

Interest in Clinical Pharmacology as a Future Career Choice and Associated Factors Among Medical Students in Tanzania

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ABSTRACT

Background: Despite its critical role in drug development, research, patient care and drug safety, Clinical Pharmacology remains one of the least preferred medical specialities among medical students, potentially threatening the future availability of professionals in this essential field. In Tanzania and broader Sub-Saharan Africa, there is a lack of comprehensive studies exploring medical students' interest in clinical pharmacology and the factors influencing their career preferences. This study uniquely addresses the underrepresentation of clinical pharmacology in career considerations by medical students in Tanzania, aiming to uncover underlying causes and inform targeted strategies to elevate interest in this vital speciality.

Methods: A cross-sectional study was conducted among 423 registered medical students in four universities in Tanzania. An online self-administered questionnaire (Google Form) was used to collect data on socio-demographics, interest in clinical pharmacology, knowledge of the potential roles of a clinical pharmacologist and attitude towards clinical pharmacology. A robust Poisson regression model was performed to identify the factors associated with the choice of clinical pharmacology as a future career choice.

Results: A total of 423 participants were enrolled in this study. The studied population's median age (min, max age) was 24 years (20, 39). Almost half of the participants, 211/423 (49.9%), have shown interest in clinical pharmacology as a future career. The main reason for those who did not show interest was preference for other specialities 100/212 (47.2%). Overall, about 61.5% (260/423) of the participants were knowledgeable about the potential roles of clinical pharmacology. Only 13.9% (59/423) of the participants had a positive attitude towards clinical pharmacology as a discipline. Married participants demonstrated lower interest compared to unmarried participants (aPR=0.85; 95% confidence interval [CI], 0.78 to 0.93; $P<.001$), while differences were also observed across academic year categories, both third- and fourth-year students demonstrated slightly higher levels of interest in clinical pharmacology compared to fifth year students (aPR 1.12; 95% CI, 1.01 to 1.26; $P=.04$ and aPR 1.16; 95% CI, 1.08 to 1.24; $P<.001$ respectively). Notably, knowledge of the potential roles of clinical pharmacology did not predict interest in clinical pharmacology.

Conclusions: This study highlights a moderate level of interest in clinical pharmacology as a future career among medical students, with nearly half expressing such interest. Despite generally adequate knowledge regarding clinical pharmacology, positive attitudes toward the speciality remains low, suggesting that factors beyond awareness alone may influence career preferences among medical students. Marital status and year of study were the only demographic variables significantly associated with career interest in this field. These findings underscore the need for targeted strategies to enhance career guidance programs.

BACKGROUND

Medicine offers numerous career paths, each with its own set of opportunities and challenges. Medical students make critical decisions regarding their future specialities during their medical school years, and these early choices significantly influence their eventual career paths.^{1,2} Studies have revealed that many medical students favoured traditional and well-known specialities such as internal medicine, surgery, obstetrics and gynaecology and paediatrics over others.^{1,2} This trend is consistent with global observations where less popular fields like clinical

pharmacology struggle to attract interest despite their critical importance. The decisions on the choice of future specialities are vital as they impact the distribution of the health workforce and the overall health sector in any country. Indeed, in the 21st century, the medical field is experiencing an increasing need for specialisation due to the advancement of medical science and the complexity of patient care.

Broader pharmaceutical workforce data also demonstrate substantial global inequities in medicine related healthcare personnel. Recent international workforce reports have shown markedly lower

pharmacist density in African and low income settings compared to high income regions, highlighting persistent disparities in access to pharmaceutical expertise and medicine management services. Comparable workforce specific estimates for clinical pharmacologists remain limited globally, reflecting the relatively underdeveloped nature of the discipline in many healthcare systems. Available reports indicate that several countries have fewer than one clinical pharmacologist per million population, while many African countries have limited or no formal specialist training pathways. In Tanzania and broader sub-Saharan Africa, the number of trained clinical pharmacologists remains low, with limited specialist training opportunities and insufficient integration of clinical pharmacology services within healthcare systems although there are no published statistics on registered clinical pharmacologists.^{3,4} Additionally, South Africa became one of the first African country in 2013 to formally introduce clinical pharmacology as a medical speciality, highlighting the historical underdevelopment of the discipline across the continent.⁵ This challenge is further reflected in postgraduate training uptake in Tanzania, from unpublished institutional records, less than 10 out of 923 postgraduate students in 2024/2025 academic year, and out of 883 students in 2025/2026, were enrolled in clinical pharmacology programs at Muhimbili University of Health and Allied Sciences (MUHAS).^{6,7} These enrolment patterns suggest limited uptake into specialist training and raise concerns about future workforce capacity.

