



Knowledge, Attitude and Practice of University Students' Preparedness for Pandemic Prevention: Lessons Learned from COVID-19

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Abstract

The COVID-19 pandemic underscored the critical role of community-level preparedness, particularly among university students who serve as influencers in public health. This cross-sectional study evaluates the KAP of 458 university students from Herat City, Afghanistan, concerning pandemic prevention. Conducted between October and December 2024, data were collected using a validated, web-based questionnaire and analyzed with SPSS version 27. High awareness of preventive measures was evident, with 97.8% understanding mask use and 95.2% recognizing the importance of social distancing. Positive attitudes toward vaccination (98.5%) and adherence to government measures (95.6%) were common. However, only 69.7% understood transmission routes, and critical gaps in preventive practices were observed, such as inconsistent handwashing (49.1%) and mask use in high-risk settings (43.0%). The overall KAP scores revealed mixed proficiency levels: 50.7% of students demonstrated high knowledge, while 49.3% showed low knowledge, highlighting the need for improved understanding. Attitude levels were predominantly positive, with 67.9% of participants reflecting strong awareness and acceptance of preventive measures. Practice levels were notably high, with 80.1% adherence to effective preventive behaviors, demonstrating commendable real-world application of knowledge and attitudes. KAP levels varied significantly, with high scores more prevalent among non-working students ($p = 0.040$). The study emphasizes the importance of targeted interventions, such as incorporating pandemic preparedness into curricula, enhancing resource accessibility, and implementing behavioral change campaigns. Addressing these gaps is critical for strengthening public health resilience and pandemic preparedness in Afghanistan. The findings conclude that fostering individual responsibility, supported by institutional and policy-level efforts, is essential for building a health-conscious academic community equipped to manage future pandemics.

Keywords: Covid-19, KAP, Pandemic, Preparedness, University Students

Introduction

The COVID-19 pandemic underscored the critical role of community-level prevention and preparedness, particularly among university students—a dynamic and mobile demographic. As educated individuals with significant potential to influence public health, their Knowledge, Attitude, and Practices (KAP) have profound implications for controlling the spread of infectious diseases [1].

Globally, research reveals diverse trends in students' pandemic preparedness. In Ethiopia, 75% of students demonstrated adequate knowledge about COVID-19 prevention, yet only 54% adhered to mask-wearing [2].



Similarly, in Bangladesh, 81% were aware of proper hygiene practices, only 62% consistently practiced social distancing [3].

Attitudes towards pandemic measures also significantly influence behavior. In Vietnam, 68% of students exhibited positive attitudes toward vaccination, correlating with higher compliance rates [4]. Conversely, 43% of Saudi Arabian students expressed skepticism about vaccine safety, leading to reduced uptake [5].

Access to reliable information further shapes compliance. For example, 79.5% of Jordanian students relied on government websites, which contributed to a 90% adherence rate [6]. In contrast, Nigerian students' reliance on social media increased exposure to misinformation, hindering compliance [7].

Demographic factors such as gender and field of study also play a role. Female students consistently demonstrated better preventive practices than males; for instance, in India, 64% of women adhered to mask-wearing, compared to 48% of men [8]. Additionally, health science students often exhibited higher KAP levels than their peers in other disciplines [9].

Despite widespread knowledge, compliance with preventive practices often lags. In Pakistan, 85% of students understood the importance of vaccination, yet only 36% adhered to mask-wearing [10]. A similar pattern emerged in Sudan, where 84% of students understood COVID-19 transmission routes, but only 65% practiced hand hygiene consistently [11].

This study synthesizes lessons from global KAP research and focuses on university students in Herat, Afghanistan, to evaluate their preparedness for pandemic prevention. Identifying and addressing gaps in knowledge, attitudes, and practices is crucial for enhancing pandemic prevention measures in Afghanistan

Materials and Methods

Study Design

This cross-sectional descriptive study was conducted online between October 5, 2024, and December 10, 2024. The target population comprised students from Herat University and Jami University who were residing in Herat City, Afghanistan, during the study period.

Population and Sampling

Convenience sampling was used to include university students who had access to email or social media platforms during the data collection period. The sample size was calculated using **Cochran's formula** for an infinite population:

$$n = \frac{z^2 pq}{e^2} = \frac{(1.96^2)(0.5)(0.5)}{0.05^2} = 384 + 10\% = 422$$

To account for a potential 10% non-response rate, the minimum required sample size was increased to **422 participants**. Ultimately, **458 students** completed the questionnaire during the study period.

