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Assessment of Public Health Literacy and Preparedness for Emerging Infectious Diseases Among Young Adults in Pakistan: A Survey-Based Study

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Abstract

Background: Public health literacy is essential for improving preparedness against emerging infectious diseases, particularly in low- and middle-income countries such as Pakistan. Despite increasing public awareness following recent disease outbreaks, limited evidence exists regarding the relationship between public health literacy, knowledge, risk perception, health information-seeking behavior, and preparedness among the Pakistani population. This study aimed to assess public health literacy and examine its association with preparedness for emerging infectious diseases among young adults in Pakistan.

Methodology: A quantitative analytical cross-sectional study was conducted among **300 young adults** residing across the provinces and administrative regions of Pakistan using a convenience sampling technique. Data were collected using a structured self-administered questionnaire measuring self-perceived public health literacy, knowledge of emerging infectious diseases, risk perception, preparedness, and health information-seeking behavior. Data were analyzed using IBM SPSS Statistics version 27. Descriptive statistics, Spearman's rank-order correlation, Chi-square tests, and multiple linear regression analyses were performed, with statistical significance set at $\mathbf{p < 0.05}$.

Results: Participants demonstrated moderate levels of public health literacy, preparedness, risk perception, and health information-seeking behavior, whereas knowledge of emerging infectious diseases was comparatively low. Public health literacy showed significant positive correlations with preparedness ($\rho = 0.372$, $p < 0.001$), health information-seeking behavior ($\rho = 0.281$, $p < 0.001$), and risk perception ($\rho = 0.147$, $p = 0.011$). Multiple linear regression identified public health literacy as the strongest positive predictor of preparedness ($\beta = 0.360$, $p < 0.001$), while knowledge showed a significant negative association ($\beta = -0.120$, $p = 0.036$). Risk perception and health information-seeking behavior were not significant predictors.

Conclusion: Public health literacy was identified as an important predictor of preparedness for emerging infectious diseases among young adults in Pakistan. Strengthening public health literacy through evidence-based education and effective health communication may improve preparedness, support informed health decision-making, and enhance national readiness for future public health emergencies

Keywords: Public Health Literacy; Emerging Infectious Diseases; Preparedness; Risk Perception; Health Information-Seeking Behavior; Pakistan.

Introduction

Emerging infectious diseases (EIDs) threaten health, society, and the economy, and because they are unpredictable, have a rapid spread, and can be devastating, they are one of the greatest public health challenges of our time. Over the past two decades, Pakistan has experienced repeated outbreaks of both emerging and re-emerging infectious diseases, including COVID-19, dengue fever, Crimean-Congo hemorrhagic fever (CCHF), XDR typhoid, measles, and poliomyelitis (Khalil et al., 2017). In addition to causing illness and death, infectious disease outbreaks are usually accompanied by an 'infodemic' which consists of the rapid dissemination of misinformation and disinformation along with its impact on public perceptions and decisions related to health (Abuhaloob et al., 2024). Therefore, making the public more health literate is crucial to a robust disease prevention, outbreak preparedness, and community resilience campaign.

Public health literacy is defined as an individual's access, understanding, appraisals, and applications of quality health information to make considered choices for personal and community health (Freedman et al., 2009). Public health literacy differs from general health literacy in that it focuses on health issues affecting the population, disease prevention, public health recommendations and getting ready to respond in times of outbreak (Sørensen et al., 2012). Those who are provided with adequate public health literacy will have better ability to know the signs, symptoms, or early indicators of a disease, understand how the disease is contracted, comply with preventive action, and critically assess health information received from different sources (Paakkari & Okan, 2020). On the other hand, a lack of public health literacy can lead to misinformation, poor health choices, inexperience with following prevention guidelines, and a lack of readiness during infectious disease emergencies (Saleem & Jan, 2024).

A specific population of particular interest in the case of emerging infectious diseases were the young adults (Mukherjee, 2017). All these factors make them more susceptible to health information and to misinformation coming online (Scherer & Pennycook, 2020). The education, workplace and community are areas where young adults are likely to meet one another, and their knowledge, attitudes and preventive practices could either facilitate the transmission or prevention of infectious diseases (Wang et al., 2018). Knowing their general knowledge about public health and preparedness is critical in designing effective public health interventions and increasing the resilience of communities for the next outbreaks of disease (Lawrence, 2024; Zadeh et al., 2025).

Multiple environmental, demographic, and socioeconomic risk factors continue to make Pakistan susceptible to both endemic and emerging infectious diseases (Ammar et al., 2025). The high population density, limited public health resources, frequent natural disasters, climate variability and a lack of adequate sanitation make cities prime breeding grounds and places where infectious diseases can spread (Ellwanger et al., 2021). While the knowledge and circumstance of disease surveillance and public health response is improving, public health promotion of community awareness, access to accurate health information and the encouragement of preventive health behaviors within the general population remain problematic (Wairimu & Special, 2024).

