

ASSESSMENT OF KNOWLEDGE AND UNDERSTANDING OF CARDIOVASCULAR RISK FACTORS AMONG HEALTHCARE AND NON-HEALTHCARE STUDENTS IN DISTRICT SWABI

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Abstract

Across the globe, heart disease is a leading cause of death. Many of its risk factors can be prevented if people have proper awareness. Young adults, especially university students, form lifelong habits during this age. Therefore, it is necessary to assess their knowledge about heart disease. The objective of this study was to compare knowledge of cardiovascular risk factors between healthcare and non-healthcare students in District Swabi. A cross-sectional study was conducted with 240 students, 120 healthcare students from Quaid Institute of Nursing and 120 non-healthcare students from University of Swabi. A 22-item questionnaire collected data on demographics, risk factor knowledge, and symptom awareness. Data was analyzed using Excel, and a Chi-square test compared groups ($p < 0.05$). Healthcare students had a higher mean score (12.28/16) than non-healthcare students (11.01/16). Among healthcare students, 58 (48%) had good knowledge, compared to 32 (27%) of non-healthcare students. The Chi-square test showed a significant difference ($\chi^2 = 12.48$, $df = 2$, $p = 0.002$). In conclusion, healthcare students had better knowledge of cardiovascular risk factors. This suggests formal medical education increases awareness. However, non-healthcare students need health education programs to reduce the future burden of heart disease.

1. INTRODUCTION

Cardiovascular disease (CVD) remains the leading global cause of death, accounting for more than 18.6 million deaths in 2019, with projections exceeding 23 million by 2030. More than three-quarters of CVD deaths occur in low- and middle-income countries. Pakistan faces a particularly high burden, with annual CVD deaths increasing from 170,000 to 340,000 between 1990 and 2019 and an age-standardized CVD mortality rate of 358.88 per 100,000 compared with the global rate of 239.85 per 100,000. Increasing hypertension, diabetes, obesity, smoking, and sedentary

lifestyles further contribute to this burden (Siddiqi et al., 2025).

CVD increasingly affects low- and middle-income countries, where approximately 80% of global CVD deaths occur. These countries face a “double burden” of infectious and non-communicable diseases, placing considerable pressure on already limited healthcare systems (Brindley et al., 2025). Atherosclerosis is a major underlying cause of CVD, involving progressive arterial wall thickening and plaque formation. Risk factors such as high cholesterol, hypertension, and smoking can damage the arterial lining, leading to plaque accumulation, arterial narrowing, thrombosis, myocardial

infarction, stroke, and death (Hassan et al., 2025).

Coronary artery disease (CAD) occurs when atherosclerotic plaque narrows or obstructs the coronary arteries, reducing oxygen supply to the myocardium. Plaque rupture may result in thrombosis, ischemia, myocardial infarction, or death. Clinical presentation varies from angina and dyspnea to asymptomatic disease, emphasizing the importance of early detection and prevention (Khan et al., 2025). Hypertension is another major cardiovascular risk factor and may remain undiagnosed because it is often asymptomatic. Persistent high blood pressure increases the risk of myocardial infarction, stroke, kidney failure, and vascular disease and can be controlled through lifestyle modification and appropriate treatment (Mansoor et al., 2025).

CVD risk factors include non-modifiable factors such as age, sex, and family history, and modifiable factors such as smoking, unhealthy diet, physical inactivity, hypertension, hypercholesterolemia, obesity, and diabetes. Addressing modifiable factors can substantially reduce cardiovascular risk (Faizan et al., 2026). The coexistence of multiple risk factors further increases risk, highlighting the importance of early prevention. Although CVD commonly manifests later in life, unhealthy behaviors often begin during childhood and young adulthood; therefore, preventive interventions should start early (Virani et al., 2021).

Rapid urbanization in Pakistan has contributed to dietary and lifestyle changes, including increased consumption of fast foods, trans fats, salt, sugar, ghee, and sugary beverages, alongside tobacco use such as cigarettes and Naswar. These changes have contributed to increasing obesity, diabetes, and CVD (Aman et al., 2025). Declining physical activity, sedentary lifestyles, and limited awareness of hypertension and other cardiovascular risk factors, particularly in Khyber Pakhtunkhwa, further increase the burden. Public education, community screening, and school-based interventions are therefore needed (Rafiq et al., 2025).

University students represent an important population for early CVD prevention because they are developing independent lifestyle habits.

