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Barriers and enablers of research participation among medical students in Burundi: A cross-sectional study

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Abstract

Background

Undergraduate research exposure can strengthen critical appraisal, scientific reasoning, and evidence-based practice among future doctors. In low-resource settings, student engagement in research also matters for building locally relevant research capacity. However, little is known about the extent of research participation among medical students in Burundi or the barriers they face. This study described medical students' research participation, attitudes, barriers, and suggested supports in Burundi.

Methods

We conducted a cross-sectional survey from July to August 2023 among medical students from the University of Burundi (UB), Hope Africa University (HAU), and the University of Ngozi (UNG). Eligible students were those in years who had completed compulsory research-related coursework. Data were collected using a structured questionnaire administered in paper and online formats. The questionnaire was adapted from previously published tools and revised for the Burundian context. Descriptive statistics summarized participant characteristics, attitudes toward research, research experience, perceived barriers, and proposed interventions. Exploratory comparisons used chi-square and Wilcoxon rank-sum tests, with $p < 0.05$ considered statistically significant.

Results

A total of 240 students participated (mean age 25.3 years, SD = 3.0); 63.7% were male, and 53.3% were from the University of Burundi. Most respondents rated research as very important for undergraduate students (80.8%) and reported very high personal interest in participating in research during their medical training (77.5%). Although 78.8% reported having attended a research course, module, or workshop outside compulsory research modules, only 30.0% had previously participated in a research project. The most commonly reported barriers were low confidence in research knowledge (49.6%) and lack of mentors (32.1%). Students most frequently recommended a dedicated research support centre (76.2%), more opportunities to join ongoing studies (58.7%), support to attend conferences (58.3%), close supervision by senior lecturers (56.7%), and annual research workshops (54.6%).

Conclusion

Medical students in Burundi reported strong research interest, but relatively limited direct participation in research projects. Their participation was concentrated in the early and operational stages of research rather than in analysis, writing, and dissemination. Medical schools in Burundi may benefit from strengthening mentorship, creating structured opportunities for hands-on research, and establishing student-oriented research support mechanisms.

Introduction

Research training is a core component of medical education because it helps students develop critical thinking, scientific reasoning, and the ability to practice evidence-based medicine (1, 2). Early exposure to research could also strengthen future academic productivity, improve understanding of study design and data interpretation, and help prepare a health workforce that is better able to generate local evidence for policy and practice (2, 3).

Low-income countries carry a disproportionately large part of the global burden of diseases and have a higher avoidable mortality rate compared to high-income countries, but most of the health research comes from high-income countries (4). In sub-Saharan Africa, it is especially important because health systems also often face context-specific challenges that require locally relevant research rather than sole reliance on evidence produced elsewhere (1).The ability to foster health research in developing countries continues to be one of the world's pressing challenges (5). The onset of the COVID-19 pandemic demonstrated the need for local data and research to inform the public of the evolution of the pandemic, based on epidemiological facts, to justify decisions concerning protective measures (6).

Despite its importance, student participation in research remains uneven and often limited (7). Recent regional literature has shown that many undergraduate health and medical students express strong research interest, yet their actual involvement in research projects is substantially lower (3, 7). Evidence from neighboring East African settings illustrated this gap between interest and participation. In Rwanda, Mugabo et al found that undergraduate students at the College of Medicine and Health Sciences showed high interest in research and many had attended a research module or workshop, yet overall involvement was still low; limited knowledge of research processes and a shortage of mentors were identified as important barriers (3). In Uganda, Kiyimba et al similarly reported that although awareness and attitudes toward research were generally positive, only about one-third of undergraduate health-profession students had participated in research activities outside compulsory class work (8).

Against this background, Corresponding data from Burundi is missing, but with research infrastructure being less developed, we hypothesized that research involvement would be even lower in Burundi. There is a clear need for a Burundi-specific study to determine the extent of medical students' involvement in research projects and to assess the factors that influence their participation. Such evidence would be valuable for medical schools, academic leaders, and policymakers seeking to strengthen undergraduate research culture, improve mentorship and access to research opportunities, and better align medical education with the country's scientific and health-system needs (9).