Apart from academia, clinical pharmacologists play a crucial role in bridging the gap between laboratory research and patient care, as well as in the patient care process itself, ensuring the safe and effective use of medications.^{8,9} Additionally, clinical pharmacologists are integral to drug development, contributing to clinical trials, regulatory approval, and post-marketing surveillance.^{8,10} In clinical practice, clinical pharmacologists are responsible for implementing pharmacogenetic and therapeutic drug monitoring (TDM) services, managing adverse drug reactions and interactions, and ensuring that patients receive optimal therapy with minimal side effects.¹¹ Their role is increasingly important in addressing irrational medicine use and supporting antimicrobial stewardship efforts aimed at combating antimicrobial resistance.¹² They are also involved in development of treatment guidelines, rational medicine use policies, and evidence based prescribing practices that enhance patient outcomes and support safe healthcare delivery.¹³ Despite the aforementioned career opportunities, clinical pharmacology remains one of the less popular specialities.^{14,15} A previous study conducted among second-year medicine and paediatrics residents reported that medical student exposure to and experience with the speciality, as well as the medical school programme and promotion of the speciality, intellectual content, perception, employment, practice opportunities, and lifestyle satisfaction, significantly influence future career choices.¹⁶ In Tanzania, several strategies, including curriculum revisions, have been implemented to increase the visibility of clinical pharmacology as a potential discipline.¹⁷ The increasing complexity of modern therapeutics, rising burden of medicine related harm, expanding antimicrobial resistance, and growing need for

safe and cost-effective prescribing further underscore the importance of strengthening the clinical pharmacology workforce in low- and middle-income countries. Given the crucial role of clinical pharmacologists in advancing the healthcare sector, it is important to understand the level of interest in clinical pharmacology and its determinants to address the gap by designing strategies to promote clinical pharmacology as an attractive career path, ultimately contributing to a more balanced and effective healthcare workforce. To date, no studies have been conducted to assess medical students' interest in clinical pharmacology as a future career choice and the associated factors in Tanzania. Therefore, the present study aimed to assess interest in clinical pharmacology as a future career, along with its related factors, among medical students in Tanzania.

METHODS

Study Design

This was a multicentre cross-sectional quantitative study between March and April 2025.

Study Setting

The study was conducted at public universities, including Muhimbili University of Health and Allied Sciences (MUHAS), State University of Zanzibar (SUZA) and University of Dodoma (UDOM), and private universities including Hubert Kairuki Memorial University (HKMU), St. Joseph College of Health and Allied Sciences (SJCHAS), Catholic University of Health and Allied Sciences (CUHAS) and Kilimanjaro Christian Medical University College (KCMUCo), medical universities in Tanzania. These institutions were purposively selected due to their recognized training programs in clinical pharmacology.

Study Participants

The study was conducted among medical students enrolled in undergraduate programs (Doctor of medicine (MD), Doctor of Dental Surgery (DDS), Bachelor of Pharmacy (BPharm) and Bachelor of Science in Nursing (BSc. Nursing) during the academic year 2024/2025 at selected universities from March to April 2025. These programs were chosen as they had full course exposure to clinical pharmacology within their curricula, and also, they all fit the entry criteria for postgraduate studies in clinical pharmacology (MSc in Clinical Pharmacology).¹⁸ The study included medical students who had clinical pharmacology as a full course and were in their clinical years (i.e., third year and above). First and second years, at the time of the study, were excluded because they had not yet been exposed to clinical pharmacology.

Sample Size and Sampling Technique

The sample size calculation was obtained from Fischer's formula at 95% confidence interval as shown below.

$$N = \frac{Z^2 P(100 - P)}{e^2}$$

N= minimum estimated sample size

Z= score for 95% confidence interval = 1.96

P= estimated proportion of medical students interested in clinical pharmacology. Since no prior Tanzanian study existed, 50% was used to maximize sample size.¹⁹

e = acceptable margin of error in estimating the true population proportion (tolerable error) 10%

Then $N = 384$, accounting for the 10% non-response rate, therefore, this study recruited a minimum of 420 participants.