The level of health literacy apparent across previous studies in Pakistan, however, was found to be different and gaps in knowledge on infectious disease prevention and control (Maqsood & Smith, 2025). For many young adults, their first/primary resource for health information is social media and Internet sources, both of which are prone to false or misleading information. This dependence can be a factor in wrong beliefs about the transmission of the disease, vaccines, preventive actions, and right health-seeking practices. Hence, public health literacy of young adults still needs to be improved to ensure their preparedness to support public health protection during a new outbreak of any disease and to encourage better and evidence-based health practices (Bonnie et al., 2015).

While there are several studies related to COVID-19 awareness, vaccination acceptance, or public health literacy in general among university students or specific groups of people in Pakistan, not much research to date has evaluated public health literacy level and preparedness for emerging infectious disease among young adults (Raza et al., 2021). The poor availability of full evidence hinders the design of ready education plans and preparedness strategies for young adults by policymakers and public health experts (Fazeli et al., 2024). As such, a more comprehensive evaluation of these factors is needed to gain a more complete understanding of strengths and areas for improvement currently have with respect to outbreak preparedness (Mohammadpour et al., 2021).

The present study seeks to validate public health urgency awareness and state of preparedness among young adults of Pakistan for emerging infectious diseases (EID). In particular, the study aims to assess the level of self-perceived public health literacy, information about EIDs, risk perception, disease outbreak preparedness, and individuals' attitudes towards seeking health information. It also seeks to find out the effects of these outcomes that are significantly affected by selected sociodemographic characteristics. Results will yield reliable baseline data that can be used by policy makers, health professionals, public health practitioners and educators to design appropriate, outreach and prevention strategies in order to increase public health awareness, preparedness for outbreaks, and evidence-based outreach prevention behaviors among young adults. In the long term, the study will help bolster community resilience, and contribute to Pakistan's ability to react to future threats from emerging infectious diseases.

Methodology

Research Design

A quantitative analytical cross-sectional study design was employed to assess the level of public health literacy (PHL) and preparedness for emerging infectious diseases (EIDs) among young adults in Pakistan. A quantitative approach was considered appropriate because it enabled the systematic collection and statistical analysis of numerical data related to the study variables. The cross-sectional survey design allowed data to be collected from a relatively large sample of participants at a single point in time using a structured questionnaire. This design was suitable for describing the characteristics of the study population and examining associations between public health literacy, knowledge of emerging infectious diseases, risk perception, health information-seeking behavior, preparedness, and selected sociodemographic characteristics.

Study Setting

The study was done with young adults living in various provinces of Pakistan namely Punjab, Sindh, KP (Khyber Pakhtunkhwa), Balochistan and Gilgit-Baltistan/Azad Kashmir. Data was gathered from educational and employment settings, community spaces, and web-based outlets to span the number of backgrounds from which participants could be reached regarding education, career, and outreach. The location criteria of the study setting have been chosen on the bases of the participant's representative of urban, semi-urban, and rural young adults; therefore, all these settings may be represented in the study investigation.

Study Population

The target population in this study was the young adults (18–29 years) of Pakistan. Participants were both female and male from various educational backgrounds and occupations. Volunteers who met the inclusion criteria were asked to participate and fill out the questionnaire.

Sample Size

The sample size was determined using the single population proportion formula. This formula was selected to estimate an adequate sample size for the target population at the desired level of precision. A 95% confidence level, 5% margin of error, and 50% estimated population proportion were used in the calculation.

$$\frac{z^2 \times p(1-p)}{d^2}$$

$$n=\frac{1.96^2 \times 0.5(1-0.5)}{0.05^2}$$

$$n=\frac{3.84 \times 0.25}{.0025}$$

$$n=384$$

Based on the above calculation, the minimum required sample size was 384 participants. Accordingly, 384 eligible young adults were invited to participate in the study. Of these, 300 returned complete questionnaires suitable for analysis, resulting in a response rate of 78.1%. Therefore, the final analysis was conducted using data from 300 participants.

Sampling Technique

The participants were recruited by participants were recruited using a non-probability convenience sampling technique. Those who fit the eligibility criteria and were available for data collection were invited. The choice of convenience sampling was made to provide responses from many participants within the timeframe and resources set and to be economical and practical.

