ESI Preprints **Not Peer-reviewed**

Strengthening Pandemic Preparedness in Undergraduate Education through Curricular Reform: Post-COVID-19 Insights

Dea Goderdzishvili, MD, PhDc
Elza Nikoleishvili, MD, PhD, Professor
The University of Georgia, Tbilisi, Georgia

Doi: 10.19044/esipreprint.6.2025.p424

Approved: 22 June 2025
Posted: 24 June 2025

Cite As:
Goderdzishvili D. & Nikoleishvili E. (2025). *Strengthening Pandemic Preparedness in Undergraduate Education through Curricular Reform: Post-COVID-19 Insights.* ESI Preprints. https://doi.org/10.19044/esipreprint.6.2025.p424

Abstract

Aims and Scope: The COVID-19 pandemic exposed widespread educational gaps in preparing future healthcare professionals for public health emergencies. This study aimed to identify key curricular indicators for strengthening pandemic preparedness in undergraduate biomedical and health sciences education, with Georgia as a representative case study of a resource-constrained setting.

Methods: A qualitative study was conducted using semi-structured virtual interviews with 33 educators from the programs of medicine, public health, nursing, dentistry, and pharmacy - 30 based in Georgian institutions and three international experts contributing to triangulation. Data collected between May and August 2024 were analysed using inductive thematic analysis with MAXQDA.

Findings: Thematic analysis revealed three core areas for reform: (1) strengthening institutional readiness by embedding pandemic-focused content and simulation-based learning; (2) enhancing public health communication, including vaccine advocacy and crisis response messaging; and (3) expanding research and collaborative capacity through interdisciplinary and international engagement.

Conclusion: This study offers practical, curriculum-level strategies to close educational gaps and strengthen pandemic preparedness in

undergraduate biomedical and health sciences education. Using Georgia as a case example, the findings present a scalable reform framework that can strengthen system resilience and better prepare future professionals for public health emergencies.

Keywords: Biomedical and health sciences, simulation-based learning, qualitative research, interdisciplinary collaboration, Georgia

Introduction

The COVID-19 pandemic revealed significant deficiencies in the preparedness of future healthcare professionals to respond effectively to public health emergencies. Undergraduate biomedical and health sciences programs globally demonstrated inadequate integration of essential competencies in outbreak management, infection control, crisis communication, and emergency response protocols (O'Byrne et al., 2020). This systemic unpreparedness limited students' ability to contribute meaningfully during the crisis and prompted urgent calls for comprehensive curricular reform, calling for the inclusion of pandemic-related competencies in undergraduate education (Shrivastava et al., 2024). Recent international initiatives underscore the importance of embedding training in epidemiology, outbreak response, crisis communication, and simulation-based learning to build a more resilient and adaptable health workforce (University of Antwerp, 2025).

This need for reform is especially urgent in low- and middle-income countries, where workforce shortages and limited educational resources often intersect. Georgia is one such case. While the country has one of the highest physician densities in the WHO European Region (561 per 100,000), a chronic shortage of nurses, pronounced urban and rural workforce imbalances, and a fragmented primary care infrastructure contributed to excess mortality rates well above the regional average during the COVID-19 pandemic (Zoidze et al., 2021; Ministry of Education, Science, Culture, and Sports of Georgia, 2020).

Despite advancements in digital infrastructure and emergency services, Georgia's education system did not implement coordinated strategies to train or engage biomedical and health sciences students in structured national emergency responses. Although the Ministry of Education and Science issued broad guidelines and supported digital transformation at the national level, there was a missed opportunity to embed structured pandemic preparedness into undergraduate curricula. This gap in curricular alignment limited students' involvement in public health communication, surveillance, and frontline response efforts during the crisis. Although some senior medical students were mobilized through rapid-

response training initiatives, these were reactive measures rather than systematically embedded components of their education. As a result, students remained largely unprepared and disengaged from organized national efforts, underscoring the disconnect between theoretical education and the practical demands of real-world emergency response (Richardson et al., 2025).