A total of 423 students participated in the study. Eligible participants were recruited using a non-probability convenience sampling approach. The study targeted all eligible students within the specified programs at the selected universities. The link to the questionnaire (Online Google Forms) was disseminated through official class WhatsApp groups used for academic communication, which provided a practical and widely accepted platform.

Study Variables

Career interest and speciality choice are complex behavioural processes influenced by individual perceptions, learning experiences, social influences, and perceived career opportunities. The present study was conceptually informed by Social Cognitive Career Theory, which proposes that career interests develop through interactions between personal characteristics, educational experiences, environmental influences, and outcome expectations.^{20,21} This framework supports the assessment of factors such as knowledge, attitudes, mentorship, and academic exposure in understanding medical students' career preferences.

Data Collection Methods

Data Collection Tool

Data were collected using a structured self-administered questionnaire developed after review of previous studies assessing medical students' speciality preferences, perceptions, and career interests related to clinical pharmacology and other medical specialties. The questionnaire included sections assessing socio-demographic characteristics, knowledge regarding clinical pharmacology, attitudes toward the speciality, and career interest. The tool was adapted to the Tanzanian context and pretested among a small group of students prior to data collection to assess clarity and comprehensibility. The tool was developed in Google Forms, which was shared through official WhatsApp groups designated for disseminating student information and announcements. The first page of the online form included the information on eligibility and informed consent to participate in the study, followed by sections A to D. Section A consisted of 10 questions about sociodemographic and academic characteristics, Section B consisted of 12 questions about interest in clinical pharmacology, sources of advice for choosing a speciality and reasons for selecting a specific speciality. Section C consisted of 10 questions on the knowledge of potential role of a clinical pharmacologist and Section D consisted of 15 questions assessing attitude towards clinical pharmacology. Before commencement of the data collection, the tool was piloted among a small group of students to ensure clarity and relevance, and these were not included in the study.

Data Collection Procedures

Assessment of Interest in Clinical Pharmacology

The interest in clinical pharmacology as a future career was explored by direct questions about participants'

willingness to pursue further training or a career in clinical pharmacology. The response was recorded as a dichotomous variable (Yes/No).^{1,15}

Assessment of Knowledge on the Potential Roles of a Clinical Pharmacologist

Knowledge of the potential roles of a clinical pharmacologist including clinical/patient care, academia, research, early drug development, and regulatory functions, was assessed by designing role-specific questions, as detailed in previous studies.^{10,22–24} It was measured using a set of 10 questions, with a wrong answer scoring 0 and a correct answer 1, for a maximum score of 10. Overall, participants with scores of 0 to 5 were considered to have inadequate knowledge, while participants with scores of 6 to 10 were considered to have adequate knowledge on the potential roles of a clinical pharmacologist.

Assessment of Attitude towards Clinical Pharmacology

The tool for assessing attitudes was adopted and modified from a study conducted among medical students in Uganda.¹ Attitude was assessed by a set of 15 statements related to perceptions of the relevance, difficulty, and value of clinical pharmacology in clinical practice using a 5-point Likert scale, strongly agree (5 points), agree (4 points), neutral (3 points), disagree (2 points) and strongly disagree (1 point). The total score was 75, and overall, participants with a score ≤ 37 were considered to have a negative attitude, while those with a score ≥ 38 were considered to have a positive attitude. Since no standardized attitude classification tool for clinical pharmacology career perception was identified in the literature, the attitude score was dichotomized using the midpoint of the total attainable score to distinguish relatively positive from less positive attitudes.

Data Management and Statistical Analysis

Data from the online data collection tool were exported to Microsoft Excel for cleaning. Then, the cleaned data were imported into IBM SPSS Statistics for Windows version 20 (IBM Corp, Armonk, NY, USA) for analysis. Descriptive statistics were used to summarise sociodemographic information, interest in clinical pharmacology, knowledge on the potential roles of clinical pharmacologists and attitude towards clinical pharmacology. Frequencies and percentages for categorical variables, while medians and ranges for continuous variables. Chi-square test was used to examine the association between categorical variables (dependent variable – interest in clinical pharmacology and independent variables – sociodemographic and academic characteristics, knowledge on the potential roles of clinical pharmacologists and attitude towards clinical pharmacology. Before multivariable analysis, the variance inflation factor (VIF) test was conducted to assess multicollinearity, tolerance results were observed to be > 0.4 for all included factors. A robust Poisson regression model was fitted to identify factors associated with choosing clinical pharmacology as a future career. Variables with $P < 0.2$ in bivariate analyses were included in a robust Poisson regression model to identify independent predictors of interest in Clinical Pharmacology as a career. A P value of < 0.05 was considered statistically significant.