Study Instrument

A researcher-constructed structured questionnaire "Assessment of Public Health Literacy and Preparedness for Emerging Infectious Diseases among young adults in Pakistan" was used to collect the data. The questionnaire was designed based on existing literature, as well as media discussions and recommendations from international and national public health organizations in the field of health literacy, health information-seeking, infectious disease prevention and outbreak preparedness.

The questionnaire **consisted** of **43 items** divided into six sections:

- **Section A:** Sociodemographic Characteristics (10 items)
- **Section B:** Self-Perceived Public Health Literacy (10 items)
- **Section C:** Knowledge of Emerging Infectious Diseases (8 items)
- **Section D:** Risk Perception Towards Emerging Infectious Diseases (4 items)
- **Section E:** Preparedness for Emerging Infectious Diseases (6 items)
- **Section F:** Health Information-Seeking Behavior (5 items)

All the public health literacy, risk perception and preparedness sections were measured using a 5-point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree). The knowledge section included response options of True, False, and Don't Know and the demographic and health information seeking sections were multiple choice.

Validity and Reliability of Instrument

The questionnaire was assessed for content validity by a panel of **5–7 experts** from public health, nursing, epidemiology, infectious diseases, and research methodology. The experts evaluated the relevance, clarity, simplicity, and appropriateness of the questionnaire, and their recommendations were incorporated before final data collection. A pilot study was conducted among **30 individuals** who had characteristics like the target population but were excluded from the final study sample. The pilot study assessed questionnaire clarity, feasibility of data collection, and the time required for completion. Internal consistency of the multi-item sections was evaluated using Cronbach's alpha coefficient. The reliability coefficients were **0.750 for Section** Self-Perceived Public Health Literacy **(10 items), 0.817 for Section** Knowledge of Emerging Infectious Diseases **(8 items), 0.718 for Section** Risk Perception Towards Emerging Infectious Diseases **(4 items), and 0.829 for Section** Preparedness for Emerging Infectious Diseases **(6**

items), indicating acceptable to good internal consistency. However, **Section** Health Information-Seeking Behavior **(5 items) showed low internal consistency (α = 0.064)** and required further evaluation.

Data Collection Procedure

Data have been collected individually by the researcher and no institution is involved. A personal approach or via internet links were used with potential young adults according to the inclusion criteria. Researcher explained the purpose and objectives of the study to participants prior to participation and informed consent was obtained in writing and/or electronically from participants. There were no coercive measures taken to involve those who didn't want to share, and the participants were given assurance that they could drop out at any time without repercussions. The questionnaire was completed either as a hard copy or online and took about 10-15 minutes to fill. The identities and confidentiality of the participants were preserved in the entire study. Data was collected until the needed number of 300 participants was reached.

Data Analysis

The information gathered were entered into Microsoft Excel and then analyzed with the aid of Statistical Package for the Social Sciences (SPSS) version 27.0.

Demographic variables and the study variables were summarized using descriptive statistics such as frequencies, percentages, means and standard deviations.

Where appropriate, inferential statistical tests were used including:

- Association between categorical data: Chi-square test.
- Independent Sample T-test for comparing two samples.
- One-way Analysis of Variance (ANOVA) comparison involving more than two groups.
- Spearman's rank-order correlation was used to examine associations among the categorized study variables.
- Multiple linear regression analysis to determine factors that correlate to preparedness for new and emergent infectious diseases.

The p-value for statistical significance was set at < 0.05.

Ethical Considerations

All participants were completely voluntary and informed consent has been obtained from all participants prior to data collection. The subjects' withdrawal from the study was encouraged at any time with no penalty or consequences. The anonymity and confidentiality of the research were effectively maintained throughout the research. No identifying information such as names or personal identification numbers was collected. All collected data were securely stored and were only used for academic purposes and research. The findings were reported in general and not in terms of any one person.

Results

Table .1 **Sociodemographic Characteristics of the Participants (N = 300)**

Variable	Frequency (n)	Percentage (%)
Age group		
18–21 years	124	41.3

Variable	Frequency (n)	Percentage (%)
22–25 years	125	41.7
26–29 years	51	17.0
Gender		
Male	150	50.0
Female	150	50.0
Province of residence		
Punjab	147	49.0
Sindh	64	21.3
Khyber Pakhtunkhwa	48	16.0
Balochistan	21	7.0
Gilgit-Baltistan/AJK	20	6.7
Residential area		
Urban	158	52.7
Semi-urban	78	26.0
Rural	64	21.3
Educational status		
Intermediate/A-Level	163	54.3
Undergraduate	37	12.3
Graduate	70	23.3
Postgraduate	30	10.0
Occupation		
Student	60	20.0
Government employee	130	43.3

Variable	Frequency (n)	Percentage (%)
Private employee	73	24.3
Self-employed	37	12.3
Monthly household income (PKR)		
Less than 30,000	43	14.3
30,001–60,000	171	57.0
60,001–100,000	63	21.0
More than 100,000	23	7.7
Presence of chronic disease		
Yes	43	14.3
No	257	85.7
Previous diagnosis of infectious disease		
Yes	121	40.3
No	179	59.7
Formal public health or healthcare training		
Yes	47	15.7
No	253	84.3

Table .1 shows that most participants were aged 22–25 years (41.7%), followed closely by those aged 18–21 years (41.3%). Male and female participants were equally represented. Nearly half of the participants were from Punjab (49.0%), and more than half lived in urban areas (52.7%).

