



ORIGINAL ARTICLE

Investigating the Barriers and Solutions to Conducting Research in COVID-19 from the Perspective of Graduate Students

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ABSTRACT

Introduction: Scientific research plays a critical role in improving health systems and social well-being; however, public health crises pose serious challenges to the research process, particularly for graduate students. This study aims to identify the barriers to conducting research during public health crises and propose potential solutions from the perspective of graduate students.

Materials and Methods: This descriptive cross-sectional study was conducted in 2020 among 210 graduate students at Mazandaran University of Medical Sciences. Data were collected using a researcher-developed questionnaire assessing personal and organizational research barriers and proposed solutions. Data were analyzed using descriptive statistics, independent t-tests, and Spearman's correlation coefficient in SPSS version 27.

Results: Results indicated that "weakness in individual research skills" (6.42 ± 25.10) was the most significant personal obstacle, while "administrative obstacles" (2.63 ± 16.49) were the main organizational barrier. "Motivational support for students" received the highest solution score (2.97 ± 21.99). Moreover, significant positive correlations were found between organizational and personal obstacles ($r = 0.35$, $p = 0.001$) and between appropriate solutions ($r = 0.44$, $p = 0.001$). Gender, marital status, research background, and completion of a research methods course significantly influenced perceived barriers.

Conclusion: The findings suggest that addressing research challenges during public health crises requires strengthening research skills, reducing administrative barriers, and providing adequate motivational and institutional support.

Keywords: Public Health, Research, COVID-19, Students, Graduate

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Introduction

Scientific research serves as a fundamental pillar of national development and progress, contributing significantly to social welfare, the improvement of health systems, and the advancement of scientific and technological capacities (1). In today's complex global health environment, the need for specialized

and focused research has become increasingly evident (2). In addition, postgraduate research plays a key role in developing specialized knowledge and strengthening students' research competencies, thereby contributing to the improvement of health services and the achievement of sustainable

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development goals (2, 3). Since postgraduate education is largely research-oriented and requires the completion of a thesis, graduate students represent an important source of scientific production within universities (1).

A substantial proportion of research conducted in medical universities originates from student theses, which can influence health system performance and public health improvement (4, 5). In addition to knowledge production, participation in research activities enhances students' critical thinking, teamwork, and analytical skills, and helps them understand the complex relationships among scientific data within healthcare systems (6, 7). During public health crises—such as disease outbreaks, natural disasters, or other emergencies—the importance of scientific research becomes even more pronounced, as it helps identify emerging problems, generate evidence, and support effective responses within health systems (7, 8). Nevertheless, researchers and students often encounter multiple challenges that may negatively affect both the quality and quantity of research activities (9).

Public health crises can place considerable pressure on health systems while simultaneously disrupting educational and research processes in academic institutions (10, 11). Evidence suggests that during such crises, a mismatch between available research infrastructure and the needs of students may arise, limiting their ability to effectively conduct research (12). In these situations, students often require additional educational, financial, advisory, and psychological support, yet such support may not always be adequately available (13, 14). Moreover, restrictions on access to research environments and field data can further hinder the continuation of research activities.

One of the most significant public health crises in recent years was the COVID-19 pandemic, which began in late 2019 and rapidly spread worldwide, exerting considerable pressure on health, economic, and social systems (15). Iran was among the countries that experienced multiple

waves of the disease and faced widespread disruptions during this period (16). The pandemic not only challenged the national health system but also affected the educational and research activities of universities and academic centers (17, 18). Many graduate students whose research depended on fieldwork, laboratory access, or institutional resources encountered serious limitations. University closures, restricted access to facilities, shifting institutional priorities, and increased psychological stress were among the major challenges experienced by students during this time (19, 20).

These circumstances created new operational barriers to student research, including limited physical access to research environments, changes in administrative procedures, and an institutional focus on crisis management rather than research support (12, 21). Given the essential role of postgraduate research in advancing scientific knowledge and the need for policymakers to better understand students' research challenges, examining these barriers has become increasingly important. Furthermore, identifying practical solutions based on students' experiences may help improve research conditions and strengthen research capacity during future crises.

Therefore, the present study was conducted to investigate the barriers and potential solutions related to conducting research during public health crises from the perspective of postgraduate students.

Materials and Methods

This study is a descriptive cross-sectional investigation conducted in 2020 among master's students at Mazandaran University of Medical Sciences. The sample size was determined to be 210, based on the Krejcie and Morgan table and considering a population of 460 individuals. After obtaining the list of students' names from the university's educational vice chancellor, sampling was conducted using a simple random sampling method. Inclusion criteria encompassed students who had completed at least two semesters in

graduate school, passed the research methods course, and were willing to participate in the study. Exclusion criteria included conditional and guest students.