Data Collection Tools

Data were collected using a structured, web-based, self-administered questionnaire developed in Dari through Google Forms. The questionnaire was based on a review of prior studies and consisted of four sections:



- **Sociodemographic Information**

This section included 15 questions on gender, age, height, weight, marital status, academic year, faculty, university, housing status, residence type, occupation, economic status, daily water consumption, main water source, and family members.

- **Knowledge Assessment**

Nine questions assessed participants' knowledge. Correct answers were scored as 1, and incorrect responses were scored as 0. The total knowledge score ranged from 0 to 6.

- **Attitude Assessment**

Six questions evaluated attitudes. Correct answers were scored as 1, and incorrect responses as 0. The total attitude score ranged from 0 to 6.

- **Practice Assessment**

Eight questions assessed practices. Correct answers were scored as 1, and incorrect responses as 0. The total practice score ranged from 0 to 6.

The questionnaire was reviewed and validated by three experienced experts. Reliability was assessed using **Cronbach's alpha** in a pilot sample of 30 students. Reliability scores were **0.782** for knowledge, **0.815** for attitude, and **0.798** for practice, indicating high reliability.

Data Collection Procedures

The questionnaire link was distributed through email, Facebook pages, Telegram accounts, and various student association networks. Social media groups and student organizations were targeted to ensure diverse participation and equal representation across universities.

Statistical Analysis

Responses collected via Google Forms were exported to Excel and subsequently analyzed using SPSS version 27. Data cleaning and validation were performed prior to analysis. Descriptive statistics, including means, medians, frequencies, and percentages, were used to summarize demographic and key variable data. Knowledge, attitude, and practice scores were converted to percentages and categorized by median (High and Low). Univariate analysis was performed to assess the association between independent variables, such as occupation status, and high knowledge levels regarding COVID-19 and pandemic preparedness. Chi-square tests were applied for categorical and continuous variables, respectively, to determine statistical significance. A p-value < 0.05 was considered statistically significant.

Ethical Considerations

Participants were informed about the purpose of the study and the research use of their data at the beginning of the questionnaire. Participation was anonymous, and confidentiality was strictly maintained. Ethical approval for the study was granted by the **Institutional Review Board (IRB) at Jami University** (Reference No.: J.2024.10.5.2).



Results

The study primarily involved young adults, with the majority aged 24–26 years (38.4%) and a substantial proportion aged 21–23 years (31.7%). Most participants were single (74.9%) and came from large families, with over half (52.8%) having 6–10 family members. The sample was evenly distributed across academic years, with nearly equal representation from early, middle, and advanced stages of study. A significant majority (83.8%) were affiliated with Herat University, and slightly more participants (55.9%) were enrolled in non-medical faculties than medical faculties. In terms of living arrangements, most participants resided with their families (68.1%), and the majority lived in urban areas (61.8%). About half (49.1%) engaged in occupations alongside their studies. Economic status varied, with most participants identifying as middle (46.5%) or poor (35.4%), and only a small percentage reporting good economic condition (18.1%). Notably, 71.6% had experienced COVID-19, and 68.3% had received the COVID-19 vaccine, indicating high exposure to and awareness of the pandemic within the sample. These findings provide a cohesive snapshot of the participants' demographic, educational, and socio-economic profiles.

		Number of Participants	Percentage
Age	18-20	63	13.8
	21-23	145	31.7
	24-26	176	38.4
	27-31	74	16.2
Marital status	Single	343	74.9
	Married	115	25.1
Family members	1-5	146	31.9
	6-10	242	52.8
	11-15	45	9.8
	16-20	25	5.5
Academic year	First & second year	150	32.8
	Third & fourth year	159	34.7
	Fifth, Sixth & Seventh year	149	32.5
University	Jami University	74	16.2
	Herat University	384	83.8
Faculty	Medical faculties	202	44.1
	Non-medical faculties	256	55.9
Housing status	With family	312	68.1
	Dormitory	146	31.9
Residence type	Urban	283	61.8
	Rurban	175	38.2
Occupation (beside studying)	Yes	225	49.1
	No	233	50.9
Economic Status	Good	83	18.1
	Middle	213	46.5



	Poor	162	35.4
Have you ever been diagnosed with COVID-19?	Yes	328	71.6
	No	130	28.4
Have you received the COVID-19 vaccine?	Yes	313	68.3
	No	145	31.7

Table 1. Demographic and Socioeconomic Characteristics of Universities Students

The findings reveal a high level of awareness among participants regarding key preventive measures for infectious diseases. Nearly all participants recognized the importance of wearing masks (97.8%) and maintaining social distance (95.2%) to prevent the spread of respiratory diseases. A significant majority were aware of government guidelines for pandemic prevention (94.1%), as well as the role of handwashing with soap (89.7%) and vaccines in reducing the severity and spread of pandemics (84.5%). Additionally, 69.7% understood common modes of transmission for infectious diseases, highlighting a strong overall knowledge of preventive practices among the participants.