Most respondents had Intermediate/A-Level education (54.3%), while government employees represented the largest occupational group (43.3%). More than half of the participants reported a monthly household income of PKR 30,001–60,000 (57.0%). Most participants did not have a chronic disease (85.7%), had not previously been diagnosed with an infectious disease (59.7%), and had not received formal public health or healthcare training (84.3%).

Table .2 **Descriptive Statistics of the Categorized Study Variables (N = 300)**

Variable	**Mean**	**Standard Deviation**	**Minimum**	**Maximum**
Self-Perceived Public Health Literacy	2.30	0.56	1	3

Variable	Mean	Standard Deviation	Minimum	Maximum
Knowledge of Emerging Infectious Diseases	1.52	0.73	1	3
Risk Perception Towards Emerging Infectious Diseases	2.38	0.65	1	3
Preparedness for Emerging Infectious Diseases	2.33	0.68	1	3
Health Information-Seeking Behavior	2.04	0.27	1	3

Note. Category scores were coded as 1 = low/poor, 2 = moderate, and 3 = high/good.

Risk perception had the highest mean category score (M = 2.38, SD = 0.65), followed by preparedness (M = 2.33, SD = 0.68) and public health literacy (M = 2.30, SD = 0.56). These findings suggest that participants generally demonstrated moderate to high levels of risk perception, preparedness, and public health literacy. Health information-seeking behavior had a mean score of 2.04 (SD = 0.27), indicating a predominantly moderate level. Knowledge of emerging infectious diseases had the lowest mean score (M = 1.52, SD = 0.73), suggesting comparatively lower knowledge among participants.

Table .3 Spearman's Correlation Between the Main Study Variables (N = 300)

Variable	1	2	3	4	5
1. Self-Perceived Public Health Literacy	1.000	−0.331**	0.147*	0.372**	0.281**
2. Knowledge of Emerging Infectious Diseases	−0.331**	1.000	−0.133*	−0.230**	−0.129*
3. Risk Perception	0.147*	−0.133*	1.000	0.028	−0.034
4. Preparedness	0.372**	−0.230**	0.028	1.000	0.067
5. Health Information-Seeking Behavior	0.281**	−0.129*	−0.034	0.067	1.000

Spearman's rank-order correlation showed a statistically significant positive relationship between public health literacy and preparedness ($\rho = .372$, $p < .001$). Public health literacy was also positively associated with health information-seeking behaviors ($\rho = .281$, $p < .001$) and risk perception ($\rho = .147$, $p = .011$).

Knowledge showed significant negative relationships with public health literacy ($\rho = -.331$, $p < .001$), preparedness ($\rho = -.230$, $p < .001$), risk perception ($\rho = -.133$, $p = .022$), and health information-seeking behaviors ($\rho = -.129$, $p = .026$). No statistically significant relationships were found between risk perception and preparedness ($\rho = .028$, $p = .635$), risk perception and health information-seeking behaviors ($\rho = -.034$, $p = .563$), or preparedness and health information-seeking behaviors ($\rho = .067$, $p = .244$).

Table .4 **Chi-Square Associations Between Selected Variables (N = 300)**

Variables Examined	χ^2	df	p-value	Result
Gender × Preparedness Level	1.281	2	.527	Not significant

Variables Examined	χ^2	df	p-value	Result
Age Group × Preparedness Level	2.708	4	.608	Not significant
Educational Status × Preparedness Level	3.347	6	.764	Not significant
Formal Public Health Training × Public Health Literacy Level	5.231	2	.073	Not significant
Residential Area × Preparedness Level	6.561	4	.161	Not significant
Previous Infectious Disease × Preparedness Level	2.488	2	.288	Not significant

Note. Statistical significance was set at $p < .05$.

The chi-square analysis showed no statistically significant association between preparedness level and gender, age group, educational status, residential area, or previous diagnosis of an infectious disease. All p-values were greater than .05. Similarly, no statistically significant association was found between formal public health or healthcare training and public health literacy level, χ^2 (2) = 5.231, p = .073. However, this association approached statistical significance. The expected-count assumption was satisfied for most tests. In the analysis involving formal public health training, one cell had an expected count below five. Therefore, this result should be interpreted cautiously.