Embedding pandemic preparedness into undergraduate biomedical and health sciences education, through targeted training in infection prevention, crisis communication, disaster medicine, and One Health concepts, can serve as a form of primary prevention. Such curricular integration would not only enhance individual readiness but also strengthen national resilience by preparing a healthcare workforce capable of responding effectively to future public health emergencies. In this context, curricular reform emerges not merely as an educational necessity but as a strategic public health intervention that supports workforce development, institutional preparedness, and system-wide capacity building (Caruso, 2022). While these challenges reflect wider regional patterns, they also present opportunities for targeted educational reform. Integrating pandemic preparedness into undergraduate curricula is now widely recognized as a priority for strengthening both national and global health systems (Zoidze et al., 2021).

This qualitative study, conducted as part of a broader doctoral research project, explores how pandemic preparedness can be strengthen through the perspectives of Georgian educators and curricular committee members in medicine, public health, nursing, pharmacy, and dentistry. Their insights inform a framework for advancing curricular reform aligned with international guidance and national priorities. The findings are intended to support the development of practical and adaptable strategies for embedding pandemic preparedness into undergraduate biomedical and health sciences education in Georgia and similar contexts.

Methods

This qualitative study adopted a constructivist-interpretivist paradigm to explore how Georgian educators perceive and interpret pandemic preparedness within undergraduate biomedical and health sciences education. The study also aimed to understand how institutional and contextual factors influence their views on curricular reform. Semi-structured interviews were conducted with educators and curricular committee members from Georgian higher education institutions (HEIs). Participants were purposefully selected based on a minimum of five years of teaching experience in medicine, public health, nursing, dentistry, or

pharmacy, ensuring diverse disciplinary representation and familiarity with the national academic context.

Data were collected between May and August 2024. Participants were recruited through email invitations, and those who agreed to participate provided written responses to semi-structured interview questions via Google Forms. Educators received four open-ended questions, and curricular committee members received six questions designed to elicit both contextual insights and confirmatory perspectives as seen in Table 1.

Table 1. Semi-structured interview questions for Georgian Higher Education Institution (HEI) educators and curricular committee members

Study Participant	Interview Questions
Educators	1. In your opinion, how well do schools and faculties of biomedical and health sciences in Georgia prepare students for pandemic preparedness and response?
	2. Based on the experience of your university, how adequate is the material provided in the university's curricula in acquiring theoretical knowledge and practical skills on pandemic preparedness and response issues? If insufficient, what additional measures would you recommend to your university?
	3. How can you, as an HEI educator, encourage students to actively participate in community preparedness and response to pandemics, such as promoting vaccination, social distancing, or even participating in certain clinical cases?
	4. During the educational process at your university, do you use emergency simulation games and scenarios? If not, do you know of any other universities that have/are using similar simulation games in their curricula or extracurricular training for emergency preparedness?
Curricular Committee Members	1. Based on the experience at your university, to what extent does the undergraduate curriculum consider the theoretical knowledge and practical skills aspects of pandemic preparedness and response?
	2. Based on the experience at your university during the period of the COVID-19 pandemic or after, was there a need to adapt/change existing curricula?
	3. What specific changes were made at your university during or after the COVID-19 pandemic to improve teaching about preparedness and response to future pandemics?
	4. What general recommendations would you have for schools and faculties of biomedical and health sciences curricula to promote pandemic preparedness and response at the undergraduate level?
	5. Are you aware of any other universities (national or international) that have implemented curriculum content reform to promote preparedness and response to future pandemics that you would consider implementing at your university?
	6. During the educational process at your university, do you use emergency simulation games and scenarios? If not, do you know of any other universities that have/are using similar simulation games in their curricula or extracurricular training for emergency preparedness?

