



Key Obstacles in Medical Research in Afghanistan: A Path toward Solutions and Development

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Afghanistan faces critical healthcare challenges that demand innovative approaches and a robust focus on medical research to improve health outcomes. Despite its importance, the country's medical research sector remains underdeveloped, hindered by numerous barriers that affect progress and sustainability. Addressing these pressing health challenges and achieving meaningful advancements in healthcare requires a concerted effort to identify obstacles, implement sustainable solutions, and foster a culture of innovation and collaboration within the research community. Thus, we aimed to explore the key challenges and propose actionable solutions to enrich medical research in Afghanistan. This study employed a mixed-methods approach to explore obstacles to medical research in Afghanistan. Quantitative data were collected from 381 survey respondents and analyzed using SPSS 26, while qualitative data from 30 interviews were thematically analyzed with NVivo. The combined approach provided comprehensive insights into challenges and potential solutions. Our findings from survey and interview respondents highlights major barriers to medical research in Afghanistan, including inadequate funding (68%), poor infrastructure (inadequate facilities 51.2%, lacking modern lab equipment (22.8%)), and limited training opportunities (38.6%). Key solutions include increasing global and government funding (62.2%), expanding training Programs (43.6%) and improving infrastructure with advanced tools (40.2%). Strengthening international collaborations (37.0%) and fostering joint research projects (32.0%) are also vital for bridging resource gaps and ensuring sustainable advancement. Addressing Afghanistan's medical research challenges requires innovative strategies, prioritizing human resource development, budget allocation, and infrastructure improvements. Additionally, fostering a culture of research through mentorship programs, incentives, and policy reforms can further strengthen Afghanistan's medical research capabilities, creating a robust environment that drives better clinical outcomes and public health impacts.

Keywords: Afghanistan, Funding Challenges, Healthcare Outcomes, Medical Research, Research Capacity

Introduction

Health is a crucial component of human and social development, essential for both individual well-being and economic output. World Health Organization (WHO) and the International Declaration of Human Rights (IDHRs) give fundamental right of health to all the human beings by the constitution [1, 2]. Medical research



plays a key role by providing evidence-based perceptions for effective treatments, preventive approaches, and policies that advance public health. Over a century ago, the revolutionary 1910 Flexner Report transformed health professional education by implanting modern science into medical curricula, a shift that significantly contributed to a doubling of life probability throughout the 20th century [3]. However, as we entered the 21st century, extensive health inequalities within and between countries revealed that these advances were not distributed rightly. Meanwhile, novel challenges, such as emerging infectious diseases, ecological pressures, and lifestyle-related health risks place added stress on health systems worldwide, which now struggle to keep pace with growing health demands [4, 5].

Medical research has been instrumental in driving technological and healthcare advancements in developed nations, leading to significant improvements in disease management, healthcare accessibility, and overall health outcomes. However, the benefits of these advancements have not reached the developing world equally, particularly the economically disadvantaged populations within these regions (6-8). Significant gaps exist in disease burden, research funding distribution, and scientific productivity between developed nations and low-and middle-income countries (LMICs), which jointly house around 85% of the worldwide population. In LMICs, while non-communicable disease rates approach those seen in high-income countries, the load of communicable diseases, maternal and child health, and dietetic ailments are estimated 13 times higher, with injury-related health impacts being three times higher compared to high-income countries (9,10). Alarming, only about 10% of global medical research and development funding addresses 90% of the worldly health concerns predominantly those affecting low-income populations a phenomenon widely known as "the 10/90 gap" [6].

In low-income countries (LICs) affected by political instability, such as Afghanistan, barriers to conducting health research are profound, often driven by funding limitations, dependence on international aids, and a lack of adequate research infrastructure. These limitations hamper the capacity of LICs to establish robust health systems and conduct essential research independently, leading to reliance on foreign support, which can be unstable due to shifting global political priorities [11-13]. Afghanistan's health system reveals these limitations extremely; its history of continued conflict and the reappearance of political disturbance, particularly after the Taliban's returned to power, have destabilized healthcare infrastructure, aggravated workforce shortages, and decreased access to essential resources [12, 14]. This dependence on international funding has created a fragile foundation for healthcare in Afghanistan, restraining sustainable health development and research efforts within the country [15].

The current political changes in Afghanistan have exaggerated these pre-existing obstacles to healthcare system and medical related researches. After the Taliban's resurgence, Afghanistan has encountered deepened sanctions and further withdrawal of external support, which have interrupted the health sector's operations and created serious shortages in medical supplies and trained personnel [16,17]. Limitations on academic freedom, along with the brain drain of health professionals, have further damaged the health system's ability to conduct impactful research independently [11]. Collectively these factors have severely limited Afghanistan's ability to address persistent health issues, leaving vital healthcare necessities unmet and hindering the development of a sustainable research culture [13, 18].



The need for medical research in Afghanistan is critical to addressing the country's pressing health challenges and improving health outcomes. Currently, Afghanistan faces a high burden of infectious diseases, malnourishment, maternal and perinatal health issues, exacerbated by limited access to healthcare services and an inadequate health infrastructure (19, 20). Effective research can guide evidence-based interventions to tackle these issues, aligning with Afghanistan's legal commitment to provide basic healthcare for all citizens [21].

