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

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Abstract

Aims and Scope: The COVID-19 pandemic exposed widespread gaps in undergraduate biomedical and health sciences programs' ability to prepare future healthcare professionals for public health emergencies. This study aimed to identify key curricular indicators for strengthening pandemic preparedness in undergraduate education, using Georgia as a representative case study of a resource-constrained setting. **Methods:** A qualitative study was conducted using virtual semi-structured interviews with 33 educators recruited through purposive sampling based on teaching experience and disciplinary background. Participants represented medicine, public health, nursing, dentistry, and pharmacy programs - 30 from Georgian institutions and 3 international experts for data triangulation. Data collected from May to August 2024 were analysed using inductive thematic analysis in MAXQDA, a qualitative analysis software. Ethical approval was obtained from The University of Georgia School of Health Sciences Ethics Committee (Approval Number: N:11-6461). **Findings:** Three key curricular indicators emerged for strengthening pandemic preparedness: (1) institutional readiness by embedding pandemic-focused content and simulation-based learning into core curricula; (2) public health communication, including vaccine advocacy, crisis response messaging, and risk communication; (3) research and collaboration capacity through interdisciplinary and international engagement to build a

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responsive academic workforce. **Conclusion:** Despite lessons from COVID-19, many undergraduate biomedical and health sciences programs continue to lack structured disaster preparedness instruction, leaving students unprepared for emergency response. The identified key indicators provide a foundation for undergraduate curricular reform. Using Georgia as an example, the findings present a scalable reform framework to strengthen pandemic preparedness, system resilience and better prepare future professionals for public health emergencies.

Keywords: Pandemic preparedness, curricular reform, simulation-based learning, interdisciplinary collaboration, public health emergency

Introduction

The COVID-19 pandemic revealed significant deficiencies in the preparedness of future healthcare professionals to respond effectively to public health emergencies. This systemic unpreparedness was not solely due to overwhelmed healthcare systems, characterised by patient surges, strained infrastructure, and shortages of nurses and physicians (Martin et al., 2023). It also stemmed from undergraduate biomedical and health sciences programs inadequately integrating essential competencies in outbreak management, infection control, crisis communication, and emergency response protocols, leaving students unprepared to contribute effectively during the pandemic (O'Byrne et al., 2020). These curricular shortcomings limited students' ability to engage meaningfully during the crisis and prompted urgent calls for comprehensive curricular reform, advocating 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).

While high-income countries (HICs) experienced unexpected high levels of morbidity and mortality due to early viral spread and population vulnerability (Hodgins & Saad, 2020), their medical education systems were generally better positioned to sustain curricular continuity and adapt to emergency conditions. Robust infrastructure, widespread digital access, and pre-existing institutional readiness allowed many HICs to pivot rapidly to online learning, integrate simulation-based tools, and limit disruptions in student training (Connolly & Abdalla, 2022; Dawidziuk et al., 2021).

In contrast, low- and middle-income countries (LMICs) often lacked the foundational resources necessary to uphold educational delivery during lockdowns. Many students in LMICs had no access to internet at home, and institutions frequently struggled with unreliable connectivity, limited digital

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tools, and a lack of trained support staff (Dawidziuk et al., 2021). As a result, efforts to adapt curricula were described as "very difficult," particularly in the absence of systemic support (Connolly & Abdalla, 2022). Medical students were rarely engaged in structured pandemic response activities, further compounding the disconnect between education and public health needs. Although these curricular advantages in HICs did not directly reduce infection or mortality rates, they played a crucial role in maintaining continuous training and supporting workforce readiness during the crisis. Their systems enabled continuity in learning, rapid adaptation to online formats, and greater student involvement amid widespread public health challenges. By contrast, LMICs faced severe structural limitations that disrupted education and left students largely unprepared to engage meaningfully in pandemic response efforts (Marinoni et al., 2020). This disparity highlights the urgent need to build more resilient and adaptable educational systems in LMICs, not only to safeguard learning continuity, but to ensure future health professionals can contribute effectively during public health emergencies.

This call for reform is particularly acute in countries like Georgia, where workforce shortages and educational resource gaps intersect. 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 mobilised 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 organised 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. Curricular readiness may

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be measured through a combination of standardised assessments, simulation-based evaluations, and learner self-assessments, offering a holistic understanding of student competence in emergency contexts (Lee et al., 2023). Pre- and post-test models are particularly useful for assessing baseline knowledge and tracking improvements in cognitive and behavioural domains following curricular interventions (Saeed et al., 2023). Simulation exercises provide real-time insights into essential practical skills, including triage decision-making, proper use of personal protective equipment (PPE), and interdisciplinary collaboration under pressure (Shrestha et al., 2023). Self-assessment surveys further capture shifts in confidence, perceived preparedness, and willingness to respond before and after training (Tadese & Bihretie, 2021). Together, these assessment tools form a comprehensive framework for evaluating the effectiveness of pandemic-related curricula, positioning curricular reform not only as an academic necessity but as a strategic public health intervention that advances workforce development, institutional preparedness, and system-wide capacity building (Caruso, 2022). As such, integrating pandemic preparedness into undergraduate curricula is increasingly recognised as essential to strengthening both national and global health systems (Zoidze et al., 2021).