The sample size (n=30) was determined based on the principle of thematic saturation. Each participant completed the interview once. All participants received a copy of their submitted responses by email and were given the opportunity to request corrections or seek additional information through a designated contact address. To ensure anonymity and reduce potential bias, each participant was assigned a numerical identifier during data processing. Given that the lead researcher had prior professional relationships with some participants, extra measures were taken to blind participant identities during coding. The study protocol was reviewed and approved by the Ethics Committee of the University of Georgia, School of Health Sciences (Approval Number: N:11-6461). Informed consent was implied through voluntary completion of the interview form.

The interviews were conducted by a public health PhD candidate with an MD diploma. A reflexive thematic analysis was conducted using MAXQDA24 (version 24.5.1), following an iterative inductive coding approach. A single researcher independently coded the data, performing multiple coding rounds to enhance reliability. The study's trustworthiness was established through the following criteria: Credibility was strengthened by triangulating responses from three international curricular committee members (from Germany, Belgium, and Armenia), which reinforced the broader applicability of the results. Dependability was established through iterative coding and filtration, ensuring reliable theme development. Confirmability was maintained by validating findings with direct participant quotes to align with perspectives. Transparency was ensured through documentation, noting limitations such as discipline representation.

Results

A total of 30 responses were collected from Georgian participants, including 25 educators and 5 curricular committee members, representing a range of disciplines. These included biomedical scientists (37%, n=11), clinicians (33%, n=10), public health specialists (13%, n=4), dentistry educators (10%, n=3), nursing educators (3%, n=1), and pharmacy educators (3%, n=1). The gender distribution among educators was predominantly female, with 20 women (80%) and 5 men (20%), while all five curricular committee members were female. Academic positions varied across participants, including 17 invited lecturers (57%), 9 associate professors (30%), and 4 full professors (13%). Table 2 summarises the demographic and professional characteristics of the study participants. Responses from three international curricular committee members, based in Germany, Belgium, and Armenia, were not included in the thematic analysis. Instead, their input was used exclusively to support triangulation, thereby enhancing the credibility and confirmatory depth of the findings.

Table 2. Descriptive characteristics of the study participants

Georgian Educators				
Numerical Identifier for Educators (E)	**Gender**	**Discipline**	**Academic Position**	**Country**
E1	Female	Clinician	Invited Lecturer	Georgia
E2	Female	Clinician	Invited Lecturer	
E3	Female	Biomedical Scientist	Associate Professor	
E4	Female	Biomedical Scientist	Associate Professor	
E5	Female	Biomedical Scientist	Invited Lecturer	
E6	Male	Biomedical Scientist	Invited Lecturer	
E7	Female	Clinician	Invited Lecturer	
E8	Female	Public Health Specialist	Associate Professor	
E9	Female	Clinician	Invited Lecturer	
E10	Female	Biomedical Scientist	Invited Lecturer	
E11	Female	Clinician	Invited Lecturer	
E12	Female	Public Health Specialist	Associate Professor	
E13	Female	Clinician	Invited Lecturer	
E14	Female	Dentistry Educator	Invited Lecturer	
E15	Female	Dentistry Educator	Invited Lecturer	
E16	Female	Biomedical Scientist	Associate Professor	
E17	Female	Clinician	Associate Professor	
E18	Male	Biomedical Scientist	Invited Lecturer	
E19	Female	Public Health Specialist	Full Professor	
E20	Female	Clinician	Associate Professor	
E21	Male	Biomedical Scientist	Invited Lecturer	
E22	Male	Biomedical Scientist	Invited Lecturer	
E23	Female	Pharmacy Educator	Invited Lecturer	
E24	Male	Biomedical Scientist	Invited Lecturer	
E25	Female	Clinician	Invited Lecturer	
Georgian Curricular Committee Members				
Numerical Identifier for Georgian Curricular Committee Member (C)	**Gender**	**Discipline**	**Academic Position**	**Country**
C1	Female	Biomedical Scientist	Full Professor	Georgia
C2	Female	Clinician	Associate Professor	
C3	Female	Public Health Specialist	Full Professor	
C4	Female	Nursing Educator	Full Professor	
C5	Female	Dentistry Educator	Associate Professor	
International Curricular Committee Members				
Numerical Identifier for International Curricular Committee Member (I)	**Gender**	**Field**	**Academic Position**	**Country**
I1	Female	Medicine	Vice Rector in Medicine	Belgium
I2	Male	Medicine	Vice Dean of General Surgery	Armenia
I3	Male	Medicine	Full Professor	Germany

