Interdisciplinary Research in Medical Sciences Specialty
ISSN: 3062-4401
2025, Volume 5, Issue 2, Page No: 64-70
Copyright CC BY-NC-SA 4.0
Available online at: www.galaxypub.co/page/journals

Galaxy Publication

Knowledge Acquisition on COVID-19 Through Self-Learning Among Bhutanese Medical Students

Nimal Perera[1], Chaminda Silva[1], Kasun Wijesinghe[1]*

[1]Department of Translational Health Sciences, Faculty of Medicine, University of Colombo, Colombo, Sri Lanka.

***E-mail** ✉ kasun.wijesinghe.th@gmail.com

Received: 17 May 2025; **Revised:** 09 October 2025; **Accepted:** 12 October 2025

ABSTRACT

hutan does not have its own medical school, and therefore Bhutanese medical students pursue their training in Sri Lanka, Bangladesh, and India. When medical institutions in these countries closed during the initial COVID-19 outbreak in March–April 2020, the students were brought back to Bhutan. After repatriation, they were placed in government-managed quarantine facilities for 21 days. This study examined their COVID-19–related knowledge acquired through self-learning, as well as their attitudes toward engaging in the national COVID-19 response. This cross-sectional study was carried out among medical students who had returned to Bhutan. Data were collected using an online questionnaire administered while the students were in facility quarantine. A sample size of 129 was determined, and convenience sampling was employed. Knowledge was measured through 20 items, each contributing 1 point to a total possible score of 20. Knowledge levels were categorized as "good" for scores ≥80%, "satisfactory" for scores between 60–79%, and "poor" for scores <60%. The relationship between knowledge scores and the duration of clinical clerkship was examined using Pearson's correlation coefficient. Students' attitudes regarding their willingness to participate in the national COVID-19 response were evaluated using rating scales. Data analysis was performed using Stata version 13.1. A total of 120 medical students took part in the survey, representing a 93% response rate. Among them, 88 students (74%) demonstrated a high level of knowledge about COVID-19, 28 students (23%) showed a moderate level, and only four (3%) had limited understanding. Students performed particularly well on questions related to symptoms, transmission pathways, preventive measures, treatment options, and Bhutan's epidemiological situation. In contrast, they had weaker performance on items concerning mechanical ventilation methods and the home care of mild infections. Knowledge scores increased with longer periods of clinical clerkship ($r = 0.326$, $p = 0.001$). The most commonly used information sources were social media (102 students, 85%), television (94 students, 78%), and newspapers (76 students, 63%). Most respondents (78 students, 65%) expressed readiness to support the national COVID-19 response, although many were uncertain about the specific contributions they could make. Only a small proportion (8 students, 7%) expressed fear of becoming infected. The medical students demonstrated strong knowledge of COVID-19, largely acquired independently through sources such as social media, television, and newspapers. They also showed a generally positive attitude toward contributing to the national response efforts led by the government.

Keywords: COVID-19, Medical education, Medical school, Online learning, Social media, Pandemic

How to Cite This Article: Perera N, Silva C, Wijesinghe K. Knowledge Acquisition on COVID-19 Through Self-Learning Among Bhutanese Medical Students. Interdiscip Res Med Sci Spec. 2025;5(2):64-70. https://doi.org/10.51847/LBGthgjXwz

Introduction

Bhutan, a nation of roughly 700,000 people located in the eastern Himalayas, provides universal free healthcare in accordance with the National Health Policy 2011, which aligns with the country's broader development philosophy. The health system operates on a three-tier structure: primary health centres and small hospitals form the first tier, district and general hospitals comprise the secondary level, and three strategically placed regional

© 2025 Interdisciplinary Research in Medical Sciences Specialty

referral hospitals provide tertiary care. During the COVID-19 pandemic, specific facilities were designated for case management, although most patients were treated at the national referral hospital in Thimphu.

Modern healthcare services in Bhutan were established in 1956, yet the country has consistently faced shortages of medical personnel, especially doctors. All physicians are trained abroad, and all are employed exclusively in the public sector under the Royal Civil Service Commission, as private medical practice is not permitted. By 2020, Bhutan had 376 doctors, with a marked deficit in specialists. Around 180 Bhutanese students were enrolled in medical programmes in Sri Lanka, Bangladesh, and India as of 2019, supported through full or partial government funding or private sponsorship. Their undergraduate programmes span four to five years, followed by a one-year internship, which may be completed at Bhutan's three tertiary hospitals through the Khesar Gyalpo University of Medical Sciences.