Table .5 **Multiple Linear Regression of Preparedness for Emerging Infectious Diseases (N = 300)**

Predictor	B	SE	β	t	p-value
Constant	1.728	0.349	—	4.952	<.001
Self-Perceived Public Health Literacy	0.434	0.071	0.360	6.086	<.001
Knowledge of Emerging Infectious Diseases	−0.111	0.053	−0.120	−2.105	.036
Risk Perception	−0.021	0.057	−0.020	−0.374	.708
Health Information-Seeking Behavior	−0.085	0.139	−0.034	−0.613	.541

The multiple regression model was statistically significant, F (4, 295) = 14.490, $p < .001$. The predictors collectively explained 16.4% of the variance in preparedness for emerging infectious diseases. Self-perceived public health literacy was the strongest statistically significant positive predictor of preparedness ($\beta = .360$, $p < .001$). This indicates that an increase in public health literacy was associated with an increase in preparedness.

Knowledge of emerging infectious diseases was also a statistically significant predictor, although the relationship was negative ($\beta = -.120$, $p = .036$). This negative result should be interpreted cautiously and the direction of the knowledge coding should be checked. Risk perception ($\beta = -.020$, $p = .708$) and health information-seeking behaviors ($\beta = -.034$, $p = .541$) were not statistically significant predictors of preparedness. Because the dependent variable and predictors were analyzed as ordinal categories coded from 1 to 3, ordinal logistic regression would

provide a more appropriate final analysis. Alternatively, multiple linear regression may be performed using the original continuous total scores.

Discussion

The results of this study are interesting because it revealed that there were no significant correlations between people's risk perception and their preparedness or health information-seeking behavior. There also was moderate to high-risk awareness about emerging infectious diseases (EIDs), but no correlation with higher levels of EID preparedness. This contrasts with several works conducted at international level that have found that individual that feels exposed to a higher risk for a pandemic are more likely to take measures relating to their health and make plans in case of a pandemic scenario (Dillard et al., 2022; Koller et al., 2022). In contrast, the current findings were consistent with findings in low-and middle-income countries where perceived threat of health does not consistently correspond to preparedness. These factors are not only socioeconomic hindrances, educational inequalities, inadequate health system infrastructure, and other structural limitations, but also a lack of perceived risk (Abdi et al., 2025). These results suggest that 'awareness' of risk increases general level of awareness but does not create a level of preparedness until matched with sufficient level of public health literacy, accurate disease knowledge and access to health care services.

This disconnect demonstrates the critical importance of more than identifying health threats. People come from a highly personalized background in which they recognize that emerging infectious diseases are a serious threat to public health, but do not have the factual knowledge, self-efficacy, or tangibleness to create effective preventive plans. The financial resources, the access to health services, the acquisition or lack of information and interrupted official public health communication all play a part in stalling the cycle between knowledge of a risk and preparedness to act. Thus, a public health message which may only convey a hazard warning will not be likely to increase community preparedness. Impacts that are sustainable need to include organized health education that enables behavior change and available prevention resources.

A similar lack of a statistically significant link was found between health information-seeking behavior, and risk perceptions. It is found in existing literature that people with high health risk perception actively look for information about health to alleviate uncertainty (Ferrer & Klein, 2015). This study, however, has not shown any increase in personal- rather than informational-risk-based information seeking behavior among individuals. This is because it is plausible to suggest that many participants are learning about health information anecdotally through things such as television, social media, and social networks etc. rather than actively seeking health information from trusted, fact-checked news sources. Moreover, the abundance of contradictory and excessive health information floating around online can dissuade people from actively seeking health information and undermine consumers' confidence in health information. It highlights the need to not just enhance access to credible health information, but boost individuals' ability to recognize and be able to access credible information sources.

No significant differences in preparedness between gender, age group, level of education, location and previous diagnosis of an infectious disease was found in chi-square analyses, suggesting more uniform preparedness status within each demographic sub-group. The results are inconsistent with studies in high-income countries, which have identified age, education, and socioeconomic status (SES) as demographic factors related to emergency preparedness (Blackburn et al., 2025). A population-level level of preparedness, however, seems more broadly distributed within Pakistan and across South Asia, particularly after the large-scale public health campaigns during the COVID-19 pandemic (Sarkar et al., 2020). Media and internet coverage of standardized prevention guidance might have reduced demographic differences due to the broad

dissemination of universally recommended public health messages and guidance to varying age, sex, and socioeconomic groups.