As represented in Table 3, thematic analysis identified three major themes and six sub-themes, offering qualitative indicators for pandemic preparedness and lessons from COVID-19. These findings provide insights into educators' perspectives on institutional readiness, public health communication, and research collaboration, highlighting key areas for strengthening pandemic preparedness in higher education.

Table 3. Thematic coding analysis of Georgian HEI educators and curricular committee members identifying qualitative indicators for pandemic preparedness

Theme	Sub-Theme	Sub-Category	Illustrative Quotes from Participants
Strengthening Institutional Readiness	Enhancing Core Curriculum for Pandemic Preparedness	Enhancing Practical Skills	"While this theoretical foundation is essential, it's important to acknowledge that practical skills are equally crucial for effective pandemic management and we recognize the value of hands-on experiences" (International Curricular Committee Member 2, Medicine).
		Enhancing Infection Control / Epidemiology Knowledge	"More emphasis is needed on infection control, I would like to develop a separate independent module in the program in this direction" (Curricular Committee Member 5, Dentistry).
		Enhancing Preventive Medicine Teachings	"Our program tries as much as possible to develop the skills of a doctor as a health advocate in order to provide maximum support for healthy life, disease prevention, including through vaccination" (Educator 5, Medicine)
		Enhancing Pandemic Preparedness Training	"Pandemic preparedness and response issues still require special training, awareness raising, and learning, which is given less attention" (Educator 19, Public Health)
	Innovating Teaching Modalities	Optimising Hybrid Learning	"During the period of the COVID-19 pandemic we recognized the necessity to reorganize and order of our teaching courses to facilitate online learning. Technical solutions were identified and implemented to support this transition" (Curricular Committee Member 1, Medicine)
		Expanding Simulation-Based Learning	"Pandemic simulation exercises are also introduced into curriculum - by this students engage in mock pandemic scenarios and develop practical crisis

			management skills" (Curricular Committee Member 1, Medicine)
Enhancing Public Health Communication	Public Communication Strategies	Enhancing Emergency/Crises Communication	"Teach effective communication during crises. Role-play scenarios where students convey risk information to diverse audiences. Address misinformation and combat stigma" (International Curricular Committee Member 2, Medicine).
		Addressing Biopsychosocial Aspects of Community Health	"Considering that, according to the World Health Organization, human health includes not only physical well-being, but also psychological well-being, healthcare workers have to pay attention to these issues" (Educator 10, Medicine)
	Vaccination Advocacy	Training Students in Public Health Advocacy	"Involve students in community health assessments. They can participate in outbreak investigations, community education, and vaccination campaigns" (Curricular Committee Member 2, Public Health)
		Building Vaccine Trust and Awareness	"How to convince the patient to get vaccinated, how the citizen's responsibility and motivation to comply with the established regulations can be increased" (Educator 10, Medicine)
Building Research and Collaborative Capacity	Research Integration	Encouraging Pandemic-Related Research	"Organising workshops and seminars, facilitating partnerships with local health organizations, promoting research opportunities, incorporating case studies in learning, encouraging peer education" (Educator 25, Medicine)
		Expanding Interdisciplinary Collaboration	"Encourage collaboration across disciplines (medicine, nursing, public health, pharmacy) to foster a holistic understanding of pandemics" (International Curricular Committee Member 3, Medicine)
		Expanding International Collaboration	"Highlight the interconnectedness of global health. Expose students to international responses, lessons from past pandemics, and the role of international organizations" (International Curricular Committee Member 2, Medicine)
	Knowledge	Applying Lessons	"Certain subjects need to be updated with