When medical colleges across South Asia closed in March–April 2020, clinical training was halted and online education rapidly replaced traditional teaching, particularly benefiting international students who returned home. The pandemic profoundly affected medical training and the transition of students into professional roles. While some regulatory bodies supported early graduation to strengthen pandemic response efforts, others warned against assigning responsibilities beyond students' competencies. Countries hit hard by COVID-19, such as Italy, expedited the hiring of medical students, in part because older healthcare workers were at greater risk of severe outcomes. This global situation highlighted the difficulty of balancing educational integrity with urgent workforce demands, especially where health personnel shortages already existed.

Following Bhutan's first confirmed COVID-19 case in March 2020, the government took swift measures, recalling 46 postgraduate doctors and over 100 medical students from abroad. Similar to other returning Bhutanese nationals, they were placed in mandatory 21-day quarantine in government-arranged facilities. This study was undertaken to evaluate returning medical students' knowledge of COVID-19, the information sources they relied upon, and their attitudes toward participating in the national pandemic response.

Study site and study population

This study was conducted among medical students in facility-quarantine in Paro and Thimphu districts.

Sample size and sampling

For the sample size estimation, we assumed that 50% of participants would demonstrate adequate knowledge about COVID-19. Using a 95% confidence level, a 5% margin of error, and applying a finite population correction for the total student population of 180 [1], the calculated sample size was obtained. After accounting for an anticipated 5% non-response rate, the final required sample size was 129. Because an accurate roster of incoming medical students from different institutions and countries was unavailable, a convenience sampling approach was adopted. All medical students placed in facility-based quarantine were contacted through email addresses obtained from the tertiary education database.

Study tool

The questionnaire was developed to gather basic demographic details from respondents and to evaluate their knowledge, information sources, and attitudes regarding involvement in COVID-19 response efforts. Seven COVID-19 subject experts assessed the tool for content and construct validity. Following their review, two items were modified and seven were removed, resulting in a revised questionnaire with an S-CVI of 0.96.

Knowledge was measured through twenty multiple-choice questions covering several domains: definition of the disease, causative organism, symptoms, transmission routes and incubation period, disease progression, diagnostic tests and the centres in Bhutan where these were available, case management and mortality, preventive strategies, global and national epidemiological patterns, and the national COVID-19 hotline number. Participants were also asked about their usual sources of COVID-19 information.

Attitude was assessed through rating-scale statements that explored students' willingness and apprehensions about contributing to the COVID-19 response, the roles they believed they could take on, and their views on the value of medical students' involvement during the pandemic in Bhutan. Additionally, the questionnaire included an item on whether students had received training at their institutions on the use of personal protective equipment when caring for COVID-19 patients.

Data collection

Data collection was conducted in April 2020 through Google Forms, which were distributed to students via email. This online approach enabled social distancing, particularly when quarantine facilities were inaccessible to visitors. The survey design followed the guidelines outlined in the checklist for reporting results of internet-based e-surveys [2].

Data processing and analysis

Responses from Google Forms were exported and analyzed using STATA Version 13.1 (StataCorp, Stata Statistical Software). Each knowledge item contributed one point to a total score of 20. Scores were classified into three categories: "good knowledge" for scores of 80% or higher, "satisfactory knowledge" for scores between 60% and 79%, and "poor knowledge" for scores below 60%. Pearson's correlation coefficient was used to examine the association between knowledge scores and the length of clinical clerkship. A significance threshold of $p < 0.05$ was applied. Students' attitudes toward their willingness to engage in the national COVID-19 response are reported using frequencies and percentages.

Ethics considerations

Approval for the study was granted by the Research Ethics Board of Health, Ministry of Health, Bhutan. Participants gave their consent in accordance with the protocol sanctioned by the ethics committee. To ensure privacy, individual responses were anonymized, and findings are presented exclusively in summarized, aggregate form.

Results and Discussion

A total of 120 medical students completed the survey, yielding a response rate of 93%. The participants had a mean age of 22 years (±2). Students were nearly evenly distributed across the first to fifth years of study. The median length of clinical clerkship completed was 8 months (IQR: 1–18 months). **Table 1** summarizes the students' demographic characteristics and their countries of study.

Table 1. Overview of Bhutanese medical students enrolled in MBBS programs in Sri Lanka, Bangladesh, and India, included in the April 2020 survey on COVID-19 knowledge and attitudes.