The data collection instrument was a researcher-developed questionnaire comprising four sections: the first section contained demographic information, including age, gender, field of study, GPA, marital status, dormitory status, and proficiency in Word software. The remaining sections involved personal barriers (20 questions), organizational barriers (22 questions), and proposed solutions (11 questions). The questionnaire employed a five-point Likert scale ranging from “strongly agree” (5) to “strongly disagree” (1). Each question assigned an overall score, with higher scores reflecting greater agreement with the perceived barriers to conducting research. Then, the average scores across the individual, organizational, and solutions sections were reported as scores out of 100. Questionnaire items were formulated using a review of credible scientific literature and underwent scientific validation by being distributed to 10 faculty members experienced in teaching the Research Methodology Unit and thesis supervision at Mazandaran University of Medical Sciences. The Content Validity Index (CVI) was calculated at 92%, and the Content Validity Ratio (CVR) was assessed at 89%. Exploratory factor analysis was conducted to identify the factors of each questionnaire section. The KMO and Bartlett tests were also employed to assess the adequacy of the sample size and the appropriateness of the data. Varimax rotation facilitated the separation of items within each factor, and items with factor loadings below 0.4 were excluded. Internal consistency was evaluated using Cronbach’s alpha coefficient,

yielding values greater than or equal to 0.8 across all factors, indicating good internal consistency among each factor’s questions. Furthermore, internal consistency was demonstrated for all questions across the personal factors, organizational factors, and proposed solutions questionnaires, with Cronbach’s alpha values of 0.92, 0.92, and 0.89, respectively. Data analysis utilized SPSS version 27 software, employing descriptive and analytical statistical tests, including independent t-tests and Spearman’s correlation coefficient, with a significance level set at 0.05. Ethical considerations included obtaining research ethics approval from the National Medical Ethics Committee (code IR.MAZUMS.REC.1399.945). Finally, informed consent was secured from participants, ensuring the confidentiality of their information.

Results

In this study, female students constituted the majority of participants, accounting for 136 (61.5%). Of the total participants, 126 (57%) were married, and the majority, 171 (77.4%), resided off-campus. In terms of research background, over two-thirds of the participants (73.8%) had attended training workshops, and 68.8% were proficient in Word software.

According to Table 1, average scores indicated that from the students’ perspective, the most significant personal barriers related to personal skills had an average score of 25.10 ± 6.42 . In the organizational barriers section, administrative obstacles ranked highest with an average of 16.49 ± 2.63 . In the solutions section, the creation of a motivational environment for students received the highest average score of 21.99 ± 2.97 .

Table 1. Average scores and standard deviation of questionnaire factors and subscales by category

Questionnaire	Factor Name	Mean $\pm$ Standard Deviation
Barriers related to personal factors	Individual motivations	23.60 $\pm$ 7.25
	Personal Skills	25.10 $\pm$ 6.42
	Total	48.71 $\pm$ 12.59
Barriers related to organizational factors	Infrastructural barriers	35.10 $\pm$ 6.01
	Administrative barriers	16.49 $\pm$ 2.63
	Faculty-related barriers	18.20 $\pm$ 3.80
	Motivational barriers	12.13 $\pm$ 2.27
	Total	82.64 $\pm$ 11.73
Appropriate solutions	Creating motivational support for students	21.99 $\pm$ 2.97
	Providing material support for students	21.46 $\pm$ 2.94
	Total	43.45 $\pm$ 5.10

Table 2 results demonstrated that women experienced more personal barriers than men, with an average score of ($t = 2.90$, $p = 0.004$). Single students reported significantly higher scores across all three factors compared to their married counterparts ($p < 0.05$). Students without a research background reported more personal barriers than those with one ($p = 0.007$); however, in terms of organizational barriers and strategies, those with research experience scored higher

($p = 0.001$). Additionally, completing the research methods course and familiarity with Word software significantly lessened personal barriers and enhanced appropriate strategies ($p=0.001$ and $p = 0.046$). These findings underscore the significant influence of demographic and educational variables on students' understanding of research barriers and strategies, emphasizing the need for focus on these factors in educational and support planning.