Knowledge	No		Yes	
	Participants	Percentage	Participants	Percentage
Do you know the common modes of transmission for infectious diseases?	139	30.3	319	69.7
Are you aware that vaccines can reduce the severity and spread of pandemics?	71	15.5	387	84.5
Do you know that handwashing with soap can help prevent the transmission of viruses?	47	10.3	411	89.7
Have you heard about the importance of wearing masks to prevent the spread of respiratory diseases?	10	2.2	448	97.8
Do you know that maintaining social distance can reduce the risk of infection during pandemics?	22	4.8	436	95.2
Are you familiar with any government guidelines for pandemic prevention?	27	5.9	431	94.1

Table 2. Knowledge of University Students About COVID-19 and Pandemic Preparedness

The results demonstrate a strong consensus among participants regarding the importance of preventive measures and trust in pandemic management. Almost all participants believed that wearing masks (97.4%), vaccines (98.5%), and educating oneself about pandemics (98.5%) are crucial for controlling future pandemics. A significant majority agreed on the effectiveness of government-imposed measures like lockdowns (95.6%) and trusted the healthcare system to manage future pandemics effectively (98.7%). However, fewer participants (74.5%) considered following preventive measures as a personal responsibility, indicating a potential area for improving individual accountability.

Attitude	No		Yes	
	Participants	Percentage	Participants	Percentage
Do you believe that wearing masks is essential to preventing the spread of pandemics?	12	2.6	446	97.4
Do you think vaccines are necessary for controlling future pandemics?	7	1.5	451	98.5
Do you agree that government-imposed measures like lockdowns are effective in pandemic control?	20	4.4	438	95.6
Do you feel it is important for individuals to educate themselves about pandemics?	7	1.5	451	98.5
Do you think following preventive measures is a personal responsibility?	117	25.5	341	74.5
Do you trust the healthcare system to manage future pandemics effectively?	6	1.3	452	98.7

Table 3. Attitude of University Students About COVID-19 and Pandemic Preparedness

The findings highlight varied adherence to preventive health behaviors among participants. While the majority had received a COVID-19 vaccine (79.0%) and followed social distancing guidelines during pandemics (97.2%), other behaviors showed less consistency. About half (49.1%) reported regularly washing their hands with soap after being in public places, and 43.0% wore masks in crowded or high-risk environments. Additionally, 76.9% actively sought health-related information during pandemics, and 94.3% participated in or shared information through awareness campaigns. These results suggest strong adherence to some preventive measures but indicate areas for improving compliance with everyday protective behaviors.

Practice	No		Yes	
	Participants	Percentage	Participants	Percentage
Do you regularly wash your hands with soap after being in public places?	233	50.9	225	49.1
Do you wear a mask in crowded or high-risk environments?	261	57.0	197	43.0
Have you received a COVID-19 vaccine?	96	21.0	362	79.0
Do you follow social distancing guidelines during pandemics?	13	2.8	445	97.2
Do you actively seek out health-related information during pandemic situations?	106	23.1	352	76.9
Have you participated in any awareness campaigns or shared preventive health information with others?	26	5.7	432	94.3

Table 4. Practice of University Students About COVID-19 and Pandemic Preparedness

The overall scores of students on knowledge, attitude, and practice regarding COVID-19 and pandemic preparedness reveal mixed levels of proficiency. While 50.7% demonstrated high knowledge levels, a significant 49.3% had low knowledge, suggesting room for improvement in understanding COVID-19 and pandemic preparedness. In terms of attitude, the majority (67.9%) displayed a high level of positive attitudes, reflecting strong awareness and acceptance of preventive measures. Practice levels were notably high, with 80.1% demonstrating adherence to effective preventive behaviors, indicating a commendable application of their knowledge and attitudes in real-world scenarios.

KAP Levels	Low		High	
	Participants	Percentage	Participants	Percentage
Knowledge Level	226	49.3	232	50.7
Attitude Level	147	32.1	311	67.9
Practice Level	91	19.9	367	80.1

Table 5. Overall Scores of Students on Knowledge, Attitude and Practice Regarding COVID-19 and Pandemic Preparedness

The univariate analysis revealed a significant association between occupation status and high knowledge levels regarding COVID-19 and pandemic preparedness. Students who were not working alongside their studies were more likely to have high knowledge (55.4%) compared to those who were employed (45.8%) ($p=0.040$).