The objective of the study is twofold: firstly, to gain a comprehensive understanding of the extent of medical students' involvement in research projects in Burundi, and secondly, to document barriers and enablers that influence their research participation.

Methods and materials

Study design and location

We conducted a descriptive cross-sectional survey between July and August 2023 in three universities in Burundi with medical schools: the University of Burundi (UB), Hope Africa University (HAU), and the University of Ngozi (UNG).

Study population and eligibility

The target population comprised medical students who had already completed the compulsory research-related courses in their curriculum. That included students from the third academic year onward at UB and UNG and from the second academic year onward at HAU.

Sample size and recruitment

The required sample size was estimated using the Raosoft sample size calculator (10), assuming a population of 627 eligible students, a 95% confidence level, a 5% margin of error, and a 50% response distribution. The minimum sample size was 239 students. Students were invited to participate during class sessions in the eligible years, and additional online recruitment was used for HAU students completing internships outside the main campus (of Bujumbura). Participation was voluntary, and completion of the questionnaire implied consent.

Survey tool

The questionnaire was adapted from a previously published survey used among undergraduate students at the University of Rwanda by Mugabo et al (3). Survey questions were created based on insights obtained from an initial literature review regarding research participation among undergraduate students in medicine and health sciences (11–13). Items were revised to reflect the Burundian medical education context, and the response format for attitudinal items was reduced to a 5-point Likert scale to improve interpretability. The questionnaire included items on demographic characteristics, attitudes towards research, previous research involvement, barriers to participation, and suggestions for improving student engagement in research. The adapted questionnaire was piloted with four non-medical students to assess clarity and wording before field implementation.

Data collection and validation

Data were collected over 46 days, from 15 July to 31 August 2023. Paper questionnaires were administered to students from UB, UNG, and pre-clinical students from HAU. An online Google Form was shared through WhatsApp for HAU students undertaking internships outside the main campus. After data collection, responses from paper questionnaires were entered into the same electronic form to create a unified dataset. One trained data collector was assigned to each medical school.

Variable and analysis

The main descriptive outcome was self-reported participation in a research project. Additional variables described students' attitudes towards research, stages of research in which they had participated, perceived barriers, and proposed institutional supports. Data were analysed using SPSS version 25.0. Continuous variables were summarized using means and standard deviations, and categorical variables using frequencies and percentages. Because some questionnaire items allowed multiple responses, percentages for those items do not sum to 100%. Exploratory comparisons included chi-square testing for associations between selected categorical variables and Wilcoxon rank-sum testing for differences in interest scores by gender. A two-sided p-value of less than 0.05 was considered statistically significant.

Ethics approval and consent to participate

Ethical approval was obtained from CIEB-FMCHUK (Comité Institutionnel d'Éthique et de Bioéthique de la Faculté de Médecine et du Centre Hospitalo-Universitaire de Kamenge), affiliated with the Faculty of Medicine, University of Burundi (reference FM/N.V/474/2023) dated 11th July, 2023.

All participants received detailed information about the study's purpose and procedures before participating. Written informed consent was obtained from all participants. Participation was voluntary, and participants were informed of their right to decline participation or withdraw from the study without any consequences. All study procedures were conducted in accordance with applicable ethical guidelines and the principles of the Declaration of Helsinki. No directly identifying information was collected, and results were reported in aggregate form.

Results

Descriptive statistics and baseline population comparisons

A total of 240 medical students participated in the survey. The mean age was 25.25 years (SD=2.96; range 20-43 years). Most respondents were male (n=153, 63.7%). More than half were enrolled at UB (n=128, 53.3%), and the largest proportions were in the fourth year (n=81, 33.8%) and fifth year (n=85, 35.4%) of study (Table 1).