Table 2. Comparison of mean and standard deviation of scores for personal, organizational factors, and appropriate solutions based on demographic information

Qualitative Variables	Personal Factors (Mean $\pm$ SD)	t (p-value)	Organizational Factors (Mean $\pm$ SD)	T (p-value)	Appropriate Strategy (Mean $\pm$ SD)	t (p-value)
Gender						
Male	45.39 $\pm$ 14.27	2.90 (0.004)	85.67 $\pm$ 12.06	0.14 (0.892)	44.33 $\pm$ 5.16	1.99 (0.048)
Female	50.67 $\pm$ 11.01		85.90 $\pm$ 12.27		42.93 $\pm$ 5.02	
Marital Status						
Married	44.96 $\pm$ 12.94	5.35 (0.001)	83.60 $\pm$ 11.33	3.18 (0.002)	42.55 $\pm$ 4.85	3.16 (0.002)
Single	53.61 $\pm$ 10.24		88.77 $\pm$ 12.67		44.70 $\pm$ 5.22	
Research Background						
No	51.00 $\pm$ 8.85	2.72 (0.007)	82.33 $\pm$ 10.28	4.22 (0.001)	41.84 $\pm$ 5.43	4.64 (0.001)
Yes	46.55 $\pm$ 14.91		88.93 $\pm$ 12.90		44.93 $\pm$ 4.33	
Workshop Attendance						
No	50.79 $\pm$ 11.85	1.49 (0.137)	85.46 $\pm$ 12.85	0.25 (0.800)	43.64 $\pm$ 5.42	0.31 (0.757)
Yes	47.91 $\pm$ 12.79		85.93 $\pm$ 11.96		43.40 $\pm$ 5.02	
Research Methodology						
No	53.40 $\pm$ 7.75	5.22 (0.001)	86.24 $\pm$ 12.21	0.41 (0.682)	45.46 $\pm$ 4.09	5.07 (0.001)
Yes	45.72 $\pm$ 14.06		85.54 $\pm$ 12.17		42.24 $\pm$ 5.30	
Word Familiarity						
No	52.13 $\pm$ 6.86	3.55 (0.001)	83.15 $\pm$ 10.71	2.33 (0.021)	42.44 $\pm$ 5.24	2.01 (0.046)
Yes	47.10 $\pm$ 14.19		87.00 $\pm$ 12.61		43.93 $\pm$ 5.00	
Quantitative Variables						
			p-value			
Age	-0.34 (0.001)	-	-0.17 (0.013)	-	-0.16 (0.018)	-
GPA	-0.26 (0.001)	-	0.12 (0.079)	-	-0.14 (0.037)	-

Correlation analysis results presented in Table 3 indicated that an increase in organizational barriers scores correlated positively with personal barriers scores ($r = 0.35$) and appropriate solutions ($r = 0.44$), suggesting that students experiencing more organizational barriers also identified more

personal barriers and required more support solutions. However, no significant correlation was observed between personal barriers scores and appropriate solutions (correlation -0.07), indicating a lack of significant direct relationship between these two factors.

Table 3. Correlation between components of personal barriers, organizational barriers, and appropriate solutions

Components	Personal barriers	Organizational barriers	Appropriate solutions
Personal barriers	–	0.35 ($p = 0.001$)	-0.07 ($p = 0.272$)
Organizational barriers	0.35 ($p = 0.001$)	–	0.44 ($p = 0.001$)
Appropriate solutions	-0.07 ($p = 0.272$)	0.44 ($p = 0.001$)	–

Discussion

The present study aimed to examine the barriers to conducting research from the perspective of postgraduate students during the COVID-19 pandemic, a major public health crisis that disrupted higher education systems globally. The findings revealed that the most prominent barriers were related to weaknesses in personal research skills, organizational and administrative challenges, and deficiencies in the motivational environment supporting student research. **Rather than being merely descriptive, these findings suggest that research barriers during a public health crisis are produced by the interaction of three levels of influence: individual competence, institutional structure, and crisis-related disruption.**

One of the central findings of this study was the predominance of personal skill-related barriers. Research activities at the postgraduate level require advanced competencies in research methodology, statistical analysis, academic writing, database searching, and critical interpretation of findings. The abrupt transition from face-to-face to virtual education during the COVID-19 pandemic likely disrupted the acquisition and reinforcement of these skills. Unlike theoretical knowledge, methodological and statistical competencies often depend on hands-on training, close supervision, and interactive learning environments. **In other words, the mechanism here is not simply “students lacked skills,” but that the pandemic**

weakened the instructional conditions through which those skills are normally built and consolidated. The reduction in direct supervision and academic interaction may therefore have weakened students’ confidence and practical proficiency in research-related tasks.