Tabulation of Univariate Analysis		High Knowledge			High Attitude			High Practice		
		N	%	P-value	N	%	P-value	N	%	P-value
Age	18-20	30	47.6	0.495	43	68.3	0.856	54	85.7	0.454
	21-23	73	50.3		102	70.3		119	82.1	
	24-26	96	54.5		118	67.0		136	77.3	
	27-31	33	44.6		48	64.9		58	78.4	
Marital status	Single	181	52.8	0.118	236	68.8	0.476	274	79.9	0.819
	Married	51	44.3		75	65.2		93	80.9	
Family members	1-5	69	47.3	0.269	103	70.5	0.698	112	76.7	0.254
	6-10	129	53.3		164	67.8		202	83.5	
	11-15	25	55.6		29	64.4		33	73.3	
	16-20	9	36.0		15	60.0		20	80.0	
Academic year	First & second year	74	49.3	0.681	105	70.0	0.418	118	78.7	0.781
	Third & fourth year	85	53.5		111	69.8		127	79.9	
	Fifth, Sixth & Seventh year	73	49.0		95	63.8		122	81.9	



University	Jami University	30	40.5	0.057	44	59.5	0.089	56	75.7	0.294
	Herat University	202	52.6		267	69.5		311	81.0	
Faculty	Medical faculties	107	53.0	0.379	135	66.8	0.662	157	77.7	0.251
	Non-medical faculties	125	48.8		176	68.8		210	82.0	
Housing status	With family	159	51.0	0.848	210	67.3	0.689	257	82.4	0.079
	Dormitory	73	50.0		101	69.2		110	75.3	
Residence type	Urban	142	50.2	0.795	190	67.1	0.655	232	82.0	0.208
	Rurban	90	51.4		121	69.1		135	77.1	
Occupation (beside studying)	Yes	103	45.8	0.040	148	65.8	0.338	174	77.3	0.140
	No	129	55.4		163	70.0		193	82.8	
Economic Status	Good	36	43.4	0.338	51	61.4	0.170	71	85.5	0.384
	Middle	112	52.6		142	66.7		169	79.3	
	Poor	84	51.9		118	72.8		127	78.4	
Have you ever been diagnosed with COVID-19?	Yes	165	50.3	0.812	226	68.9	0.467	265	80.8	0.573
	No	67	51.5		85	65.4		102	78.5	
Have you received the COVID-19 vaccine?	Yes	153	48.9	0.265	211	67.4	0.740	254	81.2	0.422
	No	79	54.5		100	69.0		113	77.9	

Table 6. Univariate analysis of Knowledge, Attitude, and Practice (KAP) with Demographics

Discussion

Pandemic preparedness among university students hinges on a balanced interplay of knowledge, attitudes, and practices, as demonstrated by this study, which reveals significant strengths in awareness and attitudes while identifying critical gaps in preventive behaviors and knowledge application.

Knowledge of Preventive Measures

Participants demonstrated a high level of awareness about preventive measures, including wearing masks (97.8%) and maintaining social distance (95.2%). These findings are consistent with Fatima et al., which reported 95.7% adherence to mask-wearing and social distancing among medical and non-medical students [12]. Similarly, Ansarifard et al. found over 94% adherence among Iranian dental students [13].

However, only 69.7% of participants in this study understood common transmission modes of infectious diseases, lower than the 79.6% reported by Taghrir et al. among Iranian medical students [14]. This gap may reflect variations in educational outreach or the depth of COVID-19-related content in academic curricula.

Awareness of vaccines as a critical preventive measure was reported by 84.5% of participants, aligning closely with the 83% reported by Alsoghair et al. (2021) among Saudi medical students [15]. However, mixed knowledge levels in this



study—50.7% high and 49.3% low—contrast with Elhadi et al., where 71.8% of Libyan college students demonstrated substantial knowledge [16]. Addressing these knowledge gaps is essential, as students with limited understanding may struggle to adopt effective preventive measures.

Attitudes Toward Pandemic Prevention

Participants displayed overwhelmingly positive attitudes, with 98.5% supporting vaccines and 95.6% endorsing government-imposed measures like lockdowns. These findings align with Albaqawi et al., where 96% of nursing students across multiple universities supported public health initiatives [17]. Similarly, Soltan et al. reported that 94% of Egyptian medical students trusted government measures during the pandemic [18].