Given the challenging healthcare landscape, medical research can play a transformative role by informing public health strategies, optimizing resource allocation, and addressing gaps in healthcare provision [22, 23]. Developing local research capacity will not only improve healthcare services but also foster self-reliance, helping Afghanistan move away from its dependence on foreign aids and strengthening its overall health system resilience. This study thus aims to identify the key challenges and solutions to contribute to the development of a roadmap for enhancing medical research in Afghanistan, which is essential for achieving improved health outcomes and fulfilling the state's health mandates [24, 25].

2.0. Materials and Methods

2.1. Study Design

This study employed a **mixed-methods design** to investigate the obstacles to conducting medical research among medical professionals from various fields in Afghanistan. It utilized an **online survey** as part of its quantitative component, ensuring accessibility and participation from diverse regions and specialties. The study was conducted entirely online in Afghanistan, with data collected over a period of six weeks, from **October 1 to November 10**. This approach allowed for a comprehensive analysis of both quantitative and qualitative insights, enhancing the depth and reliability of the findings.

2.2. Inclusion Criteria

The inclusion criteria for quantitative data required participants to be Afghan nationals and affiliated with the medical field. For qualitative data, participants were selected based on their academic positions (from lecturer to professor levels) and their completion of at least one research project.

2.3. Data Collection and Analysis

The study employed a convenience sampling method, where the survey link was shared online among Afghan medical professionals. To estimate the required sample size, the formula for sample size calculation was:

$$N = \frac{Z^2 \cdot p \cdot (1-p)}{e^2}$$

Where:

- $Z=1.96$ (95% confidence level)
- $p=0.5$ (maximum variability)

- $e = 0.05$ (margin of error)

Substituting the values:

$$N = \frac{(1.96)^2 \cdot 0.5 \cdot (1-0.5)}{(0.05)^2}$$

$$N = 384.16$$

Thus, approximately 384 participants were needed. The study collected 428 responses, and after excluding 47 incomplete responses, a final sample of 381 participants was analyzed.

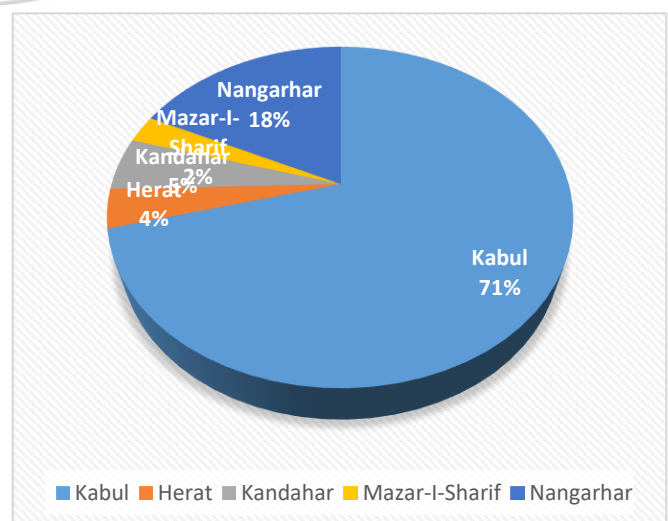
The questionnaire was created after critical analysis of the literature [26, 27, 28]. The survey comprised multiple-choice questions focusing on demographics, research infrastructure, funding, training, socio-political factors, and potential solutions. To ensure the clarity, reliability, and relevance of the survey instrument, a pilot test was conducted with a sample of 30 respondents. The responses from the pilot were analyzed using SPSS 26 (Statistical Package for the Social Sciences), focusing on descriptive statistics and trends across demographic variables. The results from the pilot study demonstrated good reliability and consistency, indicating that the survey instrument was well-designed and suitable for the main study. Based on these findings, no significant revisions were necessary before proceeding with the full-scale data collection. Qualitative data were collected through in-depth interviews with 40 selected academic staff from Kabul University, Katib University, Khatam Al Nabiiyyen University, and Afghan International University. Conducted in participants' offices, these interviews explored experiences, research infrastructure, funding challenges, training needs, and socio-political factors. Each interview was recorded, transcribed, and analyzed thematically using NVivo software. An inductive approach allowed for the emergence of themes, and coding was refined to ensure consistency across the data set [29].

3.0. Results

3.1. Socio-Demographic attributes of Respondents

Table 1 shows the Socio-Demographic attributes of respondents, comprised 63.5% males and 36.5% females, mainly within the age group of 18-25 years (59.3%), reflecting a younger demographic in the medical field. Occupation-wise, most respondents were medical students (53.3%), followed by physicians/doctors (21.3%) and teaching staff at universities (18.9%). The majority (60.4%) had less than a year of experience in medical research, with a significant portion holding undergraduate degrees (71.1%). Geographically, the majority were based in Kabul (70.9%), indicating a concentration of academic and research activities in the capital (Figure 1).

Figure 1: Geographical Characteristics of Survey Respondents





The interview respondents consisted of 30 individuals mostly under 40 years old (60%) and predominantly lecturers (60%), with the rest being professors (23.3%) and assistant professors (16.7%). They came from institutions like Kabul University (8), Afghan International Islamic University (7), Kateb University (5), Khatam Al-Nabieen University (5), and Bayazid Rokhan Institute (5).