	Exchange and Lessons Learned	to Future Crises	specific considerations of pandemics, including lessons learned from COVID and future expectations" (Educator 22, Medicine)
		Facilitating Cross-Sectoral Knowledge Sharing	"Collaboration between teams such as public health, research, global health, infectious diseases, microbiology, information technology and etc. can provide students with a comprehensive understanding of pandemic management" (Curricular Committee Member 1, Medicine)
		Educator-to-Student and Peer-to-Peer Knowledge Sharing	"I see my role as a teacher in providing students with as much detail as possible. Information, article tactics, examples of existing experience" (Educator 7, Medicine)

Theme 1: Strengthening Institutional Readiness

This theme highlighted the need to equip students and faculty with essential crisis management skills. Over half of the participants (55%, n=16) emphasised integrating pandemic preparedness training into curricula, while 48% (n=14) identified infection control and epidemiology as essential components. One educator noted: *"*Our unpreparedness and inadequate response to the previous pandemic demonstrate the need for curriculum revisions that incorporate lessons from COVID and future expectations" (Educator 22, Biomedical Scientist).

Additionally, 31% (n=9) prioritised enhancing practical skills and preventive medicine teachings: "The curriculum provides only theoretical knowledge, which is insufficient. It is necessary to deepen this knowledge, to add practical skills, to learn more about preventive measures" (Educator 3, Biomedical Scientist).

Furthermore, 38% (n=11) advocated for hybrid learning and simulation-based education, emphasising pandemic scenarios as crucial for real-world preparedness: "My university incorporate some emergency simulation games and scenarios into their curricula…These simulations can help students practice decision-making and response strategies in a controlled environment" (Educator 25, Clinician).

Theme 2: Enhancing Public Health Communication

Improving public health communication strategies during crises emerged as another key indicator. 45% (n=13) identified vaccine advocacy

as essential, with 92% of those responses (n=12) stressing the need to train students in public health advocacy to build vaccine trust and combat misinformation: “Our program tries as much as possible to develop the skills of a doctor as a health advocate to provide maximum support for healthy life, disease prevention, including through vaccination” (Educator 5, Biomedical Scientist).

Additionally, two educators marked the importance of addressing biopsychosocial aspects, such as community well-being, to build resilience during pandemics: “The pandemic and the imposed regulations also had an impact on the emotional space of the population. We saw that people needed help in this direction as well” (Educator 10, Biomedical Scientist).

Theme 3: Building Research and Collaborative Capacity

This theme underscored advancing research and fostering collaboration. 48% (n=14) prioritised integrating pandemic-related research into curricula, while 66% (n=19) highlighted knowledge exchange, including cross-sectoral sharing (47%, n=9), as essential for strengthening collaboration: “The collaboration between teams such as public health, research, global health, infectious diseases, microbiology, information technology and etc. can provide students with a comprehensive understanding of pandemic management.” (Curricular Committee Member 1, Biomedical Scientist).

A smaller group (7%, n=2) reinforced expanding international discussions to enhance both local and global preparedness: “We are in the process of researching and identifying best practices from other universities, both national and international, that have implemented curriculum content reforms to promote preparedness and response to future pandemics.” (Curricular Committee Member 2, Clinician)

Discussion

Principle Findings and Contributions

This study explores core indicators for enhancing pandemic preparedness in undergraduate biomedical and health sciences education. It focuses on curriculum reform, public health communication, and interdisciplinary collaboration, offering a context-specific perspective grounded in the experiences of Georgian educators and curricular committee members. Unlike studies that concentrate on broad institutional or policy recommendations, this research provides practical, curriculum-level strategies tailored to local realities. Pandemic preparedness has been widely addressed in educational research, particularly in relation to incorporating pandemic-related content, strengthening competency-based frameworks, and aligning training with health policy. Many biomedical and health sciences

programs continue to lack structured disaster preparedness instruction, leaving students unprepared for emergency response. Prior studies emphasize that outbreak management and response skills should be embedded across the curriculum to ensure graduates are equipped with essential competencies (Martin et al., 2020; Miller et al., 2023).