The relationship did not reach a statistically significant level between having received any formal training in public health or healthcare and having public health healthcare literacy; however, it came close to the commonly used alpha value at 0.05. Descriptively, greater public health literacy was noted among participants who were formally trained in health, compared to untrained participants. This pattern is consistent with the results of previous studies that have successfully proven the effectiveness of structured health education on the understanding of disease prevention, health promotion and emergency responses capacities (Addiarto et al., 2025). This non-significant result may be due to the small percentage of sample who had formal health care training, which may reduce the power to detect a significant difference. Future research should examine larger numbers of health care practitioners with training to establish a more general profile of the effect of formal training in public health.

Multiple linear regression provided further information regarding predictors of EID preparedness. The overall model was statistically significant, and accounted for 16.4% of the variance in preparedness. This aligns with the established behavioral science literature that identifies the need to consider a range of psychological, educational, social, and environmental factors which drive preparedness (Ejeta et al., 2015). Several variables that were not included in this study have been found capable of influencing preparedness on their own, such as trust in health authorities, prior outbreak experiences, and the availability of healthcare services, cultural beliefs, and community resilience, and should be further explored in future studies.

Self-perceived public health literacy proved to be the largest positive predictor of EID preparedness among all the predictors that were included in the regression model. A higher score on the public health literacy scale was significantly associated with greater preparedness for an infectious disease outbreak. This is in sync with a significant body of international evidence which consistently identifies health literacy as an integral part of emergency preparedness and high literacy as a key condition for people to understand and act upon information they receive from the public health system, thereby being able to respond appropriately (Burkle et al., 2023). These findings have been like public health educational attainment status and hence more compliance with preventive measures in case of epidemic outbreaks of infectious diseases that have been reported from regional studies within Pakistan (Bilal et al., 2022). Hence, efforts that aim to increase public health literacy at a population level are warranted and are a potential pathway to improving the preparedness of the community in Pakistan.

The other pieces of knowledge that were significant were those regarding emerging infectious diseases, where again, the relationship was negative. This is a counterintuitive result which challenges the theoretical expectations of knowledge and preparedness and should be interpreted carefully. This finding should not be taken to mean that educated people about the disease means less preparedness. Rather, methodological constraints related to the ordinal categorization and coding of the knowledge variable are likely to be responsible for this. The same kinds of analytical anomalies have been described for measures of knowledge constructs that rely on categorical scales as opposed to composite scores with continuous data (Holesch, 2021). These indicate areas for further research: researchers need to use a validated continuous measurement scale to reduce coding bias and provide more conclusive evidence of the knowledge–preparedness link in order to address the complexities of this relationship.

Taken as a whole, this study demonstrates that public health literacy is a central issue in readiness for emerging infectious diseases. Understanding, assessing, and using health information in an appropriate way is more important for practical preparedness, despite the importance of disease risk knowledge. Implementing evidence-based public health education to enhance population public health literacy provides a viable strategy to inform population and

create more resilient communities against future public health threats, especially infectious disease outbreaks, occurring repeatedly in Pakistan.

Implications of the Study

Our study results indicate that raising Public Health Literacy could improve youth's preparedness against emerging infectious diseases in Pakistan. Public health institutions, educational institutions and other stakeholders should reinforce health literacy based on the information found in evidence-based education and awareness programs. Additionally, ensuring accurate information is shared about health and facilitating access to credible information sources could be beneficial in raising preparedness and assist informational decision-making on health-related matters in future public health threats.

Limitations and Recommendations

There are some limitations observed in this study. The weak links in this study are based on the cross-section design, which was not able to prove causality, and on the implementation of self-reported questionnaires, which could have led to recall and social desirability bias. Besides, the findings of the present study might not be generalizable to the vast population of Pakistan as the study employed a convenience sampling technique. Hence the findings in the study must be considered while interpreting them. Based on the findings, the emphasis should be on promoting PHL by implementing evidence-based educational programs and public awareness raising campaigns. Public health literacy must be incorporated into the educational programs; and healthcare organizations must provide reliable and trusted health information via the media. Larger and diverse samples, and longitudinal study designs should be considered in future research to build on these findings and further examine factors associated with preparedness for emerging infectious disease outbreaks.

Conclusion

In this study, participants had about moderate health public health literacy, risk perception, preparation, and health information-seeking behavior, and there was comparatively less knowledge on emerging infectious diseases. Public health literacy was also associated with preparedness in a positive manner, and was the strongest predictor of preparedness for emerging infectious diseases. Neither was risk perception, nor was health information-seeking behavior, showing that increasing awareness is not enough for preparedness. Findings from this study overall indicate that efforts towards strengthening public health literacy by targeted educational interventions and implementation of health communication skill-based education based on evidence can contribute towards better individual preparedness and better public health emergency responses in Pakistan.