Demographic characteristic		n	%
What is your Gender?	Male	242	63.5%
	Female	139	36.5%
What is your age?	18–25	226	59.3%
	26–35	88	23.1%
	36–45	41	10.8%
	46 and above	26	6.8%
What is your current occupation?	Medical student	203	53.3%
	Nurse	10	2.6%
	Pharmacist	15	3.9%
	Physician/Doctor	81	21.3%
	Teaching staff at a university	72	18.9%
How many years of experience do you have in the medical research field?	Less than 1 year	230	60.4%
	1–5 years	99	26.0%
	6–10 years	27	7.1%
	Above 10 Years	25	6.6%
What is the highest level of education you have completed?	Undergraduate degree	271	71.1%
	Master's degree	80	21.0%
	PhD or equivalent	20	5.2%
	Post-doctoral	10	2.6%
Which region of Afghanistan are you based in?	Kabul	270	70.9%
	Herat	14	3.7%
	Kandahar	19	5.0%
	Mazar-I-Sharif	10	2.6%
	Nangarhar	68	17.8%

Table 1: Socio-demographic characteristic of the respondent (N=381)

Table 2 (continued)

Characteristic of Interview respondents (N=30)		
Age	Below 40 Years	18 (60.0%)
	Above 40 Years	12 (40.0%)
Occupation	Professor	7 (23.3%)
	Assistant Professor	5 (16.7%)
	Lecturer	18 (60.0%)
Affiliation	Faculty of Pharmacy, Kabul University	5 Professors, 3 Lecturers
	Afghan International Islamic University	2 Professors, 5 Ass. Professors
	Kateb University	5 Lecturers
	Khatam Al-Nabieen University	5 Lecturers
	Bayazid Rokhan Institute of Higher Education	5 Lecturers
Total	Respondents	30 (100%)

3.2. Accessibility and Adequacy of Research Infrastructure

Table 2 describes that research facilities are largely reported as inadequate, with 51.2% rating them as such, and 29.4% finding them completely inadequate. Accessibility to medical research journals and databases is inconsistent, with only 35.4% finding them always accessible, while 24.7% rarely accessed them. Equipment challenges are notable, with 39.4% identifying a lack of modern lab equipment, reliable internet, and computers as pressing issues. Additionally, 22.6% reported regular disruptions due to power or internet failures, exacerbating challenges in conducting research. Respondents emphasized the need for improved technology and tools (40.2%) to enhance the research ecosystem.

Variables		n	n%
How adequate are the medical research facilities in your institution?	Very adequate	30	7.9%
	Adequate	44	11.5%
	Inadequate	195	51.2%
	Completely inadequate	112	29.4%
How accessible are medical research journals and databases for your work?	Always accessible	135	35.4%
	Sometimes accessible	115	30.2%
	Rarely accessible	94	24.7%
	Never accessible	37	9.7%
What type of equipment is most lacking in your institution?	Modern lab equipment	87	22.8%
	Computers and software	58	15.2%
	Reliable internet connection	86	22.6%
	All of the above	150	39.4%



How often do you face disruptions due to power or internet failures during your research work?	Never	56	14.7%
	Occasionally	141	37.0%
	Frequently	98	25.7%
	Regularly	86	22.6%
What improvements do you believe are needed in the current research infrastructure?	New research facilities	113	29.7%
	Access to international journals	92	24.1%
	Better technology and tools	153	40.2%
	Enhanced support staff	23	6.0%

Table 3: Accessibility and Adequacy of Research Infra-structure (N=381)

3.3. Funding Sources and Allocation Challenges

Table 3 shows that the funding source remained a significant hurdle, with 33.9% of respondents never receiving sufficient funding and only 26.8% stating they sometimes did. A majority relied on self-funding (55.4%) as their primary source, with government grants and international organizations contributing minimally. Alarming, 68.0% reported that less than 50% of their research projects were fully funded. Equipment and materials were the most underfunded areas (52.5%). Respondents suggested establishing more grant opportunities (35.2%) and increasing direct government funding (30%) as vital solutions.

Variable		n	n %
How often do you receive sufficient funding for your research projects?	Always	102	26.8%
	Sometimes	103	27.1%
	Rarely	46	12.1%
	Never	129	33.9%
What is the primary source of funding for your research?	Government grants	48	12.6%
	International organizations	54	14.2%
	Private foundations	68	17.8%
	Self-funded	211	55.4%
What proportion of your research projects are fully funded?	100%	0	0.0%
	75%–99%	44	11.5%
	50%–74%	78	20.5%
	Less than 50%	259	68.0%
Which aspect of your research is most underfunded?	Equipment and materials	200	52.5%
	Personnel	68	17.8%
	Data collection	83	21.8%
	Publication fees	30	7.9%
How can the Afghan government better support research funding?	Increase direct funding	114	30%
	Establish more grant opportunities	133	35.2%
	Collaborate with international agencies	105	27.8%
	Tax incentives for private research support	26	6.9%

Table 4: Funding Source and Allocation Challenges (N=381)

3.4. Training Needs and Barriers to Capacity Building

Table 4 shows the response of the respondents about training needs and their responses show that opportunities are perceived as insufficient by 38.6% of respondents, with 40.9% admitting they had never participated in

formal research training programs. Data analysis techniques (48.3%) and research methodologies (25.5%) emerged as the most desired areas for skill development. Workshops and seminars (43.6%) are the preferred mode of training delivery. Financial constraints (34.1%) and limited program availability (40.9%) are the primary barriers, further limiting capacity-building efforts.