Basic characteristics	n	(%)
Sex		
Female	89	(74)
Male	31	(26)
Country of study		
Sri Lanka	85	(71)
Bangladesh	30	(25)
India	5	(4)
Year of study		
First year	23	(19)
Second year	20	(17)
Third year	30	(25)
Fourth year	22	(18)
Fifth year	25	(21)
Study sponsor		
Full government sponsored	56	(47)
Partial government sponsored	46	(38)
Private sponsored	18	(15)
Trained on the use of personal protective equipment		
Yes	5	(4)
No	115	(96%)

Knowledge on COVID-19

Among the respondents, 88 students (74%) demonstrated good knowledge of COVID-19, 28 (23%) had satisfactory knowledge, and only 4 (3%) were classified as having poor knowledge. High scores were observed in areas such as symptom recognition, modes of transmission, preventive measures, treatment options, and aspects of local epidemiology, including the fact that all cases were imported at the time of data collection, the availability of RT-PCR testing at selected centres, and knowledge of the local COVID-19 hotline. Conversely, students scored lowest on topics related to types of mechanical ventilation for severe cases and the World Health Organization's recommendations for home management of non-critical COVID-19 patients. Knowledge scores showed a significant positive correlation with the length of clinical clerkship completed ($r = 0.326$, $p = 0.001$), but no association was found with sex, age, or country of study. Detailed knowledge scores are presented in **Table 2**.

Table 2. Evaluation of COVID-19 knowledge among Bhutanese MBBS students studying in Sri Lanka, Bangladesh, and India, based on the April 2020 Knowledge and Attitude survey.

Knowledge Question	Correct Responses n (%)	Incorrect Responses n (%)
Definition of COVID-19	108 (90%)	12 (10%)
Cause of COVID-19	110 (92%)	10 (8%)
Most common symptoms of COVID-19	118 (98%)	2 (2%)
Can asymptomatic individuals transmit COVID-19?	117 (97%)	3 (3%)
Incubation period of COVID-19	104 (87%)	16 (13%)
Most common mode of COVID-19 transmission	104 (87%)	16 (13%)
COVID-19 cases in Bhutan were all imported (as of April 2020)	119 (99%)	1 (1%)
Method for confirming COVID-19 diagnosis	98 (82%)	22 (18%)
Centres without RT-PCR testing (as of April 2020)	102 (85%)	18 (15%)
Correct proportion of patients by severity of infection	99 (83%)	21 (17%)
Approved treatments for COVID-19	89 (74%)	31 (26%)
Items NOT part of mechanical ventilation	22 (18%)	98 (82%)
Reported COVID-19 mortality rate	108 (90%)	12 (10%)
Home management for non-severe COVID-19 cases	65 (54%)	55 (46%)
WHO-recommended quarantine period for primary contacts	111 (93%)	9 (7%)
Most important preventive measure against COVID-19	100 (83%)	20 (17%)
Measures to limit physical interactions, EXCEPT	106 (88%)	14 (12%)
Key protective measure for healthcare workers	105 (88%)	15 (12%)
Groups NOT at risk for severe COVID-19	100 (83%)	20 (17%)
Toll-free number for COVID-19 information in Bhutan	95 (79%)	25 (21%)

Students reported obtaining COVID-19 information from a variety of sources, with the most common being social media—specifically the Ministry of Health's Facebook page (102, 85%) and the Prime Minister's Office page (80, 67%). Television (94, 78%) and newspapers (76, 63%) were also frequently used. Less than half of the participants (52, 43%) consulted scientific journals, and only about one in four students (31, 26%) had participated in COVID-19-related lectures or symposia at their institutions. **Table 3** provides a detailed breakdown of these information sources.

Table 3. Reported sources of COVID-19 information among Bhutanese MBBS students studying in Sri Lanka, Bangladesh, and India, based on the April 2020 Knowledge and Attitude survey.

Sources of information	n	(%)
Facebook page – Ministry of Health	102	(85)
Television	94	(78)
Facebook page – Prime Minister's Office	80	(67)
Newspapers	76	(63)

Health professionals	70	(58)
Scientific journals	52	(43)
Lectures/symposium	31	(26)
Family members	30	(25)
Others	8	(7)

Attitude towards participation in COVID-19 responses

Most students (78, 65%) believed they should be involved in the government's COVID-19 response, and a majority (92, 77%) expressed willingness to serve anywhere in the country. Despite this, many were uncertain about the specific roles they could assume, with only 19 (16%) considering clinical work and 33 (37%) considering advocacy or communication activities. Nearly half of the participants (57, 48%) felt they might not be able to make meaningful contributions to the COVID-19 response. Concern about contracting the virus was reported by a small minority (8, 7%). **Table 4** presents a detailed summary of students' responses to the attitude statements.

Table 4. Attitudes of Bhutanese MBBS students in Sri Lanka, Bangladesh, and India toward involvement in the COVID-19 response, based on the April 2020 Knowledge and Attitude survey.