Ethical Considerations

The ethical approval to conduct the study was granted by the Muhimbili University of Health and Allied Sciences (MUHAS) Institutional Review Board (Ref No. DA.282/298/02L/425). Participation was voluntary, and informed consent was obtained digitally from all participants before they began the questionnaire. The privacy of the participant's information was maintained throughout, as no identifying personal data was collected.

RESULTS

Sociodemographic and Academic Characteristics of Study Participants

A total of 423 participants were enrolled in this study and most attended public medical schools. The median age (min, max age) of the studied population was 24 years (20, 39), with the majority of participants aged 20 to 25 years. Males were the majority, and most respondents were not married. Regarding the program of study, DDS students had the highest representation, followed by MD students. Fourth-year students were the largest group by academic year. Participants were asked to self-rate their perceived academic standing using four categories: excellent, good, fair, or poor, the majority perceived a "Good" academic standing. Concerning parent/guardian profession, the most had non-medical backgrounds. Lastly, the majority of the participants were funded by the government. Table 1 presents the sociodemographic and academic characteristics of the study participants.

Career Preference Characteristics and Interest in Clinical Pharmacology as a Future Career Choice

Out of the 423 participants, majority showed interest in pursuing postgraduate studies. Participants were allowed to choose all the reasons for choosing a future career speciality (i.e. allowed to choose more than one reason for choosing career paths), the main reasons for the choice of future career speciality were personal interest in the speciality, followed by perceived career opportunities, and job stability with financial incentives. While the most had an interest in clinical pharmacology as a subject, only less than a half-expressed interest in clinical pharmacology as a future career. Among those who had no interest in choosing clinical pharmacology, the main reason was preference for other specialities, (Figure 1). Among those who showed interest in pursuing postgraduate studies, more than half preferred to do it within the country. Regarding academic guidance, out of those who had academic mentors, more than half acknowledged that having an academic mentor influenced their interest in a career choice. A preponderance of the study participants, showed a high level of research interest. More than half of the study participants had received advice on future career paths. Among the 244 participants who reported receiving career advice, family members were the most common source of guidance with family being the most common source of this advice. Table 2 summarises the career preference characteristics among the study participants.

Knowledge on the Potential Roles of a Clinical Pharmacologist and Attitude Towards Clinical Pharmacology as a Discipline

Since knowledge and perceptions toward a medical speciality may influence future career preferences,

participants' knowledge and attitudes regarding clinical pharmacology were assessed.

TABLE 1: Sociodemographic and Academic Characteristics of the Study Participants

Variable	Frequency	Percentage
Age group (years)		
20-25	355	83.9
26-30	59	13.9
30+	9	2.1
Sex		
Male	282	66.7
Female	141	33.3
Marital status		
Married	183	43.3
Not-Married	240	56.7
Program of study		
BPharm	63	14.9
DDS	182	43.0
MD	156	36.9
BSc. Nursing	22	5.2
Year of study		
Third	66	15.6
Fourth	201	47.5
Fifth	156	36.9
Medical school		
Public	237	56.0
Private	186	44.0
Perceived Academic standing (GPA)		
Excellent	37	8.7
Good	247	58.4
Fair	75	17.7
Poor	64	15.1
Parent/Guardian profession		
Medical	83	19.6
Non-medical	340	80.4
Studies sponsorship		
Self-sponsored	105	24.8
Government sponsored	318	75.2

Overall, out of the 423 participants, the predominant number were found to have adequate knowledge regarding the potential roles of a clinical pharmacologist. The most frequently recognised role of clinical pharmacologists was in academia, followed by a role in healthcare, and research. Figure 2 presents the frequency and percentages of participants who identified correctly the roles of a clinical pharmacologist in academia, healthcare, research, early drug discovery and development, and regulatory authorities and policy making. Regarding attitude, out of the 423 participants, only 59 (13.9%) had a positive attitude towards clinical pharmacology as a discipline.