Variable		n	%
How would you rate the availability of research training programs in Afghanistan?	Very sufficient	61	16.0%
	Sufficient	146	38.3%
	Insufficient	147	38.6%
	Nonexistent	27	7.1%
Which areas of research training do you feel you need the most?	Data analysis techniques	184	48.3%
	Research methodologies	97	25.5%
	Writing and publishing papers	65	17.1%
	Grant writing and funding applications	35	9.2%
Have you participated in any formal research training programs?	Yes, extensively	60	15.7%
	Yes, moderately	61	16.0%
	Yes, but minimally	104	27.3%
	No, not at all	156	40.9%
How would you prefer to receive additional research training?	Online courses	61	16.0%
	Workshops and seminars	166	43.6%
	International fellowships	81	21.3%
	Mentorship programs	73	19.2%
What are the main barriers to accessing research training?	Financial constraints	130	34.1%
	Limited availability of programs	156	40.9%
	Lack of time	0	0.0%
	Political instability	95	24.9%

Table 5: Training needs and Barriers to capacity building (N=381)

3.5. Impact of Socio-Political Factors on Research Activities

Political instability is a severe impediment, with 50.1% reporting significant disruptions to their research (Table 5). Security concerns also played a major role, as 34.4% extreme effects on their ability to conduct research. Government policies often hindered research (38.1%), and 48.8% felt political instability severely limited research funding. Respondents recommended increased funding (29.9%) and international collaborations (26.5%) to overcome these socio-political challenges.



Variable		n	%
What improvements do you believe are needed in the current research infrastructure?	New research facilities	11	29.7%
	Access to international research journals	3	24.1%
	Better technology and tools	92	40.2%
	Enhanced support staff	15	6.0%
		3	
How has political instability impacted your ability to conduct research?	Severely impacted	23	
	Moderately impacted	19	50.1%
	Slightly impacted	1	25.2%
	Not impacted at all	96	17.6%
To what extent do security issues in Afghanistan affect your research activities?	Extremely	67	7.1%
	Significantly	27	
	Somewhat	13	34.4%
	Not at all	1	31.2%
Are there government policies that hinder or facilitate your research?	Extremely	11	25.2%
	Significantly	9	9.2%
	Somewhat	96	
	Not at all	35	
How do you think the political situation affects the availability of research funding?	Hinder research	14	38.1%
	Somewhat hinder research	5	28.3%
	Facilitate research	10	19.4%
	No impact on research	8	14.2%
What support can international organizations provide to overcome socio-political challenges in research?	Severely limits funding	74	
	Moderately limits funding	54	
	No impact on funding	18	48.8%
	Increases funding opportunities	6	32.8%
What support can international organizations provide to overcome socio-political challenges in research?	Increased funding	12	14.4%
	Collaborations	5	3.9%
	Offer research fellowships and scholarships	55	
	Provide training and capacity-building programs	15	
		86	22.6%
What support can international organizations provide to overcome socio-political challenges in research?	Increased funding	80	21.0%
	Collaborations	10	26.5%
	Offer research fellowships and scholarships	1	29.9%
	Provide training and capacity-building programs	11	
		4	

Table 6: Impact of Socio-Political Factors on Research Activities (N=381)

3.6. Solutions and Future Directions for Research Development

Table 6 shows the solutions and future directions for research development. Improving research facilities (52%) and funding mechanisms (48%) are the top suggestions for advancing medical research in Afghanistan.



Respondents saw joint research projects (32%) and access to international journals (28%) as critical forms of international collaboration. The WHO was overwhelmingly favored (62.2%) as the organization best positioned to prioritize funding. Afghan universities are encouraged to facilitate international partnerships (37%) and invest in better infrastructure (20.2%) to support the research ecosystem.

Variable		n	n%
What is the most significant challenge you face in conducting medical research?	Lack of infrastructure	85	22.3%
	Lack of funding	10	27.3%
	Inadequate training	4	25.2%
	Political instability	96	25.2%
		96	
What specific improvements would you suggest to enhance medical research in Afghanistan?	Improved research facilities	85	22.3%
	Increased funding	10	27.3%
	Better training programs	4	25.2%
	Strengthened international collaborations	96	25.2%
		96	
What type of international collaboration would benefit your research the most?	Joint research projects	18	47.2%
	Access to international journals	0	19.4%
	Exchange programs	74	11.0%
	International research conferences	42	22.3%
		85	
Which international organizations should prioritize funding for medical research in Afghanistan?	WHO	94	24.7%
	UNICEF	39	10.2%
	World Bank	11	2.9%
	All of The Above	23	62.2%
		7	
What actions can Afghan universities take to better support research efforts?	Provide more grants	96	25.2%
	Build better infrastructure	77	20.2%
	Offer more training	67	17.6%
	Facilitate international partnerships	14	37.0%
		1	

Table 7: Solutions and Future directions for Research Development (N=381)

3.7. Thematic analysis

The table 7 presents a thematic analysis of challenges and solutions in Afghan medical research, categorized into seven main themes with their subthemes quantified by frequency and percentage. Funding challenges dominate as a critical barrier, with lack of government or private sector support (6.84%), insufficient local and international funding (6.55%), and reliance on self-funding (4.84%) being prominent issues. Research infrastructure is another pressing concern, marked by poor access to medical journals and databases (6.27%), lack of advanced lab instruments (5.70%), and insufficient lab facilities (5.13%). Training and capacity building further hinder progress, with inadequate workshops and awareness programs (5.98%), insufficient training in methodologies (5.41%), and limited mentorship (4.27%). Political and socio-cultural challenges, such as brain drain and demotivation (4.56%), gender-specific challenges in data collection (3.99%), and limited cultural acceptance (3.42%), compound the difficulties. Collaborative efforts are also constrained, as evidenced by a lack of international opportunities (5.70%) and the need for joint research projects (5.13%). Ethical processes reveal gaps, with the absence of review boards (5.41%) and challenges in addressing ethical concerns (3.70%). Highlighted solutions include increasing funding and resources (7.12%), fostering collaboration at national and international levels (6.27%), and conducting more workshops and training (5.70%), emphasizing the need for comprehensive strategies to address these barriers.