Since atherosclerosis can begin during childhood and adolescence, universities provide an opportunity to promote healthy behaviors before long-term habits become established. In District Swabi, the presence of universities and colleges with students from health and non-health disciplines provides an opportunity to compare cardiovascular health knowledge between these groups (Ullah et al., 2026).

However, formal education does not necessarily translate into healthy behavior. Health sciences students receive cardiovascular education, whereas students from other disciplines often obtain information from social media, television, family, and peers. Even healthcare students may demonstrate a gap between theoretical knowledge and practice. Comparing cardiovascular disease knowledge among university students in Swabi can identify these knowledge gaps and support the development of culturally appropriate health-promotion programs aimed at improving cardiovascular health and reducing the future burden of CVD (Shahzad et al., 2026).

2. METHODOLOGY: A descriptive cross-sectional comparative study was conducted to assess and compare cardiovascular health literacy among healthcare and non-healthcare students at two institutions in District Swabi: Quaid Institute of Nursing, Golu Dher, and the University of Swabi. The study was conducted over eight months, from November 2025 to June 2026, covering literature review, data collection, analysis, and report writing.

The study included two groups: healthcare students pursuing BS Nursing and non-healthcare students from disciplines such as Engineering, Business Administration, and Social Sciences. Full-time students aged 18–25 years who provided informed consent were eligible. Students with diagnosed cardiovascular conditions, final-year students, and those unwilling to participate were excluded.

A total of 240 participants, comprising 120 from each group, were recruited. Sample size was calculated using Cochran's formula for cross-sectional studies (Cochran, 1977), with equal allocation based on Julious (1995). The sample size was also consistent with similar studies conducted in Pakistan (Shaikh et al.,

2025; Khan et al., 2022). Participants were selected using non-probability convenience sampling.

Data were collected using a structured, simplified questionnaire containing three sections: demographic characteristics, identification of 10 common cardiovascular risk factors, and recognition of cardiovascular warning symptoms using Yes/No/I don't know responses. Data were coded and analyzed using SPSS version 26.0. Descriptive statistics, including mean and standard deviation, were used, while the Chi-square test assessed differences in awareness between the two groups. A p-value <0.05 was considered statistically significant.

3. RESULTS

This chapter presents the findings of the study. A total of 240 students participated, with 120 from the healthcare group (Quaid Institute of

Nursing) and 120 from the non-healthcare group (University of Swabi).

4.1 Demographic Characteristics of Participants:

Table 4.1 shows the demographic characteristics of both groups. The mean age was similar between healthcare (20.75 years) and non-healthcare (20.73 years) students. In terms of gender, both groups had more male participants, with 89 males (74%) in the healthcare group and 97 males (81%) in the non-healthcare group. The semester distribution reflected the program structures: healthcare students were mostly in odd semesters (1st, 3rd, 5th, and 7th), while non-healthcare students were mostly in even semesters (2nd, 4th, and 6th). This pattern is consistent with how nursing and general university programs are typically structured.

Table 4.1: Demographic Characteristics of Participants

Characteristics	Healthcare (n=120)	Percentage (%)	Non-Healthcare (n=120)	Percentage (%)
Age (mean)	20.75	----	20.73	----
Gender				
Male	89	74%	97	81%
Female	31	26%	23	19%
Semester				
1st semester	31	26%	0	0%
2nd semester	0	0%	47	39%
3rd semester	39	33%	0	0%
4th semester	0	0%	23	19%
5th semester	27	22%	0	0%
6th semester	0	0%	38	32%
7th semester	23	19%	12	10%

4.1.1 Gender distribution of Participants

Figure 4.1 shows the overall gender distribution of all 240 participants. The majority were male, with 186 participants (78%), while females

made up 54 participants (22%). This higher proportion of male participants is consistent with the demographics of both institutions.

