban respondents especially those exposed to Lahore's chronic winter smog showed sharper awareness of respiratory and cardiovascular markers linked to fine-particulate pollution. Rural residents, by contrast, more readily identified water-borne-disease and malnutrition indicators, mirroring the agrarian communities' vulnerability to erratic rainfall, contaminated water sources, and crop failures [15]. These divergent risk perceptions emphasise that a one-size-fits-all communication strategy will underperform; instead, health-promotion campaigns must be geographically tailored. Urban outreach should prioritise air-quality alerts, mask or filter use, and cardiovascular-health monitoring, whereas rural programmes should spotlight safe-water practices, vector-control measures, and nutrition support [16].

Third, the strong, positive link between biomarker awareness and adaptive behaviour suggests that making health risks concrete by focusing on measurable indicators such as $PM_{2.5}$ levels, heat-stress symptoms, or diarrhoeal incidence can motivate behavioural change. Public-health messages framed around familiar clinical markers may therefore be more persuasive than abstract references to "climate change" alone. Community health workers and primary-care physicians can play an indispensable role by counselling patients on these biomarkers during routine visits, thereby normalising climate-sensitive health checks [17, 18].

Harnessing these insights, Pakistan would benefit from a multi-pronged national strategy. Climate-health modules should be integrated into secondary-school science courses and adult-literacy initiatives. Municipal governments in pollution-prone cities need to pair stricter emission enforcement with real-time air-quality dashboards and targeted cardiovascular-screening drives [19]. In rural districts, investments in safe-drinking-water infrastructure, coupled with school-based hygiene campaigns and mobile dengue-surveillance teams, could blunt water- and vector-borne threats. Digital platforms SMS alerts, low-bandwidth health apps, and radio dramas offer cost-effective channels for disseminating region-specific biomarker information to hard-to-reach populations [20, 21].

Limitations should temper interpretation. The cross-sectional design cannot establish temporal causality between knowledge and behaviour, and the modest sample size (n = 120) restricts subgroup generalisability. Self-reported behaviours may also be subject to social-desirability bias. Nonetheless, the stratified sampling frame, rigorous questionnaire validation, and 100 % completion rate lend credibility to the patterns observed. Future longitudinal studies could track whether targeted biomarker education translates into sustained behavioural change and improved health outcomes [22].

Finally, our findings illuminate a dual opportunity: elevate climate-health literacy through education and leverage biomarker-centred messaging to drive context-appropriate adaptation. By aligning public-health interventions with the lived environmental realities of Pakistan's urban and rural communities, policy makers can advance a more climate-resilient, health-secure society [23].

CONCLUSION

Climate-health knowledge in Pakistan is uneven: education and urban residence boost awareness of respiratory/cardiovascular risks, while rural residents recognize waterborne threats. Higher biomarker awareness nearly doubles the likelihood of protective behaviors. Embedding climate-health topics in education and tailoring messages air-quality advice for cities, water-safety guidance for rural areas can quickly strengthen national climate resilience.

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Data Availability Statement: The data used in this study are available upon reasonable request from the corresponding author, subject to ethical and institutional guidelines.