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Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this study.

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Authors' Contribution

The author solely conceived and designed the study, collected, and analyzed the data, interpreted the findings, and prepared the manuscript.

Data Availability Statement

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Reference

Abdi, Y. H., Abdi, M. S., Bashir, S. G., Ahmed, N. I., & Abdullahi, Y. B. (2025). Understanding Global Health Inequality and Inequity: Causes, Consequences, and the Path Toward Justice in Healthcare. Public Health Chall, 4(4), e70156. https://doi.org/10.1002/puh2.70156

Abuhaloob, L., Purnat, T. D., Tabche, C., Atwan, Z., Dubois, E., & Rawaf, S. (2024). Management of infodemics in outbreaks or health crises: a systematic review. Front Public Health, 12, 1343902. https://doi.org/10.3389/fpubh.2024.1343902

Addiarto, W., Pandin, M., Yusuf, A., & Yunita, R. (2025). Disaster Education and Training Programs for Enhancing Community Preparedness: A Systematic Review from the Nursing Perspective. https://doi.org/10.1101/2025.09.16.25335950

Ammar, M., Moaaz, M., Yue, C., Fang, Y., Zhang, Y., Shen, S., & Deng, F. (2025). Emerging Arboviral Diseases in Pakistan: Epidemiology and Public Health Implications. Viruses, 17(2). https://doi.org/10.3390/v17020232

Bilal, W., Qamar, K., Abbas, S., Siddiqui, A., & Essar, M. Y. (2022). Infectious diseases surveillance in Pakistan: Challenges, efforts, and recommendations. Ann Med Surg (Lond), 78, 103838. https://doi.org/10.1016/j.amsu.2022.103838

Blackburn, C. C., Boyce, M. R., Rico, M., Niekamp, K., Moats, J., Radcliff, T., & Thomas, E. (2025). Predictors of Individual-Level Preparedness for Natural Disasters and Trust in Disaster Assistance in the United States, 2024. Public Health Rep, 140(4), 306-315. https://doi.org/10.1177/00333549251341236

Bonnie, R. J., Stroud, C., & Breiner, H. (2015). Investing in the Health and Well-Being of Young Adults. https://doi.org/10.17226/18869

Burkle, F. M., Jr., Khorram-Manesh, A., & Goniewicz, K. (2023). COVID-19 and Beyond: The Pivotal Role of Health Literacy in Pandemic Preparedness. Prehosp Disaster Med, 38(3), 285-286. https://doi.org/10.1017/s1049023x23005824

Dillard, A. J., Lester, J., & Holyfield, H. (2022). Associations between COVID-19 risk perceptions, behavior intentions and worry. Health Psychol Rep, 10(2), 139-148. https://doi.org/10.5114/hpr.2022.114477

Ejeta, L. T., Ardalan, A., & Paton, D. (2015). Application of Behavioral Theories to Disaster and Emergency Health Preparedness: A Systematic Review. PLoS Curr, 7. https://doi.org/10.1371/currents.dis.31a8995ced321301466db400f1357829

Ellwanger, J. H., Veiga, A. B. G., Kaminski, V. L., Valverde-Villegas, J. M., Freitas, A. W. Q., & Chies, J. A. B. (2021). Control and prevention of infectious diseases from a One Health perspective. Genet Mol Biol, 44(1 Suppl 1), e20200256. https://doi.org/10.1590/1678-4685-gmb-2020-0256

Fazeli, S., Haghani, M., Mojtahedi, M., & Rashidi, T. H. (2024). The role of individual preparedness and behavioural training in natural hazards: A scoping review. International Journal of Disaster Risk Reduction, 105, 104379. https://doi.org/https://doi.org/10.1016/j.ijdrr.2024.104379

Ferrer, R., & Klein, W. M. (2015). Risk perceptions and health behavior. Curr Opin Psychol, 5, 85-89. https://doi.org/10.1016/j.copsyc.2015.03.012

Freedman, D. A., Bess, K. D., Tucker, H. A., Boyd, D. L., Tuchman, A. M., & Wallston, K. A. (2009). Public health literacy defined. Am J Prev Med, 36(5), 446-451. https://doi.org/10.1016/j.amepre.2009.02.001

Holesch, A. (2021). Measuring solidarity: towards a survey question on fiscal solidarity in the European Union. Acta Polit, 56(2), 376-394. https://doi.org/10.1057/s41269-021-00198-4