Simulation and Curricular Innovation

One of the most prominent findings of this study is the need for simulation-based education. Participants identified simulation as a key tool to bridge the gap between theory and practice, enhancing students' decision-making and crisis management in a controlled learning environment. As one international committee member noted: "Students can practice contact tracing, triage, and resource allocation. Virtual simulations allow scalability and adaptability." This aligns with evidence showing that simulations improve teamwork, preparedness, and critical thinking in clinical scenarios (O'Byrne et al., 2020) while post-simulation debriefings help reinforce strengths and identify areas for improvement (Dalkiliç, 2023) Research further supports the use of simulation in preparing students for high-stress situations such as triage and resource distribution during pandemics (Khan et al., 2020, Shah et al., 2024). In addition to simulation, participants stressed the importance of developing flexible and continuously updated curricula that reflect evolving educational needs. One committee member suggested: "Integrate pandemic-related content throughout the curriculum rather than confining it to specific courses. Embed discussions on outbreak investigation, infection control, and crisis communication." Embedding these topics across the curriculum, rather than isolating them, fosters a more holistic readiness. Competency-based programs, which include mandatory training in the use of personal protective equipment (PPE) and hands-on exercises in full protective gear, were seen as essential components of preparedness (Boutros et al., 2023). Elective courses like the Pandemic Preparedness Summer School, which offers interdisciplinary teaching in outbreak response and vaccine confidence, demonstrate how targeted programs can strengthen institutional preparedness and could be adapted by Georgian universities (University of Antwerp, 2025).

Communication, Collaboration and Student Support

Participants consistently highlighted the need to strengthen students' public health communication skills. Several educators stressed that COVID-19 revealed how miscommunication and misinformation undermined public trust. Elective courses in vaccine advocacy were proposed to address these gaps. Literature supports the link between improved vaccine education and professionals' ability to effectively communicate with patients (Misztal-

Okońska et al., 2020; Sojati et al., 2024). This aligns with broader global trends that emphasize communication training as a tool to combat misinformation and vaccine hesitancy (Kelekar et al., 2021; Onello et al., 2019). Interdisciplinary collaboration and practical fieldwork were also identified as essential elements for effective pandemic preparedness. A committee member emphasized: "Internships and fieldwork opportunities with local health departments, hospitals, and public health organizations are of utmost importance to ensure and promote pandemic preparedness at the undergraduate level." Such initiatives support real-world skill development and foster teamwork across disciplines. Team-based learning strategies involving students from medicine, nursing, and public health have proven effective in preparing for outbreak response (Soklaridis et al., 2023; Soemantri et al., 2023). Strengthening connections between academic institutions and public health agencies was viewed as critical to long-term preparedness (Gardanova et al., 2023). Structured interdisciplinary simulations also contribute to better coordination and joint decision-making (Jordan et al., 2022). Finally, educators emphasized the need to prioritize students' psychological well-being. The pandemic highlighted the mental health burdens faced by health professions students, reinforcing the importance of faculty mentorship, peer support, and access to psychological resources. Addressing these needs further enhance resilience of the future workforce (West et al., 2024; Chandratre et al., 2021).

Limitations

Several limitations should be considered when interpreting the findings. First, the use of written responses in place of real-time interviews may have limited the depth and spontaneity of participant insights. Second, participants did not validate the final findings, which may affect reflexivity. Third, as the study focuses on Georgia, the transferability of results to education systems in other countries may be limited by contextual differences in policy, infrastructure, and resources.

Despite its limitations, the study also has notable strengths. It gathered input from educators across five disciplines, providing a broad view of curriculum challenges and reform needs. Triangulation with international perspectives strengthened the reliability and relevance of the findings. Reflexive thematic analysis allowed inductive, context-rich insights grounded in the lived experiences of educators.