Main Themes	Sub Themes	n	n (%)
Research Infrastructure	Insufficient lab facilities and infrastructure	18	5.13%
	Lack of advanced lab instruments	20	5.70%
	Poor access to medical journals and databases	22	6.27%
Training and Capacity Building	Lack of training in research methodologies and analysis	19	5.41%
	Limited mentorship and support	15	4.27%
	Inadequate workshops and awareness programs	21	5.98%
	Lack of local and international funding	23	6.55%
	Self-funding as the primary means of research	17	4.84%



Funding Challenges	No government or private sector support	24	6.84%
Political and Socio-Cultural Impact	Brain drain and demotivation	16	4.56%
	Gender-specific challenges in data collection	14	3.99%
	Limited cultural acceptance in some research areas	12	3.42%
Collaboration and Networking	Lack of opportunities for international collaboration	20	5.70%
	Need for joint research projects	18	5.13%
Ethical and Approval Processes	Absence of an ethical review board	19	5.41%
	Challenges in navigating ethical concerns with vulnerable populations	13	3.70%
Solutions and Recommendations	Increase funding and resources	25	7.12%
	Conduct more workshops and training	20	5.70%
	Foster collaboration at national and international levels	22	6.27%

Table 7: Thematic Analysis of Interview respondents

3.8. Top 10 Barriers from Qualitative and Quantitative Data

Table 8 and Table 9 summarize the key barriers and solutions in medical research. The primary challenges revolve around funding, with insufficient coverage for research projects (68.0%) and reliance on self-funding (55.4%) as the top issues (Figure 2). Resource gaps, including underfunding of equipment and materials (52.5%), inadequate facilities (51.2%), and outdated lab equipment (39.4%), further hinder progress. Limited training programs (38.6%) and restricted access to journals (24.7%) reflect knowledge and skill deficiencies, while disruptions due to power or internet (22.6%) and political instability (25.2%) add external obstacles.

N#	Barrier	(%)
1.	Research projects with less than 50% funding coverage	68.0%
2.	Self-funding as the primary source of research funding	55.4%
3.	Equipment and materials as the most underfunded area	52.5%
4.	Inadequate medical research facilities	51.2%
5.	Lack of modern lab equipment	39.4%
6.	Limited availability of research training programs	38.6%
7.	Regular power or internet disruptions during research	22.6%
8.	Financial constraints for accessing research training	34.1%
9.	Lack of access to medical journals/databases	24.7%
10.	Political instability impacting research activities	25.2%