While several studies have examined the impact of the COVID-19 pandemic on undergraduate biomedical and health sciences education, most have focused on the immediate shift to online learning and the logistical challenges of maintaining educational continuity (Mojumder et al., 2025). Few have captured the perspectives of educators and curricular decision-makers, those with firsthand experience managing teaching and learning before, during, and after the pandemic, on how curricula can be strengthened to enhance pandemic preparedness. This remains a notable gap in the literature, particularly LMICs where vulnerabilities in education and health systems were most pronounced. Considering post-COVID insights from educators may provide a practical foundation for developing curricular reforms that enhance both preparedness and workforce adaptability in future emergencies.

This qualitative study, conducted as part of a broader doctoral research project, addresses this critical gap by exploring the perspectives of Georgian educators and curricular committee members across medicine, public health, nursing, pharmacy, and dentistry. Their insights, shaped by pedagogical expertise and first-hand experience during the COVID-19 crisis - navigating the evolving educational landscape, inform a scalable and contextually grounded framework for curricular reform. By using Georgia as a representative LMIC, the findings offer practical strategies aligned with international guidance and national priorities, providing valuable direction for countries in similar contexts seeking to enhance health workforce resilience and pandemic preparedness.

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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 research also examined how institutional and contextual factors influence their views on curricular reform.

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

Data collection: 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, while curricular committee members received six, designed to elicit both contextual insights and confirmatory perspectives on curricular development. The interview protocol was designed to gather reflections on both the perceived challenges during the COVID-19 pandemic and the proposed strategies for strengthening future preparedness through education.

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?

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	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 degree. 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 qualitative criteria: Credibility was strengthened by triangulating responses from three international curricular committee members - from Germany, Belgium, and Armenia - thereby reinforcing the broader applicability and relevance of the findings beyond the Georgian context. Dependability was established through iterative coding and a systematic filtration, ensuring consistency and reliability in theme development. Confirmability was maintained by validating findings with direct participant quotes to align with the respondent's authentic perspectives. Transparency was ensured through documentation of the

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research process, noting limitations - such as imbalances in 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	

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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

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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

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			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

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			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 Exchange and Lessons Learned	Applying Lessons to Future Crises	"Certain subjects need to be updated with 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)

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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).

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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 curricular 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-

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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 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 emphasised: "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 emphasised the need to prioritize students' psychological well-being. The pandemic highlighted the mental health burdens faced by students in health professions, reinforcing the importance of faculty mentorship, peer support, and access to psychological resources. Addressing these needs further enhances resilience of the future workforce (West et al., 2024; Chandratre et al., 2021).

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Limitations

Several limitations should be considered when interpreting the findings of this study. 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 these 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 context-rich insights grounded in the lived experiences of educators actively engaged in pandemic-era teaching and curriculum development.

Conclusion

This qualitative study explored how pandemic preparedness can be strengthened in undergraduate biomedical and health sciences education by analysing the perspectives of Georgian educators and curricular committee members across medicine, public health, nursing, pharmacy, and dentistry. Their insights emphasize the importance of integrating targeted training in infection prevention, crisis communication, simulation-based learning, and interdisciplinary collaboration as part of a broader curricular reform agenda. These findings reinforce the central argument that curricular reform is not only an educational priority but also a strategic intervention to build a more resilient and responsive health workforce.

By presenting a contextually grounded yet scalable framework aligned with both international guidance and national priorities, this study contributes to the ongoing discourse on pandemic preparedness in health professions education, particularly in low- and middle-income countries (LMICs). The proposed interventions - such as embedding pandemic content into coursework, incorporating real-life scenarios through simulation-based learning, and promoting interdisciplinary knowledge-sharing - offer concrete strategies for institutions pursuing curricular reform. These targeted interventions not only enhance student competencies but also support the development of a resilient and adaptable healthcare workforce, capable of responding effectively to future public health emergencies. By emphasizing structured training tools - such as infection control modules and communication exercises - and active learning strategies that foster engagement and collaboration, the study further reinforces how educational reform can strengthen both preparedness and adaptability.

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While some limitations apply, the perspectives captured offer valuable direction for similarly positioned countries seeking to enhance health workforce resilience and emergency readiness. Future research should aim to broaden participant representation and explore the longitudinal effects of preparedness-focused curricula on student competencies, graduate readiness, and workforce resilience.

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Data Availability: All study questions are included in the content of the paper. Detailed participant responses are not publicly available due to ethical and privacy considerations regarding confidentiality. Anonymised transcripts or full data can be provided upon reasonable request to the corresponding author.

Declaration for Human Participants: This study has been approved by The University of Georgia School of Health Sciences Ethics Committee (Approval Number: N:11-6461). All procedures involving human participants complied with the ethics committee's guidelines and the principles of the Helsinki Declaration.

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