Conclusions

This study contributes to the global discourse on strengthening pandemic preparedness in undergraduate biomedical and health sciences education by offering Georgia as a case study. Through the perspectives of

educators across multiple disciplines, it emphasises curriculum-level reforms focused on simulation-based training, public health communication, and interdisciplinary collaboration. These strategies address local educational gaps while aligning with global efforts to strengthen workforce readiness. By linking local insights to broader needs, this research supports scalable approaches to preparing a more resilient and adaptable healthcare workforce. Future studies should broaden participant diversity and assess the long-term impact of such reforms on educational outcomes and system resilience.

Conflict of Interest: The authors reported no conflict of interest.

Data Availability: All data are included in the content of the paper.

Funding Statement: The authors did not obtain any funding for this research.

References:

1. Boutros, P., Kassem, N., Nieder, J., Jaramillo, C., Von Petersdorff, J., Walsh, F. J., Bärnighausen, T., & Barteit, S. (2023). Education and Training Adaptations for Health Workers during the COVID-19 Pandemic: A Scoping Review of Lessons Learned and Innovations. *Healthcare*, *11*(21), 2902. https://doi.org/10.3390/healthcare11212902
2. Caruso, C. (2022, November 17). *COVID-19's Lessons for Future Pandemics*. Harvard Medical School. Retrieved June 21, 2025, from https://hms.harvard.edu/news/covid-19s-lessons-future-pandemics
3. Chandratre, S., Knight, C., & Dodson, L. (2021). Supporting Medical Student Mental Health during COVID-19: Strategies Implemented for an Accelerated Curriculum Medical Campus. *Journal of Medical Education and Curricular Development*, *8*. https://doi.org/10.1177/23821205211006392
4. Dalkiliç, S. (2023). Evaluation of Health Management Education Curriculum in terms of Disaster Management. *Journal of International Health Sciences and Management*, *9*(18), 44–51. https://doi.org/10.48121/jihsam.1317458
5. Gardanova, Z., Belaia, O., Zuevskaya, S., Turkadze, K., & Strielkowski, W. (2023). Lessons for Medical and Health Education Learned from the COVID-19 Pandemic. *Healthcare*, *11*(13), 1921. https://doi.org/10.3390/healthcare11131921
6. Jordan, S. R., Connors, S. C., & Mastalerz, K. A. (2022). Frontline healthcare workers' perspectives on interprofessional teamwork

during COVID-19. *Journal of Interprofessional Education & Practice*, *29*, 100550. https://doi.org/10.1016/j.xjep.2022.100550

7. Kelekar, A. K., Lucia, V. C., Afonso, N. M., & Mascarenhas, A. K. (2021). COVID-19 vaccine acceptance and hesitancy among dental and medical students. *The Journal of the American Dental Association*, *152*(8), 596–603. https://doi.org/10.1016/j.adaj.2021.03.006
8. Khan, J. A., & Kiani, M. R. B. (2020). Impact of multi-professional simulation-based training on perceptions of safety and preparedness among health workers caring for coronavirus disease 2019 patients in Pakistan. *Journal of Educational Evaluation for Health Professions*, *17*, 19. https://doi.org/10.3352/jeehp.2020.17.19
9. Martin, A., Blom, I. M., Whyatt, G., Shaunak, R., Viva, M. I. F., & Banerjee, L. (2020). A rapid systematic review exploring the involvement of medical students in pandemics and other global health emergencies. *Disaster Medicine and Public Health Preparedness*, *16*(1), 360–372. https://doi.org/10.1017/dmp.2020.315
10. Miller, S., St Onge, E., Buring, S., Allen, J., Patel, P., Pullo, J., Schmittgen, J., & Whalen, K. (2023). Curricular changes in times of crisis: Lessons learned. *Currents in Pharmacy Teaching and Learning*, *15*(1), 101–109. https://doi.org/10.1016/j.cptl.2023.02.014
11. Ministry of Education, Science, Culture and Sports of Georgia. (2020). *Pandemic and general education in Georgia*. https://mes.gov.ge/mesgifs/1609844890_2020-Annual-report-ENG.pdf
12. Misztal-Okońska, P., Goniewicz, K., Hertelendy, A. J., Khorram-Manesh, A., Al-Wathinani, A., Alhazmi, R. A., & Goniewicz, M. (2020). How medical studies in Poland prepare future healthcare managers for crises and disasters: results of a pilot study. *Healthcare*, *8*(3), 202. https://doi.org/10.3390/healthcare8030202
13. O'Byrne, L., Gavin, B., & McNicholas, F. (2020). Medical students and COVID-19: the need for pandemic preparedness. *Journal of Medical Ethics*, *46*(9), 623–626. https://doi.org/10.1136/medethics-2020-106353
14. Onello, E., Friedrichsen, S., Krafts, K., Simmons, G., & Diebel, K. (2019). First year allopathic medical student attitudes about vaccination and vaccine hesitancy. *Vaccine*, *38*(4), 808–814. https://doi.org/10.1016/j.vaccine.2019.10.094
15. *Pandemic Preparedness | Pandemic Preparedness | Summer School | Antwerp Summer University | University of Antwerp*. (n.d.). https://www.uantwerpen.be/en/summer-winter-schools/pandemic-preparedness/