Table 1. Demographic characteristics of participants.

		n	%
Age	<20	2	0.8
	21-25	156	65.0
	26-30	73	30.4
	>31	9	3.8
	Total	240	100.0
Gender	Female	87	36.3
	Male	153	63.7
	Total	240	100.0
School	HAU	28	11.7
	UB	128	53.3
	UNG	84	35.0
	Total	240	100.0
Academic year	2nd	2	0.8
	3rd	20	8.3
	4th	81	33.8
	5th	85	35.4
	6th	52	21.7
	Total	240	100.0

Attitudes and Perceptions towards Research

Research was viewed very positively by respondents. Most students (n=194, 80.8%) rated the importance of research for undergraduate students at the highest point on the 5-point scale, and the mean importance score was 4.65 (SD=0.85). Similarly, 186 students (77.5%) rated their personal interest in participating in research during undergraduate studies at the highest point on the scale, with a mean score of 4.52 (SD=1.04). When asked how they would investigate a problem, 77.1% reported that they would read about the topic, 37.5% would ask friends for advice, and 36.7% said they would conduct a research study on the subject (Figure 1).

Research participation and stages of involvement

Most respondents (n=189, 78.8%) reported that they had attended a research course, module, or workshop outside the compulsory research modules in their universities. However, only 72 students (30.0%) reported previous participation in a research project. Among those with prior research experience, nearly half (n=34, 47.2%) were in the final academic year. Most had participated through their university (n=55, 73.4%), while smaller proportions reported involvement through student-led organisations (20/72, 26.7%) or other organisations (n=13, 18.1%). Only 12 respondents (5.0%) reported having published work in a recognised scientific journal.

Among students who had participated in research, involvement was concentrated in earlier and operational stages of the research process. The most frequently reported activities were study design and drafting of a study protocol (57.3%) and data gathering (46.6%). Lower proportions reported participation in data management and analysis (20.0%), manuscript writing (22.7%), conference presentation (13.3%), and dissemination through publication (8.0%) (Table 2).

Table 2. Stages of research participation among students who had previous research experience

Research process	n	% among students with research experience
Grant writing	13	17.3
Study design and drafting of a study protocol	43	57.3
Request for ethical approval	10	13.3
Data gathering	25	46.6
Data management and analysis	15	20.0
Writing a summary	26	34.7
Writing a manuscript	17	22.7
Disseminate results by presenting at a conference	10	13.3
Disseminate the results as part of a publication	6	8.0

Perceived benefits, barriers, and students' suggestions

Among students with research experience, reported benefits included better understanding of the research process, understanding how scientists work on problems, and improved ability to design a study, collect data, analyse data, and write a summary. The most commonly reported barriers to research participation were low confidence in knowledge about research processes (n=119, 49.6%), lack of mentors (n=77, 32.1%), lack of time (n=56, 23.3%), and lack of funds (n=52, 21.7%).

Students’ most strongly endorsed suggestions for improving participation were the creation of a student research support centre (n=183, 76.2%), greater involvement in ongoing research studies (n=141, 58.7%), assistance to attend research conferences (n=140, 58.3%), supervision by senior lecturers (n=136, 56.7%),

and annual research workshops (n=131, 54.6%). Other suggestions included research internships (46.3%), more teaching on research in the medical curriculum (42.9%), annual undergraduate research competitions (42.5%), and journal or book clubs (39.6%).

Exploratory comparative analysis of research-interest scores by gender

An exploratory comparison showed that mean research-interest scores were slightly higher among male students than female students (4.59 versus 4.40), but the difference was not statistically significant (Wilcoxon W = 9829.5, p = 0.081). Participation in workshops outside compulsory research modules was statistically associated with perceiving research as important for undergraduate students (chi-square = 11.925, p = 0.018) (Table 3).

Table 3. Exploratory comparison of research-interest scores by gender.

	Gender	n	Mean	SD	Test Wilcoxon W	P-value
Interest in participating in research during undergraduate studies	Male	153	4.59	0.997	9829.500	0.081
	Female	87	4.40	1.105		

Discussion

The study provided one of the first multi-institutional descriptions of research participation among medical students in Burundi. The overall picture is one of high perceived importance of research and strong personal interest, but relatively limited direct participation in research projects. This gap between positive attitudes and actual involvement is consistent with findings from other countries in Africa and elsewhere, where students often value research but face structural barriers to participation.

A particularly important finding is that students who had participated in research were more often involved in protocol development and data collection than in later stages such as data analysis, manuscript preparation, conference presentation, and publication. From a medical education perspective, it suggests that many students are being exposed to selected parts of the research process without consistently gaining experience across the full research cycle. If sustained, this pattern may limit students' development of higher-level scholarly skills, including interpretation, scientific writing, and dissemination.