Attitude Statement	Agree n (%)	Neutral n (%)	Disagree n (%)
Medical students should take part in the COVID-19 response.	78 (65%)	41 (34%)	1 (1%)
Medical students should be limited to clinical duties (patient care) during the COVID-19 response.	19 (16%)	17 (14%)	84 (70%)
Medical students should focus only on community advocacy and communication instead of hospital work during the COVID-19 response.	33 (37%)	62 (52%)	25 (21%)
I am willing to serve anywhere in the country (rural or urban) during the COVID-19 response.	92 (77%)	24 (20%)	3 (3%)
Under current circumstances, medical students cannot make meaningful contributions to the COVID-19 response.	16 (13%)	47 (39%)	57 (48%)
I am concerned about contracting COVID-19 if working in a hospital setting.	8 (7%)	47 (39%)	65 (54%)

Knowledge on COVID-19

Overall, Bhutanese medical students demonstrated a high level of knowledge about COVID-19. They were well-informed about the disease's symptoms, modes of transmission, causative agent, diagnostic confirmation, and preventive strategies. The students also displayed strong awareness of local epidemiology in Bhutan, including the fact that cases were imported until August 2020, the regional centres offering RT-PCR testing, and the national COVID-19 hotline. Areas of weaker knowledge included the types of mechanical ventilation for severe cases and the World Health Organization's guidance on home management of non-severe cases.

This study highlights patterns of medical learning among students from three countries during the educational disruptions caused by the 2020 pandemic. A notable finding is the prominent role of social media as a source of information, which appeared to be more influential than traditional channels such as lectures, symposia, or scientific journals. Similar trends have been reported among medical students in Jordan and Turkey, where the majority relied on online platforms and social media for COVID-19 information [3, 4]. In Bhutan, official Facebook pages of the Ministry of Health and the Prime Minister's Office provided content curated by medical experts, underscoring the growing value of real-time information sharing through social media [4, 5]. Interestingly, 43% of students reported consulting scientific journals, which is higher than the 27% reported among students in Jordan [3]. At the time of the survey, most medical colleges had not yet implemented online lectures, and only a quarter of students had received formal instruction on COVID-19 from their teachers.

As future healthcare professionals, medical students require comprehensive knowledge encompassing both clinical and public health aspects of emerging infectious diseases. This study illustrates that students were largely self-directed learners, acquiring sufficient knowledge on a novel topic in an unprecedented situation. The integration of online learning tools represents an extension beyond traditional educational roles [5, 6] and is a

critical skill for success as a 21st-century physician. However, the World Health Organization emphasizes the need to critically evaluate online information due to the abundance of unregulated content [7]. We therefore recommend that medical curricula incorporate training on assessing the reliability and accuracy of scientific information accessed through online sources.

Attitude towards engagement in COVID-19 activities

The students generally demonstrated a positive attitude toward participating in Bhutan's national COVID-19 response. This aligns with findings from a survey in Singapore, where about two-thirds of medical students considered it their professional duty to join clinical teams in hospitals [8]. In regions facing acute healthcare workforce shortages, it has been proposed that medical students could manage routine patient care, allowing other healthcare professionals to focus on COVID-19 cases [9, 10].

In our study, however, students were uncertain about whether their role should be primarily clinical or focused on communication and advocacy, and only 13% felt they could make meaningful contributions. Similarly, a study in Turkey reported that approximately one-quarter of students (24.3%) did not feel competent to handle clinical duties, while others were willing to work in emergency departments [4]. Engaging medical students in clinical care should therefore be based on careful assessment of their readiness and the healthcare system's needs and shortages. Potential roles include assisting with routine outpatient care, managing chronic patients, and conducting antenatal checks, many of which can be performed through telemedicine with minimal risk of infection. Students in advanced stages of training may also support inpatient care.

A significant factor that may discourage students from returning to clinical environments is fear of infection. Previous studies have reported fear in 1.3% of medical students in Turkey and anxiety in 24.9% of students in China [4, 11]. In our study, 7% of students expressed fear of contracting COVID-19.

Preparedness of medical students in clinical engagement

Across countries, the extent to which medical students have been involved in clinical duties during the COVID-19 pandemic has differed widely, largely depending on national regulations and policies. Critics argue that because medical students are not licensed practitioners, involving them in direct patient care increases their risk of exposure, places additional pressure on limited PPE supplies, and could potentially contribute to viral transmission if students are not adequately trained [4, 6]. In our study, only 4% of students reported having received training in the proper use of personal protective equipment, a figure similar to that of final-year students in Turkey, where only 7% had such training [4].