Association Between Knowledge on the Potential Roles of a Clinical Pharmacologist, Attitude Towards Clinical Pharmacology, and Interest in Clinical Pharmacology as a Career Path

We performed a cross-tabulation to assess the association between knowledge on the potential roles of a clinical pharmacologist, attitude towards clinical pharmacology, and interest in clinical Pharmacology as a career path

TABLE 2: Career Preference Characteristics Among the Study Participants

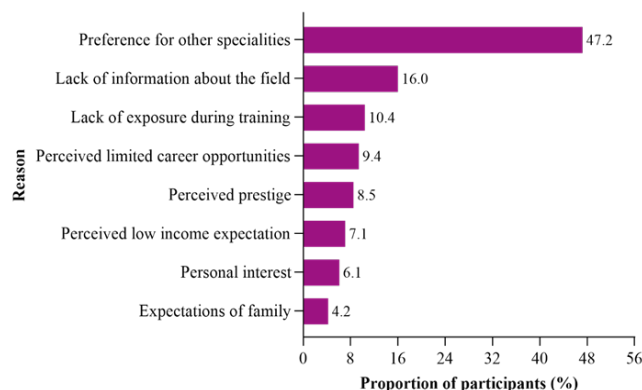
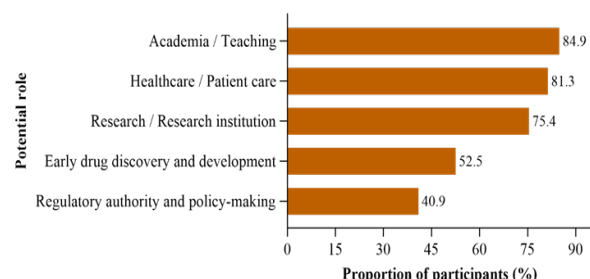
Variable	Frequency	Percentage
Willingness to pursue postgraduate studies		
Yes	290	68.6
No	133	31.4
Factors influencing future career choice among participants willing to pursue postgraduate studies (n=290)		
Personal interest in the speciality	197	67.9
Perceived career opportunities	124	42.8
Job stability and financial incentives	124	42.8
Societal impact and patient interaction	70	24.1
Curriculum exposure	36	12.4
Preferred place to do study postgraduate studies among participants willing to pursue postgraduate studies (n= 290)		
In the country	162	55.9
Abroad	128	44.1
Interested in clinical pharmacology as a career choice		
Yes	211	49.9
No	212	50.1
Interested in clinical pharmacology as a subject		
Yes	260	61.5
No	163	38.5
Preferred field of practice/sector		
Public service	158	37.4
Private sector	103	24.3
Research	100	23.6
Academia/Teaching	63	14.7
Academic mentor		
Yes	236	55.8
No	187	44.2
Academic mentor influence on career choice (n= 236)		
Yes	134	56.8
No	102	43.2
Interested in research		
High interest	341	80.6
Low interest	82	19.4
Received advice on future career path		
Yes	244	57.7
No	179	42.3
Source of career advice among participants who reported receiving career guidance (n= 244)		
Family	141	57.8
Friends	33	13.5
Faculty staff (university staff)	19	7.8
Clinical staff (Doctor, dentist, nurse, pharmacist etc.)	51	20.9

(Table 3). Knowledge on the potential roles of a clinical pharmacist was significantly associated with interest in clinical pharmacology as a career path, whereby majority of those with inadequate knowledge opted for clinical pharmacology as a career compared with those who had adequate knowledge. On the other hand, more of those with a positive attitude towards clinical pharmacology as a discipline showed interest in clinical pharmacology than those with a negative attitude, though this was not statistically significant.

Factors Associated with the Interest in Clinical Pharmacology as a Future Career

We performed a robust Poisson regression model to identify the factors associated with interest in clinical pharmacology as a future career choice. After a univariable regression

analysis, factors such as marital status, program of study, year of study, current academic standing, preferred location of practice/sector, interest in research and knowledge on the potential roles of a clinical pharmacist had a *P* value of < 0.2 and were subjected to multivariable regression analysis. On multivariable regression analysis, marital status and year of study were independently associated with interest in clinical pharmacology as a future career. Married participants were 15% less likely to be interested in clinical pharmacology as compared with those not married. Regarding academic year, as compared to fifth year students, both fourth year and third year students demonstrated slightly higher but comparable levels of interest in clinical pharmacology, (Table 4). Notably, being knowledgeable of the potential roles of a clinical pharmacist did not predict interest in clinical pharmacology as a future career.