In the present study, most respondents perceived research as highly important during undergraduate training, with 80.8% assigning the highest possible rating to its importance and 77.5% similarly rating their personal interest in participating in research during medical school. Despite this strong interest, only 72 students (30.0%) reported having previously participated in a research project, and nearly half of the

participants (47.2%) were in their final academic year. This pattern suggested a clear gap between students' positive attitudes toward research and their actual involvement in research activities. Similar trends have been reported in other settings. In Brazil, Oliveira et al. found that although 52.8% of students had not participated in any undergraduate research project, 85.4% of them expressed interest in doing so (14). In Egypt, Abushok et al. reported that 69% of medical students were willing to participate in clinical research, although willingness to engage in community-based research was considerably lower (27.7%) (15). Comparable findings have been reported in South Africa, where Nel et al. observed that 86% of students believed undergraduates should participate in clinical research, yet only 23.8% had actually been involved in such activities (16). Likewise, Bovijn et al. found that while 61.7% of students expressed a positive attitude toward medical or clinical research, only 16.5% had previously participated in voluntary research (13). In Rwanda, Mugabo et al. also reported high perceived importance of research and strong student interest, despite limited actual involvement (3). These findings indicate that positive perceptions of research among medical students are common across diverse settings, but meaningful participation often remains low.

In our study, no statistically significant association was found between gender and interest in participating in research during undergraduate studies ($p = 0.081$). This finding is consistent with some previous studies. Nel et al. similarly reported positive attitudes toward research without a statistically significant gender difference(16). Mugabo et al. also found little difference between male and female students in their ratings of the importance of research and their interest in participating during undergraduate training (3)**.** Although Stockfelt et al. reported slightly higher interest scores among male students than female students (7.7 vs 7.1) in Sweden (17). The pattern across studies suggested that research interest is generally high among both sexes, even when small differences are observed. Our findings, therefore, suggest that gender may not be a major determinant of research interest among medical students in Burundi.

With regard to barriers, the most commonly reported challenges in our study were lack of confidence in knowledge of research processes (49.6%), lack of mentors (32.1%), lack of time (23.3%), and lack of funds (21.7%). These findings are broadly consistent with the literature. Oliveira et al. identified time constraints and difficulty finding a mentor as the main barriers among students not involved in research (14)**.** Abushok et al. likewise reported lack of time, weak motivational systems, insufficient knowledge and skills, and inadequate mentoring as key barriers(15). Studies from South Africa (16) and Sweden (17)have also highlighted limited time, insufficient mentoring, poor research knowledge, and financial or structural constraints as important barriers to student participation in research. In Rwanda, Mugabo et al. similarly found that perceived insufficient understanding of research methods, limited mentorship, and financial challenges were major barriers (3). The consistency of these findings with our results suggested that the barriers faced by Burundian medical students reflect challenges that are common in many resource-constrained educational settings. At the same time, the prominence of limited confidence in research knowledge in our study highlights the need to strengthen practical research training and structured mentorship within medical education.

Our findings demonstrated that although medical students in Burundi have strong research interests, their participation remains limited. This mismatch appears to be driven primarily by gaps in research skills,

mentorship, time, and financial support. The strong student demand for a dedicated support structure further suggests that institutional mechanisms such as research support centres, mentorship programs, and practical research opportunities may be important for improving undergraduate research engagement.

Strengths and limitations

A strength of this study is that it included students from three medical schools in Burundi, allowing a broader view of the undergraduate medical education context than a single-institution survey. The study also captured not only research participation, but attitudes, barriers, and student-generated recommendations, which increases its practical relevance for educational planning.

The study also had limitations. First, its cross-sectional design prevents causal interpretation. Second, paper-based and online data collection modes were both used, which may have introduced differences in how students responded. Third, although the questionnaire was adapted from a published tool, local piloting was limited and focused on clarity rather than full psychometric validation. Finally, the study described participation patterns but did not use multivariable analysis to identify independent predictors of research participation.