Should governments choose to incorporate medical students into clinical environments, it is essential that they first provide comprehensive orientations, infection-prevention training, and clear guidance to ensure students work strictly within their skill levels [12, 13]. Several authors recommend offering structured volunteer roles tailored to students' educational goals and learning needs [12]. Evidence from Denmark illustrates the value of this approach: once students received appropriate training in infection control and a clear explanation of their role in the pandemic response, two-thirds volunteered to work in emergency COVID-19 units [13].

Bhutan has also demonstrated the potential contributions of students during health emergencies. At the height of the pandemic, when large numbers of samples required RT-PCR testing, students from medical laboratory programs were mobilized to assist with specimen collection and laboratory procedures [14].

Study limitations

As the COVID-19 situation in South Asia—and Bhutan specifically—continued to shift, it is likely that the perceptions of medical students also evolved over time. This study sought to capture their knowledge and attitudes regarding participation in the national COVID-19 response, within the unique Bhutanese context where all medical training occurs abroad. Reporting such knowledge-attitude findings is important, as it contributes to the growing body of research on how students learn and respond during public health emergencies.

The knowledge component of this study was assessed using an online questionnaire rather than a traditional examination format. Although this approach differs from conventional testing, it reflects the practical realities imposed by COVID-19 restrictions, including the need for social distancing, and therefore represents a valid method for data collection under pandemic conditions.

In evaluating attitudes, it is also possible that some responses were influenced by social-desirability bias, especially regarding students' stated willingness to participate in pandemic-related activities.

Conclusion

Medical students demonstrated a strong understanding of COVID-19, with social media serving as their primary source of information. Although they generally expressed willingness to engage in Bhutan's national COVID-19 response, many were unsure about the specific roles in which they could contribute effectively. These insights offer a clearer picture of how medical students might be involved in future pandemic management efforts.

Acknowledgments: The authors are grateful to the medical students who responded to the survey.

Conflict of Interest: None

Financial Support: None

Ethics Statement: None

References

1. Ministry of Education. Annual education statistics 2019. 31st ed. Thimphu: Ministry of Education, Royal Government of Bhutan; 2019.
2. Eysenbach G. Improving the quality of web surveys: the checklist for reporting results of internet E-surveys (CHERRIES). J Med Internet Res. 2004;6:e34.
3. Khasawneh AI, Humeidan AA, Alsulaiman JW, Bloukh S, Ramadan M, Al-Shatanawi TN. Medical students and COVID-19: knowledge, attitudes, and precautionary measures. A descriptive study from Jordan. Front Public Health. 2020;8:253.
4. Çalışkan F, Mıdık Ö, Baykan Z, Şenol Y, Tanrıverdi EÇ, Tengiz FI. The knowledge level and perceptions toward COVID-19 among Turkish final year medical students. Postgrad Med. 2020;132:764-822.
5. Chan TM, Dzara K, Dimeo SP, Bhalerao A, Maggio LA. Social media in knowledge translation and education for physicians and trainees: a scoping review. Perspect Med Educ. 2020;9:20-30.
6. Miller DG, Pierson L, Doernberg S. The role of medical students during the COVID-19 pandemic. Ann Intern Med. 2020;173:145-6.
7. Zarocostas J. How to fight an infodemic. Lancet. 2020;395:676.
8. Compton S, Sarraf-Yazdi S, Rustandy F, Radha Krishna LK. Medical students' preference for returning to the clinical setting during the COVID-19 pandemic. Med Educ. 2020.
9. Stokes DC. Senior medical students in the COVID-19 response: an opportunity to be proactive. Acad Emerg Med. 2020.
10. Di Donato V, McKenzie S. Fresh out of medical school, young Italian doctors are being fast-tracked to the coronavirus frontline [Internet]. 2020 [cited 2020 Apr 10]. Available from: https://edition.cnn.com/2020/03/30/europe/italy-young-doctors-coronavirus-intl/index.html
11. Cao W, Fang Z, Hou G, Han M, Xu X, Dong J. The psychological impact of the COVID-19 epidemic on college students in China. Psychiatry Res. 2020;287:112934.
12. Choi B, Jegatheeswaran L, Minocha A, Alhilani M, Nakhoul M, Mutengesa E. The impact of the COVID-19 pandemic on final year medical students in the United Kingdom: a national survey. BMC Med Educ. 2020;20:206.
13. Rasmussen S, Sperling P, Poulsen MS, Emmersen J, Andersen S. Medical students for health-care staff shortages during the COVID-19 pandemic. Lancet. 2020;395:e79-80.
14. Dorji T. The gross national happiness framework and the health system response to the COVID-19 pandemic in Bhutan. Am J Trop Med Hyg. 2020.