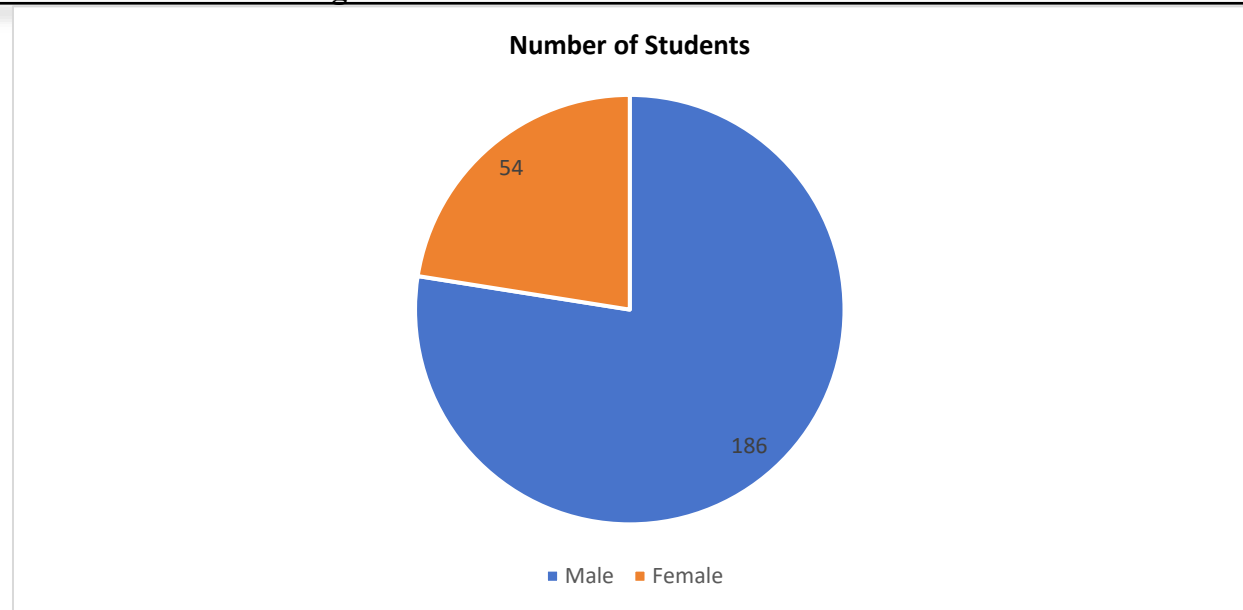


Figure 4.1: Gender distribution of participants

4.1.2 Age Distribution of Participants

Figure 4.2 shows the age distribution of participants. The largest age group was 21 to 23 years, with 120 students (50% of the sample). The second largest group was 18 to 20 years,

with 95 students (40%). Only 25 students (10%) were 24 years or older. This indicates that the majority of participants were young adults between 18 and 23 years of age, which is typical for undergraduate students.

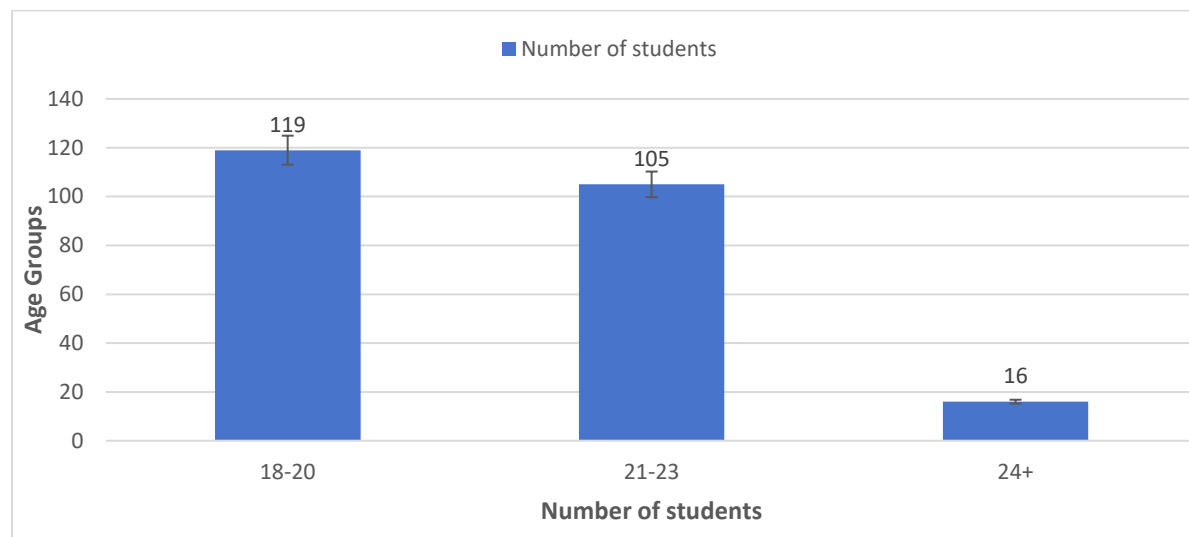


Figure 4.2: Age distribution of participants

4.2 Knowledge Scores:

The mean knowledge score for healthcare students was 12.28 out of 16 (76.8%), while non-healthcare students had a mean score of 11.01 out of 16 (68.8%). Healthcare students scored higher on average than non-healthcare students.