Table 8: Top Ten Barriers in Medical Research in Afghanistan

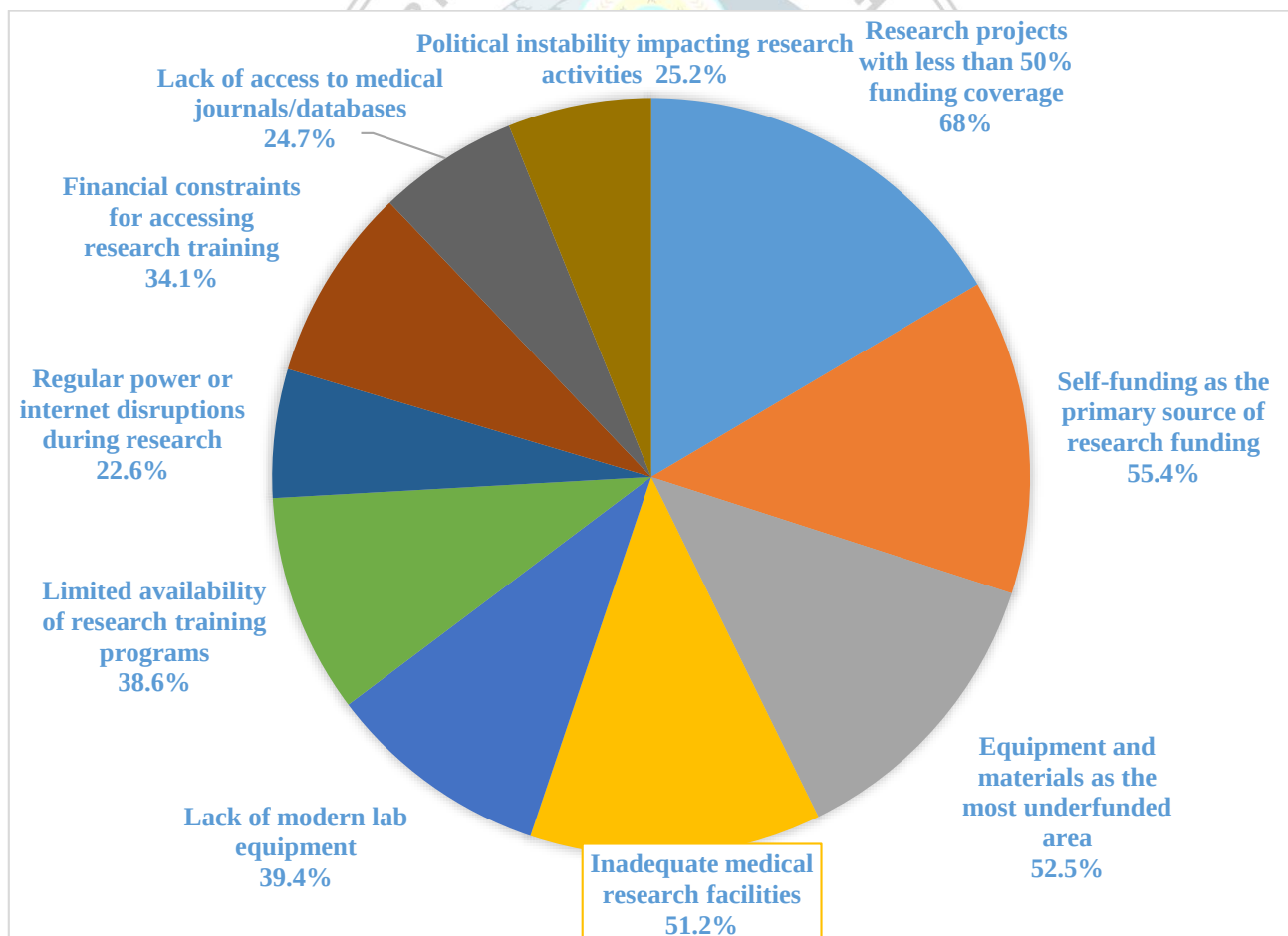


Figure 2: Top Ten Barriers in Medical Research



3.9. Top Ten Recommendations for Development of Medical Research in Afghanistan

Table 9 and Figure 3 address the top 10 solutions for the development of medical research in Afghanistan. These solutions focus on increasing financial support, such as prioritizing funding by global organizations (62.2%) and expanding grant opportunities (35.2%). Capacity-building initiatives, including workshops (43.6%) and mentorship programs (19.2%) are key to skill enhancement. Infrastructure improvements, like providing advanced research tools (40.2%) and better facilities (29.7%), are vital. Strengthening international collaborations (37.0%) and joint research projects (32.0%) would enhance resource sharing and innovation. Improved access to journals (24.1%) would further bridge information gaps, creating a robust foundation for advancing medical research.

Table 9: Top Ten Recommendations for development of Medical Research in Afghanistan

N#	Recommendations	(%)
1.	Encourage WHO and global organizations to prioritize funding	62.2%
2.	Offer workshops and seminars for training	43.6%
3.	Enhance availability of advanced research technology/tools	40.2%
4.	Strengthen international collaborations	37.0%
5.	Establish more grant opportunities	35.2%
6.	Increase funding through direct government support	30.2%
7.	Build better research infrastructure	29.7%
8.	Foster joint research projects with international institutions	32.0%
9.	Provide access to international journals	24.1%
10.	Facilitate mentorship programs for skill development	19.2%