Implications for medical education

Medical schools in Burundi may wish to move beyond mandatory coursework alone and create more structured pathways for research engagement. Potential strategies include developing student research support centres, formalising mentorship arrangements, integrating students into ongoing faculty and student-led research projects, offering targeted skills workshops in analysis and scientific writing, and creating opportunities for students to present or publish their work. These strategies could support both student learning and the longer-term development of a stronger research culture in medical education.

Conclusion

Medical students in Burundi reported a strong research interest, but only a minority had previously participated in research projects. Their involvement was concentrated in earlier and operational stages of research rather than in analysis, writing, and dissemination. Limited confidence in research knowledge and lack of mentors were the most commonly reported barriers. Strengthening mentorship, practical opportunities for research involvement, and student-oriented support structures may help medical schools translate student interest into more meaningful and sustained research engagement.

Declarations

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None

Authors' contributions

The authors have worked jointly to make this product available. Y.J.N: conceptualization, developing the methodology, verification of methodology, data collection, writing of original draft, project administration. E.M: conceptualization, developing the methodology, verification of methodology, visualization of tables and figures, and writing of original draft. L.V: conceptualization, verification of methodology, data analysis, editing and reviewing the manuscript, and visualization of tables and figures. J.C.N: conceptualization, verification of methodology, editing and reviewing the manuscript, supervision. J.I: Ethical approval application, data collection, and its coordination. A.K: data analysis, editing and reviewing the manuscript. F.N, A.B.I & R.M: Data collection and editing and reviewing the manuscript. The authors read and approved the final manuscript.

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Availability of data and materials

The dataset used during this study is protected and available upon reasonable request from the corresponding author.

Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing interests

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Figures

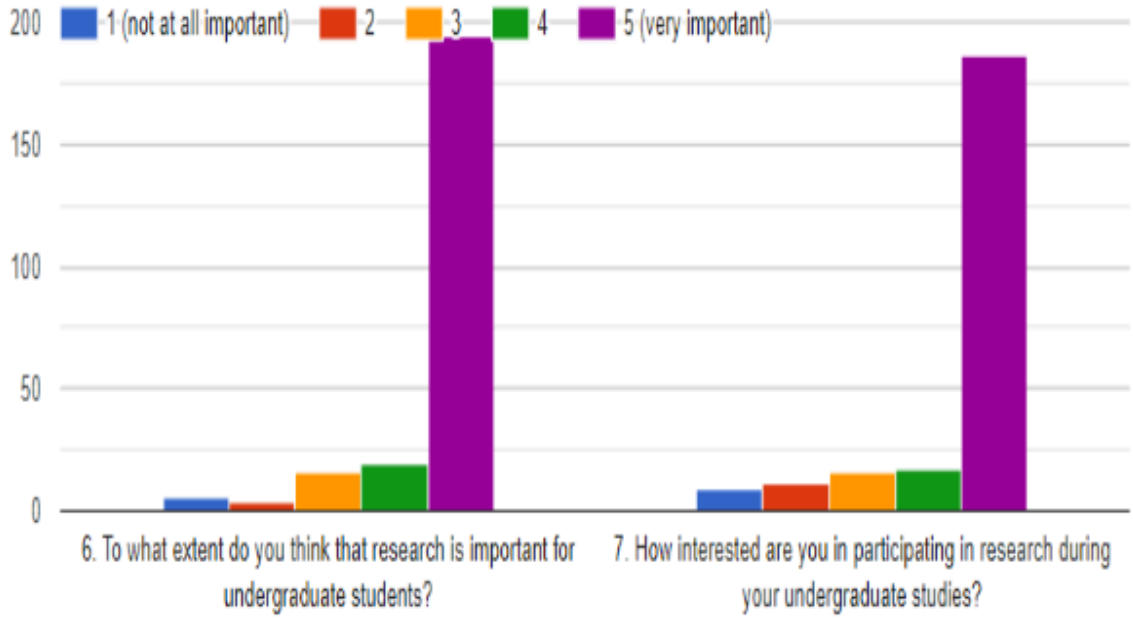


Figure 1

Attitudes and Perceptions towards Research

Supplementary Files

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