Khalil, A. T., Ali, M., Tanveer, F., Ovais, M., Idrees, M., Shinwari, Z. K., & Hollenbeck, J. E. (2017). Emerging Viral Infections in Pakistan: Issues, Concerns, and Future Prospects. Health Secur, 15(3), 268-281. https://doi.org/10.1089/hs.2016.0072

Koller, J. E., Villinger, K., Lages, N. C., Absetz, P., Bamert, M., Branquinho, C., Chaves-Avilés, L., Dimitropoulou, P., Fernández-Fernández, A. L., Gaspar de Matos, M., Griskevica, I., Gutiérrez-Doña, B., Hankonen, N., Inauen, J., Jordanova Peshevska, D., Kassianos, A. P., Kolsenikova, J., Lavrič, M., Mitanovska, T.,…Renner, B. (2022). Individual and collective protective responses during the early phase of the COVID-19 pandemic in 10 different countries: Results from the EUCLID online survey. Int J Infect Dis, 122, 356-364. https://doi.org/10.1016/j.ijid.2022.06.012

Lawrence, A. (2024). Evaluating the Effectiveness of Public Health Measures During Infectious Disease Outbreaks: A Systematic Review. Cureus, 16(3), e55893. https://doi.org/10.7759/cureus.55893

Maqsood, H., & Smith, I. (2025). Bridging the Health Literacy Gap in Pakistan: The Role of Digital Health Platforms A Review and Case Study Approach.

Mohammadpour, M., Zarifinezhad, E., Ghanbarzadegan, A., Naderimanesh, K., Shaarbafchizadeh, N., & Bastani, P. (2021). Main Factors Affecting the Readiness and Responsiveness of Healthcare Systems during Epidemic Crises: A Scoping Review on Cases of SARS, MERS, and COVID-19. Iran J Med Sci, 46(2), 81-92. https://doi.org/10.30476/ijms.2020.87608.1801

Mukherjee, S. (2017). Emerging Infectious Diseases: Epidemiological Perspective. Indian J Dermatol, 62(5), 459-467. https://doi.org/10.4103/ijd.IJD_379_17

Paakkari, L., & Okan, O. (2020). COVID-19: health literacy is an underestimated problem. The Lancet Public Health, 5(5), e249-e250. https://doi.org/10.1016/S2468-2667(20)30086-4

Raza, S., Mukhtar, N., Nawaz, M., Ali, M. A., Shabbir, M. A. B., Ashraf, M. A., Ali, Z., Saleem, M. R., Latif, R., & Yaqub, T. (2021). A Cross-Sectional Survey of Knowledge, Attitude, and Practices of University Students in Pakistan Regarding COVID-19. Front Public Health, 9, 697686. https://doi.org/10.3389/fpubh.2021.697686

Saleem, S. M., & Jan, S. S. (2024). Navigating the infodemic: strategies and policies for promoting health literacy and effective communication [Perspective]. Frontiers in Public Health, Volume 11 - 2023. https://doi.org/10.3389/fpubh.2023.1324330

Sarkar, A., Liu, G., Jin, Y., Xie, Z., & Zheng, Z. J. (2020). Public health preparedness and responses to the coronavirus disease 2019 (COVID-19) pandemic in South Asia: a situation and policy analysis. Glob Health J, 4(4), 121-132. https://doi.org/10.1016/j.glohj.2020.11.003

Scherer, L. D., & Pennycook, G. (2020). Who Is Susceptible to Online Health Misinformation? Am J Public Health, 110(S3), S276-s277. https://doi.org/10.2105/ajph.2020.305908

Sørensen, K., Van den Broucke, S., Fullam, J., Doyle, G., Pelikan, J., Slonska, Z., Brand, H., & Consortium Health Literacy Project, E. (2012). Health literacy and public health: A systematic review and integration of definitions and models. BMC Public Health, 12(1), 80. https://doi.org/10.1186/1471-2458-12-80

Wairimu, K., & Special, K. (2024). The Role of Public Health in Promoting Health Surveillance. Research Output Journal of Biological and Applied Science, 4, 11-14. https://doi.org/10.59298/ROJBAS/2024/421114

Wang, M., Han, X., Fang, H., Xu, C., Lin, X., Xia, S., Yu, W., He, J., Jiang, S., & Tao, H. (2018). Impact of Health Education on Knowledge and Behaviors toward Infectious Diseases

among Students in Gansu Province, China. Biomed Res Int, 2018, 6397340. https://doi.org/10.1155/2018/6397340

Zadeh, H. S., Ansaripoor, A. H., Chowdhury, M. H. M., & Haghparast, A. (2025). Public health interventions for developing resilience to contagious diseases: a system dynamics approach. Health Care Manag Sci, 28(4), 622-643. https://doi.org/10.1007/s10729-025-09731-9