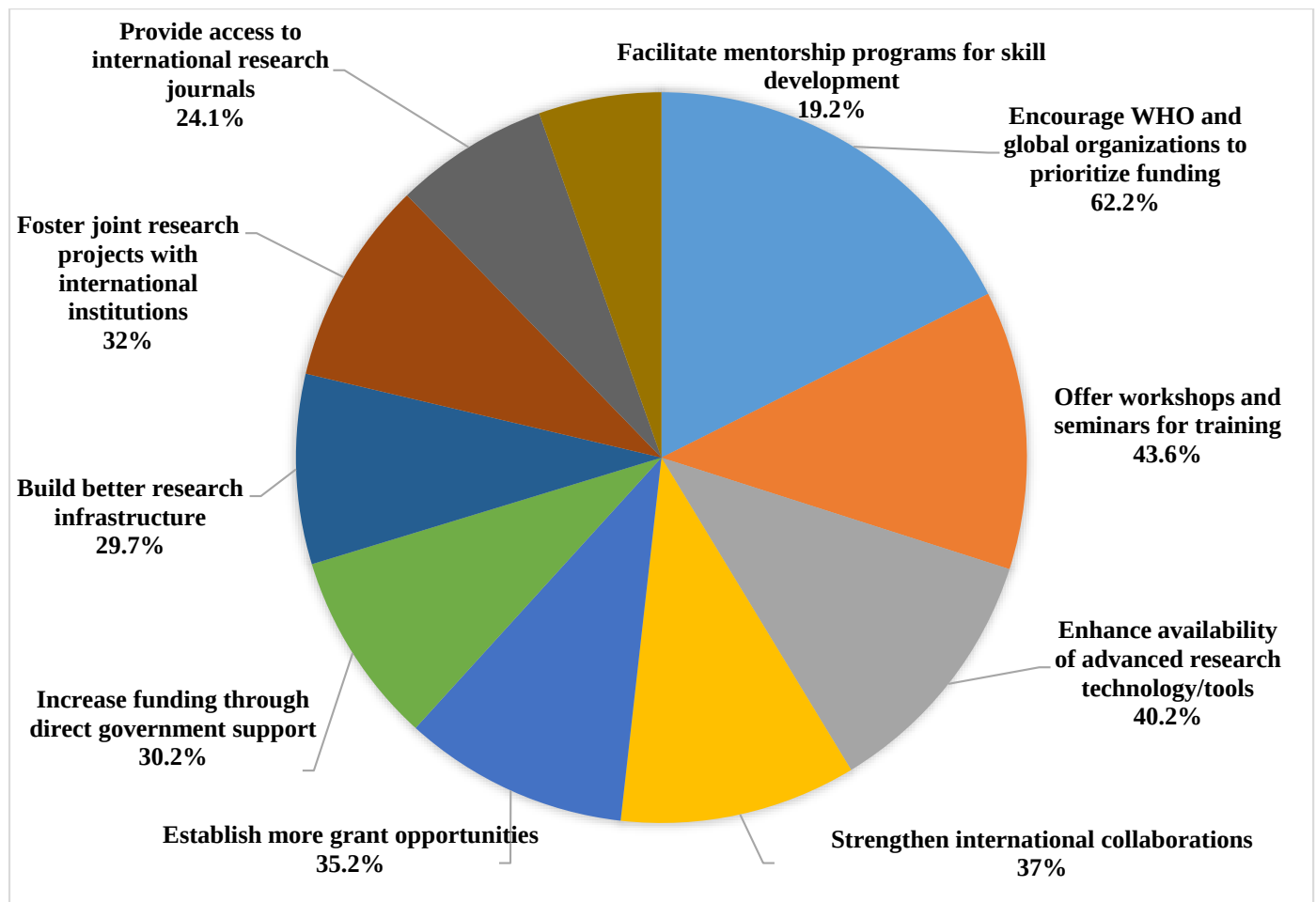


Figure 3: Top Recommendations for Medical Research

3.10. Special Comments of the Interview Respondents about Barriers and Solutions

We are demotivated due to the brain drain from the country. said a professor from Kabul University's Faculty of Pharmacy, highlighting the significant loss of skilled professionals, which has left the research landscape severely under-resourced. Another professor from the same institution remarked, ***"I have never received training, neither in the democracy era nor under the current government,"*** pointing to a lack of opportunities to develop research skills, which is a persistent barrier to progress.

The issue of inadequate infrastructure was further emphasized by another professor from Kabul University, who stated, ***"We have no laboratory equipment nor skilled personnel who can operate them."*** This lack of essential tools and expertise underscores the systemic challenges faced by researchers. Likewise, a professor from the Afghan International Islamic University shared, ***"Clinical data collections and clinical trials are not imaginable in Afghanistan since we lack a health insurance policy to maintain patients' constant visits for data collection."*** This shows how systemic gaps, such as the nonexistence of a health insurance framework, directly affect the feasibility to conduct clinical research.

Participants also pointed out organizational constraints that stifle research efforts. A health care professional expressed, ***"We do not have time to conduct research. We are just attentive on ensuring medicines are available and patients are assisted well."*** This sentiment reflects the dual burden of clinical responsibilities



and insufficient staff, which leaves little time or motivation for research. Despite these challenges, there is a glimmer of hope as another health official stated, "***We are building infrastructure, and soon, we hope to be self-sufficient in clinical research.***"

4. Discussion

The advancement of Afghanistan's research landscape is observable by the founding of pivotal institutions like the Scientific Research Center of Kabul University (1963) and the Academy of Sciences of Afghanistan (1937). Starting with linguistic and literary research under the Pashtu Academy, the Academy extended to include natural sciences and Islamic studies, reproducing groundbreaking works like the *Ariana Encyclopedia*. Despite impediments during the civil war and the Soviet attack, both institutions were restored post-2001, driving academic research across various fields.

Autonomous organizations like the Afghanistan Research and Evaluation Unit (AREU) (founded in the early 2000s) and the Afghanistan Centre for Research and Policy Studies (ACRPS) have further helped to evidence-based policy and development research. Collaborations between these entities and other centers like the Centre for Policy and Human Development (CPHD) and the National Centre for Policy Research (NCPR) underscore a collective effort to advance science and address societal challenges. Institutional Review Board (IRB) established in 2005 by Ministry of Public Health of Afghanistan (MoPH) is dedicated to health research. Our study represents the first of its kind in Afghanistan, providing an in-depth and comprehensive analysis of the obstacles and potential solutions in the field of medical research [30, 31, 32].

Our study comprised a young demographic, primarily aged 18–25, with most respondents based in Kabul. Key challenges identified include inadequate research facilities, limited funding for projects, heavy reliance on self-funding, lack of formal training opportunities, insufficient access to modern lab equipment and reliable internet. Proposed solutions focus on prioritizing funding from global organizations, improving infrastructure, fostering international collaborations, expanding grant opportunities, and offering comprehensive training programs.

Our findings align with studies from LMICs, particularly those in conflict and resource-constrained settings such as Afghanistan, Iraq, Pakistan, and African countries [33–34]. Research engagement across these regions is often linked to education level and prior research experience, while women consistently face greater barriers to participation [35, 36]. In Afghanistan and Iraq, conflict amplifies challenges, including disrupted infrastructure and limited access to resources, which severely constrain research opportunities [37]. Similarly, in Pakistan and sub-Saharan Africa, limited funding, lack of training opportunities, and weak research infrastructure are recurring issues, reflecting systemic barriers prevalent across LMICs [38, 39].