4.3 Distribution of Knowledge Levels:

Participants were classified into three categories based on their total scores: Good (14-16 marks), Moderate (10-13 marks), and Poor (0-9 marks). Table 4.2 shows the distribution of knowledge levels between the two groups.

Table 4.2: Knowledge Levels of Healthcare and Non-Healthcare Students

Knowledge	Healthcare(n=120)	Percentage (%)	Non-Healthcare(n=120)	Percentage (%)
Good (14-16)	58	48%	32	27%
Moderate (10-13)	36	30%	56	47%
Poor (0-9)	26	22%	32	27%

The results show that healthcare students performed better overall. Among healthcare students, 58 (48%) had "Good" knowledge, compared to only 32 (27%) of non-healthcare students. This means that healthcare students were almost twice as likely to have good knowledge compared to non-healthcare students.

In the "Moderate" category, non-healthcare students had a higher proportion (56, 47%) compared to healthcare students (36, 30%). In the "Poor" category, both groups were similar: 26 (22%) for healthcare and 32 (27%) for non-healthcare. These findings suggest that healthcare students not only have higher average scores but also have a higher proportion of students with good knowledge.

The knowledge-practice gap in non-healthcare students highlights the need for better health education in non-medical fields

4.3.1 Comparison of knowledge levels between healthcare and non-healthcare students

Figure 3 provides a visual comparison of knowledge levels between the two groups. The bar chart clearly shows that healthcare students outperformed non-healthcare students in the "Good" knowledge category, while non-healthcare students had higher percentages in the "Moderate" category. This visual representation confirms the findings shown in Table 2.

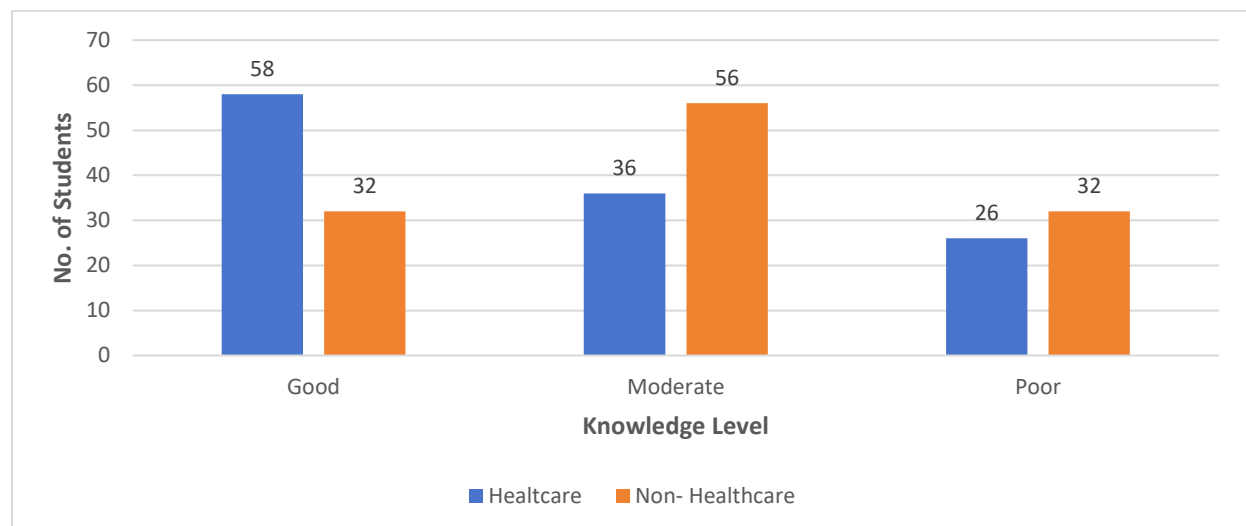


Figure 4.3: Comparison of knowledge levels between healthcare and non-healthcare students

4.4 Chi-Square Test:

A Chi-square test was conducted to determine whether the difference between the two groups

was statistically significant. The results are presented in Table 4.3.