These findings are consistent with international evidence. Mwangangi et al. (2024) identified insufficient digital infrastructure, limited research equipment, and inadequate field budgets as major constraints for postgraduate students in African universities (1). Hasan et al. (2025) further demonstrated that demographic characteristics such as gender, marital status, and prior research experience influence students’ perceptions of research barriers (22), a pattern also observed in the present study. Within Iran, Mahboubirad et al. (2021) reported weaknesses in research methodology and statistical software skills, along with prolonged approval procedures, as significant research barriers (23). Similarly, qualitative findings from Guilan University of Medical Sciences emphasized deficiencies in methodological knowledge, English proficiency, statistical software skills, and scientific search strategies (24). Taheri et al. (2018) also highlighted students’ difficulties in analyzing and interpreting data as a critical personal barrier (25).

Another explanatory mechanism relates to research anxiety and reduced academic self-efficacy during crisis conditions. Gholampour (2020) found that

postgraduate students experienced substantial anxiety concerning literature searching, statistical analysis, academic writing, and overall research competence (26). Contributing factors such as limited computer literacy, weak English skills, and unfamiliarity with reputable journals can amplify this anxiety. Likewise, Miri et al. (2018) reported lower average scores in computer and medical research skills compared to other academic domains (27). **These studies indicate that crisis conditions do not only interrupt training; they also intensify psychological barriers, making students less confident in initiating and sustaining research activities.** Therefore, structured workshops in research methodology, biostatistics, academic writing, and software training are essential to strengthen research self-efficacy among postgraduate students.

The impact of the pandemic-induced shift to virtual education further clarifies these findings. O'Doherty et al. (2018) emphasized limitations of online education in effectively transferring technical and statistical competencies that require interactive and practice-based learning (28). Abbasi et al. (2020) reported that although virtual education was unavoidable during the pandemic, it was associated with weaker educational interaction and reduced opportunities for practical skill development (29). In Iran, Adarvishi et al. (2025) also noted that insufficient infrastructure for virtual education exacerbated students' difficulties in learning research-related software and analytical skills (30). **This suggests that virtual education may preserve continuity of instruction, but it does not automatically preserve the quality of research training—especially for competencies that depend on supervision, feedback, and repeated practice.** Taken together, these findings suggest that while virtual education ensured academic continuity, it may have inadequately supported the development of higher-order research competencies.

Organizational and administrative barriers constituted another major category of obstacles. Students reported cumbersome regulations,

prolonged research proposal approval processes, and delays in project implementation and publication as significant institutional challenges. During public health crises, universities and healthcare systems often reallocate resources and prioritize clinical services, which may inadvertently slow down research-related administrative processes. **The mechanism here is structural: when institutions become crisis-oriented, research loses administrative priority, and students face delays even when they are motivated and academically prepared.** This structural shift may partially explain the prominence of bureaucratic barriers observed in this study.

International findings reinforce this interpretation. Akil Khan et al. (2025) reported that more than two-thirds of MPH students in Pakistan attributed delays in thesis completion to institutional and administrative problems (31). Al-Rihali et al. (2024) identified insufficient supervisory support and weaknesses in publication processes as major obstacles to student research productivity in Saudi Arabia (32). Furthermore, Animadwa Anane Binfouh (2024) highlighted how inequitable support policies and structural inequalities in health research systems exacerbate organizational barriers, particularly for early-career researchers (33). In Iran, Ashrafi et al. (2018) similarly emphasized complex bureaucracy and limited financial support as barriers to research development within the health system (34). **Compared with these studies, the present findings align closely in showing that administrative bottlenecks are not isolated inconveniences but a recurrent systemic obstacle across settings.** Collectively, these findings indicate that administrative challenges represent a systemic issue across different countries and contexts, underscoring the need for institutional reforms aimed at streamlining procedures and strengthening structural support.

The study also demonstrated that demographic and academic characteristics shape perceptions of research barriers. Female students, single students,

older students, and those with lower GPAs reported higher levels of perceived barriers. **This pattern may reflect unequal access to mentoring, differences in available time and family responsibilities, lower prior exposure to research, or reduced research self-efficacy rather than demographic status itself acting directly.** Tajabadi et al. (2023) similarly demonstrated that demographic and educational characteristics influence students' perceptions of research challenges (35). However, inconsistent findings have been reported in other contexts; for example, research conducted among Hormozgan medical students did not identify a significant association between age and research barriers (36). **This discrepancy suggests that demographic effects are context-dependent and may be moderated by institutional support, discipline-specific culture, and local training opportunities.** Such inconsistencies indicate that contextual institutional factors may moderate the influence of demographic characteristics.