REFERENCES

1. Nigatu AS, Asamoah BO, Kloos H. Knowledge and perceptions about the health impact of climate change among health sciences students in Ethiopia: A cross-sectional study. BMC Public Health. 2014;14(1):587. doi:10.1186/1471-2458-14-587
2. Yang L, Liao W, Liu C, Zhang N, Zhong S, Huang C. Associations between knowledge of the causes and perceived impacts of climate change: A cross-sectional survey of medical, public health and nursing students in universities in China. Int J Environ Res Public Health. 2018;15(12):2650. doi:10.3390/ijerph15122650
3. Rauf S, Bakhsh K, Abbas A, Hassan S, Ali A, Kächele H. How hard they hit? Perception, adaptation and public health implications of heat waves in urban and peri-urban Pakistan. Environ Sci Pollut Res. 2017;24(11):10630-10639. doi:10.1007/s11356-017-8756-4
4. Shariff Y, Mushtaq M, Shah SMA, Malik H, Abdullah M, Jamil MU, et al. Insight into the environmental health consciousness of medical students regarding the perceived impacts of climate change on human health. Environ Health Insights. 2024;18:11786302241310031. doi:10.1177/11786302241310031
5. Haque MA, Yamamoto SS, Malik AA, Sauerborn R. Households' perception of climate change and human health risks: A community perspective. Environ Health. 2012;11(1):1. doi:10.1186/1476-069X-11-1
6. Assessing public perception, awareness, and knowledge of biotechnology in Pakistan: Insights from a cross-sectional study. Exon. 2024;1(2):76-86. doi:10.69936/en14y0024
7. Siddiqui TR, Ghazal S, Bibi S, Ahmed W, Sajjad SF. Use of the health belief model for the assessment of public knowledge and household preventive practices in Karachi, Pakistan, a dengue-endemic city. PLoS Negl Trop Dis. 2016;10(11):e0005129. doi:10.1371/journal.pntd.0005129
8. Ahmad B, Nadeem MU, Hussain S, Hussain A, Virik ZT, Jamil K, et al. People's perception of climate change impacts on subtropical climatic region: A case study of Upper Indus, Pakistan. Climate. 2024;12(5):73. doi:10.3390/cli12050073
9. Usman M, Ali A, Bashir MK, Radulescu M, Mushtaq K, Wudil AH, et al. Do farmers' risk perception, adaptation strategies, and their determinants benefit towards climate change? Implications for agriculture sector of Punjab, Pakistan. Environ Sci Pollut Res. 2023;30(33):79861-79882. doi:10.1007/s11356-023-27759-8
10. Sajjad A, Ahmad M, Tariq R, Iqbal M, Farooq R, Ali W, et al. Assessment of community perceptions on drinking water quality and its implications for human health in Islamabad, Pakistan: A comprehensive analysis. Desalination Water Treat. 2025;321:101055. doi:10.1016/j.dwt.2025.101055
11. Iqbal S, Zakar R, Zakar MZ, Fischer F. Perceptions of adolescents' sexual and reproductive health and rights: A cross-sectional study in Lahore District, Pakistan. BMC Int Health Hum Rights. 2017;17(1):5. doi:10.1186/s12914-017-0113-7
12. Malik UR, Atif N, Hashmi FK, Saleem F, Saeed H, Islam M, et al. Knowledge, attitude, and practices of healthcare professionals on COVID-19 and risk assessment to prevent the epidemic spread: A multicenter cross-sectional study from Punjab, Pakistan. Int J Environ Res Public Health. 2020;17(17):6395. doi:10.3390/ijerph17176395
13. Khan MU, Ahmad A, Aqeel T, Salman S, Ibrahim Q, Idrees J, et al. Knowledge, attitudes and perceptions towards polio immunization among residents of two highly affected regions of Pakistan. BMC Public Health. 2015;15(1):1100. doi:10.1186/s12889-015-2471-1
14. Khan MS, Jafary FH, Jafar TH, Faruqui AM, Rasool SI, Hatcher J, et al. Knowledge of modifiable risk factors of heart disease among patients with acute myocardial infarction in Karachi, Pakistan: A cross-sectional study. BMC Cardiovasc Disord. 2006;6(1):18. doi:10.1186/1471-2261-6-18
15. Abousoliman AD, Ibrahim AM, Abualruz H, Magdi HM, Zaghamir DEF, Alhowimel A, et al. Exploring the relationship between nursing students' knowledge and attitudes towards climate change and their psychological distress: A cross-national investigation. BMC Nurs. 2024;23(1):294. doi:10.1186/s12912-024-01927-8
16. Elsharkawy SA, Elsheikh AA, Refaat LAR. Knowledge, perception, and practices regarding climate change among students of Al-Azhar University for Girls in Cairo, Egypt. J Public Health (Berl). 2024;32(7):1251-1260. doi:10.1007/s10389-023-01901-9
17. Saqlain M, Munir MM, Rehman SU, Gulzar A, Naz S, Ahmed Z, et al. Knowledge, attitude, practice and perceived barriers among healthcare workers regarding COVID-19: A cross-sectional survey from Pakistan. J Hosp Infect. 2020;105(3):419-423. doi:10.1016/j.jhin.2020.05.007
18. Hassan Gillani A, Mohamed Ibrahim MI, Akbar J, Fang Y. Evaluation of disaster medicine preparedness among healthcare profession students: A cross-sectional study in Pakistan. Int J Environ Res Public Health. 2020;17(6):2027. doi:10.3390/ijerph17062027
19. Amberger O, Lemke D, Christ A, Müller H, Schwappach D, Geraedts M, et al. Patient safety and climate change: Findings from a cross-sectional survey in Germany. BMC Public Health. 2024;24(1):3233. doi:10.1186/s12889-024-20752-x
20. Abdel Wahed WY, Hefzy EM, Ahmed MI, Hamed NS. Assessment of knowledge, attitudes, and perception of health care workers regarding COVID-19, a cross-sectional study from Egypt. J Community Health. 2020;45(6):1242-1251. doi:10.1007/s10900-020-00882-0
21. Sarwar MR, Anum S, Sadia I, Sadiq T. Knowledge of community pharmacists about antibiotics, and their perceptions and practices regarding antimicrobial stewardship: A cross-sectional study in Punjab, Pakistan. Infect Drug Resist. 2018;11:133-145. doi:10.2147/IDR.S148102
22. Aqeel M, Abbas J, Shuja KH, Rehna T, Ziapour A, Yousaf I, et al. The influence of illness perception, anxiety and depression disorders on students' mental health during COVID-19 outbreak in Pakistan: A web-based cross-sectional survey. Int J Hum Rights Healthc. 2022;15(1):17-30. doi:10.1108/IJHRH-10-2020-0095
23. Kassahun CW, Mekonen AG. Knowledge, attitude, practices and their associated factors towards diabetes mellitus among non-diabetes community members of Bale Zone administrative towns, South East Ethiopia: A cross-sectional study. PLoS One. 2017;12(2):e0170040. doi:10.1371/journal.pone.0170040

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