Table 4.3: Chi-Square Test results comparing both groups

Parameter	Healthcare	Non-Healthcare	Total
Good	58	32	90

moderate	36	56	92
Poor	26	32	58
Total	120	120	240
Chi-Square(χ^2)	12.48	—	—
Degree of Freedom (df)	2	—	—
P-value	0.002	—	—
Significance	$p < 0.05$	—	—

The Chi-square test revealed a statistically significant difference between healthcare and non-healthcare students ($\chi^2 = 12.48$, $df = 2$, $p = 0.002$). Since the p-value of 0.002 is less than the significance level of 0.05, we can conclude that the difference in knowledge levels between the two groups is real and not due to chance. This confirms that healthcare students had significantly better knowledge of cardiovascular risk factors compared to non-healthcare students.

4. DISCUSSION

This section looks at the results and links them back to the main goals of the research. The main goal of this study was to compare the knowledge and understanding of cardiovascular risk factors between healthcare and non-healthcare students in District Swabi. The results showed that healthcare students had better knowledge than non-healthcare students. This chapter explains what these findings mean, compares them with previous studies, and discusses their implications.

5.1 Knowledge of Cardiovascular Risk Factors:

The first objective of this study was to compare knowledge of modifiable cardiovascular risk factors between the two groups. The results showed that healthcare students had a higher mean knowledge score (12.28 out of 16) compared to non-healthcare students (11.01 out of 16). Statistically, the difference is real and meaningful ($p = 0.002$).

These findings are not surprising. Healthcare students receive formal education about heart diseases, risk factors, and prevention as part of their nursing curriculum. They study subjects like anatomy, physiology, and community

health nursing, which cover cardiovascular health in detail. On the other hand, non-healthcare students from departments like engineering, business, or social sciences do not receive such formal training. Their knowledge about heart disease comes mostly from social media, family, or general life experiences.

This finding is consistent with previous studies. Choudhry *et al.* (2022) found that medical students in Lahore had high theoretical knowledge about cardiovascular risk factors, with 99.3% identifying obesity and 97.9% identifying hypertension as major risks. Similarly, Gilani and Afridi (2017) reported that 90.2% of medical students in Peshawar were aware of ischemic heart disease risk factors. These studies support the idea that formal medical education increases awareness. However, the present study also found that non-healthcare students had moderate knowledge (mean score 11.01 out of 16, which is 68.8%). This is not very low. It suggests that even without formal medical training, young university students have some awareness about heart disease. This may be due to increased media coverage, social media campaigns, and general public health messages about lifestyle diseases. But still, their knowledge was lower than healthcare students, showing a clear gap.

5.2 Understanding of Risk Factors and Their Impact:

The second objective was to compare the understanding of risk factors and their impact on heart health between the two groups. The results showed that 48% of healthcare students had good knowledge (scores 14-16), compared to only 27% of non-healthcare students. Also, 47% of non-healthcare students fell into the

moderate category, while only 30% of healthcare students did.

This shows that healthcare students not only know more facts but also understand the concepts better. They are more likely to know that high blood pressure has no symptoms, that young people should worry about heart disease, and that ghee and cooking oil repeatedly used are bad for the heart. Non-healthcare students may know that smoking and obesity are bad, but they may not understand the deeper connections between these risk factors and heart disease.

This gap in understanding is important. If a person only knows that something is "bad" but does not understand why or how it affects the heart, they may not take it seriously. True understanding leads to better health behaviors. This is why health education must go beyond giving facts, it must explain the mechanisms and consequences.

Similar findings were reported by Shaikh *et al.* (2025), who found that young adults in Hyderabad had a high prevalence of modifiable risk factors like dyslipidemia and central obesity, despite being young. This shows that lack of understanding can lead to risky behaviors. Aminde *et al.* (2016) also found that 52.5% of adults in Cameroon had poor knowledge of cardiovascular diseases, and factors like education and income were associated with better knowledge. This supports the idea that formal education plays a key role.

5.3 Comparison with Previous Studies:

The findings of this study are similar to other research conducted in Pakistan. Choudhry *et al.* (2022) found that medical students in Lahore had high knowledge but also had a knowledge practice gap. Many students still smoked or consumed soft drinks regularly. Gilani and Afridi (2017) also found that medical students in Peshawar were aware of risk factors but still engaged in unhealthy behaviors like junk food consumption and physical inactivity. This suggests that knowledge alone is not enough to change behavior.