16. Richardson, E., Tvaliashvili, M., Gviniadze, K., Roubal, T., World Health Organization, & European Observatory on Health Systems and Policies. (2025). *Health Systems in Action (HSIA) insights: Georgia*. European Observatory on Health Systems and Policies, WHO Regional Office for Europe. https://iris.who.int/bitstream/handle/10665/380264/9789289059770-eng.pdf?sequence=2
17. Shah, M. H., Roy, S., & Flari, E. (2024). The critical need for disaster medicine in modern medical education. *Disaster Medicine and Public Health Preparedness*, *18*. https://doi.org/10.1017/dmp.2024.56
18. Shrivastava, S. R., Shrivastava, P. S., & Joshi, A. (2024). Role of medical education in pandemic preparedness. *National Journal of Community Medicine*, *15*(03), 244–247. https://doi.org/10.55489/njcm.150320243584
19. Soemantri, D., Findyartini, A., Mustika, R., Felaza, E., Arsyaf, M. A., Alfandy, B. P., & Greviana, N. (2023). Looking beyond the COVID-19 pandemic: the recalibration of student-teacher relationships in teaching and learning process. *Medical Education Online*, *28*(1). https://doi.org/10.1080/10872981.2023.2259162
20. Sojati, J., Murali, A., Rapsinski, G., & Williams, J. V. (2023). Do not throw away your shot: Pilot study in improving medical school curricula through focused vaccine education. *AJPM Focus*, *3*(2), 100178. https://doi.org/10.1016/j.focus.2023.100178
21. Soklaridis, S., Zaheer, R., Scully, M., Shier, R., Williams, B., Dang, L., Daniel, S. J., Sockalingam, S., & Tremblay, M. (2023). 'We are in for a culture change': continuing professional development leaders' perspectives on COVID-19, burn-out and structural inequities. *BMJ Leader*, *8*(2), 142–146. https://doi.org/10.1136/leader-2023-000837
22. West, H. M., Flain, L., Davies, R. M., Shelley, B., & Edginton, O. T. (2024). Medical student wellbeing during COVID-19: a qualitative study of challenges, coping strategies, and sources of support. *BMC Psychology*, *12*(1). https://doi.org/10.1186/s40359-024-01618-8
23. Zoidze, A., Gabunia, T., Ekberg, A., & WHO. (2021). GEORGIA FROM CRISIS TO OPPORTUNITY: ADVANCING PRIMARY HEALTH CARE REFORM AMID THE COVID-19 PANDEMIC. In *WHO*. https://www.who.int/docs/librariesprovider2/default-document-library/primary-health-care-georgia-eng.pdf?sfvrsn=3aa5efcd_6&download=true