Importantly, correlation analysis in this study revealed a **moderate positive relationship** between organizational and personal barriers ($r = 0.35$), as well as between organizational barriers and proposed solutions ($r = 0.44$). **These are moderate, not strong, associations; therefore, the data suggest interdependence rather than determinism.** In practical terms, institutional problems contribute to personal research difficulties, but they do not fully explain them. **This means that a student may have adequate motivation and some skill, yet still be blocked by bureaucracy; conversely, an institution may improve procedures, but students with weak skills may continue to struggle.** Research barriers therefore appear to be shaped by multiple interacting factors, including individual competencies, structural conditions, and motivational environments. Therefore, interventions focused exclusively on either personal skill development or administrative reform, which are unlikely to be sufficient in isolation.

Finally, motivational support emerged as an

important facilitating factor. Students emphasized that encouragement from supervisors, recognition of research achievements, and access to supportive academic environments positively influenced their engagement in research. **This finding is important because it shows that motivation is not a minor “soft factor”; it is an enabling condition that can either buffer or amplify the effects of structural barriers.** Bassey et al. (2026) identified institutional support, effective mentorship, access to research resources, structured research training, and student motivation as key facilitators of research participation among health science students (37). Previous evidence from Iran has shown that barriers to research implementation are multidimensional and include personal, organizational, and structural factors, indicating that improving research productivity requires interventions at multiple levels. **Together, these studies suggest that a supportive research culture is not merely beneficial but functionally necessary for sustaining student research productivity, especially during crisis conditions.** These findings suggest that fostering a supportive and motivating academic culture may enhance research productivity, particularly during times of crisis.

Overall, the findings of this study highlight the need for a comprehensive strategy to improve postgraduate research capacity during public health crises. Strengthening methodological and statistical training, reducing bureaucratic complexities, improving supervisory support, enhancing digital infrastructure, and fostering motivational academic environments are essential components of such a strategy. **In short, the results point to a layered problem: if the system is weak, the student is undertrained, and motivation is low, research activity becomes difficult to initiate and even harder to complete.** Addressing these dimensions simultaneously may significantly reduce research barriers and promote sustainable research development among postgraduate students.

Limitations

This study has several limitations that should be considered when interpreting the findings. First,

the study was conducted in a single academic institution, which may limit the generalizability of the results to other universities or educational contexts. Second, the data were collected using self-reported questionnaires, which may introduce reporting bias and may not fully reflect actual research behaviors or competencies.

Third, the possibility of response bias cannot be excluded, as participants who were more interested in research or more affected by research barriers may have been more likely to participate in the study. In addition, the cross-sectional design of the study limits the ability to establish causal relationships between the identified barriers and research outcomes.

Finally, cultural and institutional factors specific to the study setting may influence the perception of research barriers; therefore, caution should be exercised when generalizing these findings to other settings.

Conclusion

This study identified several personal and organizational barriers that may affect the research activities of postgraduate students during public health crises such as the COVID-19 pandemic. The findings suggest that weaknesses in research skills, administrative barriers, and limited institutional support may influence students' research experiences during crisis conditions.

The results also indicate that motivational support and improvements in research infrastructure may help facilitate research activities among graduate students. However, these findings are based on students' perceptions and should be interpreted with caution.

Therefore, universities and policymakers may consider strengthening research training programs, improving administrative support, and providing motivational and institutional support for students during crisis situations. Such measures may help reduce perceived research barriers and support the continuity of research activities during future public health emergencies.

Ethical considerations

This research has been approved by the Research Ethics Council of Mazandaran University of Medical Sciences with the ethics code IR.MAZUMS.REC.1399.945.

(<https://ethics.research.ac.ir/form/zazyylqpo5d9yumb.pdf>)

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Conflict of interests

The authors declared no conflict of interests.

Authors' contributions

Tahereh Yaghoubi, Adel Eftekhari conceived and designed the study, Abdul Jalil Karagli, Fereshteh Araghian Mojarad, contributed to the implementation of the research and data collection. Abolfazl Hosseinnataj performed the data analysis and statistical analyses. Adel Eftekhari ,Fereshteh Araghian Mojarad, , and Tahereh Yaghoubi drafted the manuscript, and Fereshteh Araghian Mojarad, , and Tahereh Yaghoubi critically revised it for important intellectual content. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

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Data Availability Statement

Data analysis is included in the study findings and raw data are available in Spss software available to the corresponding author.

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