However, the present study did not measure health behaviors or practices. It only measured knowledge and understanding. Future studies could explore whether the knowledge gap

between healthcare and non-healthcare students actually translates into differences in lifestyle behaviors.

Rafiq *et al.* (2025) found that adults in Karachi had relatively high awareness of smoking and stress as risk factors but low awareness of physical inactivity and diabetes. This is concerning because physical inactivity and diabetes are major risk factors. In the present study, non-healthcare students also showed gaps in understanding. For example, many did not know that lack of exercise or high cholesterol are major risk factors. This shows that public health messages need to focus on all risk factors, not just the most well known ones.

5.4 Implications of the Findings:

The findings of this study have several important implications.

First, they highlight the value of formal health education. Healthcare students performed better because they received structured training. This suggests that if non-healthcare students also received basic health education, their knowledge could improve. Universities should consider offering general health awareness courses for all students, regardless of their major.

Second, the findings show that there is a need for targeted awareness programs for non-healthcare students. Social media is not always a reliable source of health information. Universities can organize health seminars, workshops, or awareness weeks to educate students about heart disease prevention. These programs should focus not only on facts but also on understanding how risk factors affect the heart.

Third, the results suggest that prevention efforts should start early. The participants in this study were young adults aged 18-25. This is the age when many health habits are formed. If young people learn about heart disease prevention now, they may carry these healthy habits into adulthood. This could reduce the future burden of cardiovascular disease in Pakistan.

Fourth, the study highlights the importance of culturally appropriate education. In Pakistan, factors like ghee consumption, Naswar use, and sedentary lifestyles are common. Health

education programs should address these specific risks rather than using generic messages from Western countries

5. CONCLUSION, RECOMMENDATIONS and LIMITATIONS

6.1 Conclusion:

This project study involved the comparison of the knowledge and understanding of cardiovascular risk factors among healthcare and non-healthcare students in District Swabi. The number of students involved was 240 (120 students in each group). The results indicated that healthcare students were more knowledgeable as compared to non-healthcare students. Their mean score was 12.28/16 with the other group registering 11.08/16. Almost half of the healthcare students (48%) were good knowledge students, as opposed to only 27% of non-healthcare students. Chi-square test ensured that this difference was not by chance ($p = 0.002$). These findings indicate that medical training is significant in raising awareness about heart disease. Risk factors, prevention and warning signs are taught to nursing students during their normal classes. This training is not provided to non-healthcare students and thus most of them are only able to know as much as they learn on social media, family or through general life experiences. It was also revealed that the non-healthcare students had moderate knowledge (68.8%), which is not that low. This indicates that despite lack of formal education, young university students are somewhat aware of heart health. There is nevertheless a noticeable disjunction between the two groups. In brief, healthcare students are more aware of risk factors of heart diseases compared to non-healthcare students. The distinction is substantial and genuine. This underscores the importance of improved health education to all students and not only those in the medical disciplines.

6.2 Recommendations:

The findings of this study lead to the following recommendations. Since healthcare students had significantly better knowledge (48% good knowledge) compared to non-healthcare students (27% good knowledge), universities

should introduce mandatory health education courses specifically for non-healthcare students. Additionally, as non-healthcare students showed limited knowledge of atypical heart attack symptoms, health awareness programs should focus on symptom recognition alongside risk factor awareness. Since this study was limited to two institutions in Swabi using convenience sampling, future research should use random sampling and include more institutions from Khyber Pakhtunkhwa to improve generalizability. Furthermore, because non-healthcare students rely on informal sources like social media for health information, universities should provide reliable health information through official channels.

6.3 Limitations of the Study:

Like any research, this study had some limitations that should be mentioned.

- First, we used convenience sampling, which means we only included students who were available and willing to participate. This limits how much we can generalize our findings to all students in Swabi or Pakistan.
- Second, this was a cross-sectional study, meaning we collected data at one point in time. We cannot say whether knowledge changes over time or whether students actually practice what they know.
- Third, the data was self-reported through a questionnaire. Some students may have guessed answers or may not have been completely honest. This is common in survey-based research.
- Fourth, we only included one nursing institute and one university. Including more institutions would have given a more complete picture.
- Fifth, we did not collect written consent forms, though all participants were informed about the study and completed the questionnaire voluntarily.
- Despite these limitations, the findings provide useful information about the knowledge gap between healthcare and non-healthcare students in Swabi.

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