We identified insufficient funding as a major obstacle to conduct medical research in Afghanistan, a challenge consistent with other LMICs such as African nations. Afghanistan's heavy dependence on foreign assistance, with 80% of its national budget reliant on international assistance, aggravates this issue, as it often leads to worries in the steadiness and distribution of resources for medical research and community development [40, 41]. Factors contributing to funding challenges include inadequate skills in preparing good grant requests, lack of free time for research, and limited access to internet and library services [42, 38]. Even when free resources like statistical tools and medical journals are available, they are often underutilized due to low awareness and insufficient expertise [43, 39]. This dependence on external funding reflects patterns observed in other LMICs,



where capacity gaps and infrastructural encounters compound funding issues, hindering the growth of medical research landscape [44, 45].

Barriers to medical research trainings for students, healthcare professionals, and academic staff in Afghanistan align with hindrances reported in other LMICs [46]. Insufficient training programs, inadequate mentorship, and infrastructural deficiencies, such as untrustworthy internet and constrained access to research journals, impede the growth of research capacity [47]. Afghan healthcare professionals and students face additional obstacles, including clinical and academic schedules, leaving less time for research. Compounding these issues is the challenge of predatory publishing, which exploits the institutional burden to publish research papers. Afghan academic staff often lack sufficient guidance or awareness to differentiate legitimate journals from predatory ones, leading to compromised scholarly influences and reputational risks. The trust on recommendations from colleagues or the attraction of low publishing costs worsens this vulnerability, reflecting broader gaps in academic training and institutional oversight [48]. Addressing these barriers demands systemic reforms, such as integrating research methodology and biostatistics into medical curricula, providing mentorship, and applying institutional protections against predatory practices. These interventions are critical to fostering a sustainable research ecosystem in Afghanistan [49].

The endorsements provided by respondents in Afghanistan consistent with strategies identified in other studies to address challenges in medical research. Prioritizing funding through global organizations like WHO and encouragement of international collaborations were key solutions highlighted by respondents, reflecting approaches proven effective in enhancing research capacity in other research settings. For instance, international collaborations have been shown to facilitate access to advanced tools, expertise, and funding, bridging resource gaps [50, 51]. Similarly, the importance of conducting workshops and seminars aligns with evidence that targeted training programs significantly improve research skills and engagement [52, 53].

Augmenting research infrastructure and creating more grant chances are also consistent with findings from studies highlighting the need for sustainable financial and logistical support for researchers. For example, investments in infrastructure and technology have been reported to augment efficiency and reduce obstacles to research [54, 55, 56]. These findings reinforce the need for coordinated efforts between local institutions and global partners to address both immediate needs and long-term sustainability in the research ecosystem.

A Path towards Solutions and Development of Medical Research in Afghanistan

1. Strengthening Research Funding

- Action:** Allocate a fixed portion of the national budget to research and seek sustained funding from global organizations like WHO.
- Rationale:** Over 68% of projects remain underfunded, creating reliance on self-funding and hindering participation. Stable funding ensures continuity and credibility in research efforts.

2. Enhancing Research Infrastructure

- Action:** Update laboratories, ensure reliable internet connections, and provide new tools and resources.
- Rationale:** Insufficient infrastructure, mentioned by over half of respondents, reduces the quality and efficiency of research activities.

3. Reforming Academic Curricula



- a. **Action:** Incorporate biostatistics, research methodology, and grant-writing into undergraduate and postgraduate programs.
- b. **Rationale:** Incomplete training in essential research skills prevents students from engaging effectively in research projects.

4. Developing Capacity through Training and Mentorship

- a. **Action:** Organize countrywide workshops, offer seminars on advanced research skills, and inaugurate mentorship programs.
- b. **Rationale:** Over 40% of respondents lack formal trainings, highlights the need for skill development to enable participation in meaningful medical research.

5. Combating Predatory Publishing Practices

- a. **Action:** Implement institutional rules for journal selection, train researchers on publication morals, and create an archive of approved journals.
- b. **Rationale:** Susceptibility to predatory publishing due to lack of guidance weakens the credibility of Afghan research.

6. Promote International Collaborations

- a. **Action:** Raise partnerships with global institutions for joint research projects, training opportunities, and exchange programs.
- b. **Rationale:** Teamwork provide access to funding, expertise, and advanced tools, bridging capacity gaps and adopting innovation.

7. Coping Socio-Political Challenges

- a. **Action:** Improve transparent governance structures to protect research funding and establish long-term policies to conduct research.
- b. **Rationale:** Political instability and dependency on external aid create worries in funding and development.

8. Support Student Research Projects

- a. **Action:** Assign grants for student research and balance academic workloads to create enthusiastic research time.
- b. **Rationale:** Students often lack financial resources and time for research due to difficult academic schedules.

5. Conclusion

Medical research is vital for improving health consequences, yet Afghanistan faces extensive barriers to building a robust medical research landscape, similar to challenges detected in other resource-limited sites. Despite these hindrances, our discoveries exposed significant attention among Afghan healthcare professionals, students, and academic staff to be actively involved in research. However, systemic issues such as inadequate funding, poor infrastructure, lack of formal training, and exposure to predatory publishing practices impede progress. To cope these issues, it is essential to develop high-quality, research training programs and strong mentorship initiatives. Solidification of research infrastructure, ensuring consistent funding, and implementing helpful policies to encourage research participation are vital. Furthermore, development of local and international partnerships can provide access to innovative tools, expertise, and resources, allowing Afghan researchers to overcome current restrictions. By integrating these directed strategies, Afghanistan can unlock its research potential, improve healthcare results, and contribute to



international scientific advancements. This human-centered attitude highlights the resilience and commitment of Afghan researchers, offering a pathway to long term development.

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