Despite these positive attitudes, only 74.5% of participants viewed following preventive measures as a personal responsibility, compared to the 88% reported by Batra et al. among Indian dental students [19]. This gap suggests a need for strategies that emphasize the importance of individual accountability. For instance, Kim et al. proposed peer-driven initiatives that could foster greater personal responsibility by leveraging social influence among university students [20].

Practice of Preventive Behaviors

Participants demonstrated high adherence to social distancing (97.2%) and vaccination uptake (79.0%), consistent with findings from Abdel Wahed et al., where 90% of healthcare students adhered to social distancing and over 78% participated in vaccination drives [21]. Similarly, Almulhim et al. found that 78% of Saudi dental students actively participated in vaccination efforts [22].

However, adherence to other behaviors was lower, with only 49.1% regularly washing their hands and 43.0% wearing masks in high-risk environments. These figures align with Ketata et al., where 46% of Tunisian medical students reported consistent hand hygiene [23]. Similarly, Ding et al. found that inconsistent mask usage was a common issue among Chinese college students in crowded settings [24]. This gap between knowledge and action suggests that even students aware of preventive behaviors may lack the motivation or resources to consistently implement them.

High engagement in public health awareness campaigns (94.3%) and active information-seeking behaviors (76.9%) reflect participants' proactive attitudes toward health education. These behaviors are consistent with findings from Chan et al., where students' risk perception was strongly correlated with participation in public health campaigns [25]. However, the disconnect between engagement and daily practices highlights the need for interventions that bridge awareness and action.

Knowledge, Attitude, and Practice Scores

The mixed KAP scores observed in this study 67.9% demonstrating positive attitudes, 80.1% adhering to effective behaviors, and 50.7% achieving high knowledge levels—align with global trends. For example, Fatima et al. reported similar gaps in knowledge despite strong adherence to practices [12].

These findings emphasize the need for targeted educational interventions that emphasize the practical application of knowledge. As suggested by Kim et al., peer-driven programs could enhance both individual responsibility and consistent behaviors by creating a supportive and accountable social environment [20].

Policy Significance

This study reveals critical gaps in the Knowledge, Attitude, and Practice (KAP) of university students in Afghanistan regarding pandemic preparedness. The findings reveal a pressing need for policy interventions to enhance pandemic-related education and improve access to preventive resources in educational institutions. Addressing these gaps is vital to reducing the transmission of infectious diseases and bolstering community-level health resilience. Policymakers should prioritize the integration of pandemic preparedness modules into university curricula, alongside investments in infrastructure such as readily available handwashing stations, personal protective equipment, and vaccination drives.



Such measures would significantly strengthen Afghanistan's public health framework and ensure that students, as future leaders, are better equipped to manage and mitigate future health crises.

Strengths and Limitations

This study provides valuable insights into the pandemic preparedness of students in a region with limited research on the topic. The large and diverse sample of 458 students enhances the reliability of the findings, while the use of validated and reliable tools ensures robust data collection. However, the study's cross-sectional design limits causal inferences, and the reliance on self-reported data may introduce bias. Additionally, the convenience sampling method may restrict the generalizability of the results beyond the sampled universities. Future longitudinal studies across broader regions of Afghanistan are necessary to build on these findings.

Conclusion

The study highlights the importance of targeted interventions to address gaps in knowledge and translate awareness into consistent preventive behaviors among university students. Improving infrastructure, promoting vaccination uptake, and fostering personal accountability through education and community engagement are critical steps in strengthening pandemic preparedness. These efforts are essential not only for safeguarding public health but also for building a resilient, informed, and health-conscious academic community in Afghanistan.

Recommendations

1. Universities are recommended to integrate pandemic preparedness into their curricula, focusing on improving knowledge of disease transmission and fostering a sense of personal responsibility for preventive measures. Interactive workshops, peer-led initiatives, and digital awareness campaigns can effectively address gaps in routine behaviors like hand hygiene and mask usage. Collaboration with healthcare providers to promote vaccination awareness and facilitate access to preventive resources on campuses is equally critical.
2. To ensure consistent behavioral changes, institutions can implement peer-driven health ambassador programs and behavioral nudges, such as reminders and incentives, to reinforce daily protective actions. Providing readily available resources, such as masks and sanitizers, on campuses will further support adherence. By combining education, engagement, and resource availability, universities can significantly enhance students' pandemic preparedness and contribute to a resilient public health system.

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