FIGURE 1: Reasons for Not Choosing Clinical Pharmacology as a Future Career Choice (n=212)**FIGURE 2: Knowledge on the Potential Roles of a Clinical Pharmacologist****TABLE 3: Association Between Knowledge on the Potential Roles of a Clinical Pharmacologist, Attitude Towards Clinical Pharmacology and Interest in Clinical Pharmacology as a Career**

Variable	Interest in clinical Pharmacology as a career path		P Value
	Yes (%)	No (%)	
Knowledge on the potential roles of a clinical pharmacologist			
Adequate	114 (43.8)	146 (56.2)	.002
Inadequate	97 (59.5)	66 (40.5)	
Attitude towards clinical pharmacology			
Positive	33 (55.9)	26 (44.1)	.33
Negative	178 (48.9)	186 (51.1)	

TABLE 5: Factors Associated with the Interest in Clinical Pharmacology as a Future Career

Variable/ Category	% interested	Univariable analysis			Multivariable analysis		
		cPR	95%CI	p-value	aPR	95%CI	p-value
Age							
20 – 25	49.3	Ref					
26 – 30	52.5	0.98	0.89 – 1.07	.65			
≥ 31	55.6	0.96	0.76 – 1.20	.72			
Sex							
Male	48.9	Ref					
Female	51.8	0.98	0.92 – 1.05	.58			
Marital status							
Married	66.1	0.82	0.77 – 0.89	<.001	0.85	0.78 – 0.93	<.001
Not married	37.5	Ref			Ref		
Program of study							
Bpharm	57.1	0.92	0.79 – 1.08	.33	0.90	0.76 – 1.08	.25
DDS	32.4	1.08	0.94 – 1.25	.26	1.08	0.92 – 1.27	.34
MD	67.9	0.85	0.74 – 0.99	.03	0.94	0.80 – 1.10	.42
Nursing	45.5	Ref			Ref		
Year of study							

Continue

TABLE 5: Continued

Variable/ Category	% interested	cPR	Univariable analysis 95%CI	p-value	Multivariable analysis aPR	95%CI	p-value
Third year	56.1	1.03	0.93 – 1.13	.62	1.12	1.01 – 1.26	.04
Fourth year	40.3	1.14	1.06 – 1.22	<.001	1.16	1.08 – 1.24	<.001
Fifth year	59.6	Ref			Ref		
Type of medical school							
Public	49.8	1.00	0.94 – 1.07	.97			
Private	50.0	Ref					
Current academic standing							
Excellent	24.3	1.29	1.15 – 1.45	<.001	1.12	0.99 – 1.26	.08
Good	48.6	1.11	1.01 – 1.23	.03	0.98	0.88 – 1.08	.66
Fair	54.7	1.07	0.95 – 1.20	.26	0.94	0.88 – 1.07	.34
Poor	64.1	Ref			Ref		
Parent/Guardian profession							
Medical profession	47.0	1.02	0.95 – 1.11	.55			
Non-medical profession	50.6	Ref					
Sponsorship status							
Self-sponsored	51.4	0.99	0.92 – 1.06	.72			
Government sponsored	49.4	Ref					
Preferred location of practice							
Public	37.3	1.11	1.01 – 1.22	.04	1.00	0.91 – 1.11	.99
Private	59.2	0.96	0.86 – 1.07	.45	0.95	0.86 – 1.05	.29
Research	58.0	0.97	0.87 – 1.08	.55	0.98	0.88 – 1.10	.76
Academia	53.2	Ref			Ref		
Having an academic mentor							
Yes	49.6	1.01	0.94 – 1.07	0.89			
No	50.3	Ref					
Interested in research							
Yes	47.8	1.08	0.99 – 1.17	0.08	1.06	0.98 – 1.14	.17
No	58.5	Ref			Ref		
Received advice on future career							
Yes	50.4	0.99	0.93 – 1.06	0.80			
No	49.2	Ref					
Attitude towards clinical pharmacology							
Negative	48.9	1.05	0.95 – 1.15	0.32			
Positive	55.9	Ref					
Knowledge on the potential roles of a clinical pharmacist							
Adequate	43.8	1.11	1.04 – 1.19	.002	0.93	0.86 – 1.01	.08
Inadequate	59.5	Ref			Ref		

DISCUSSION

The present study investigated the interest in clinical pharmacology as a future career among medical students in Tanzania and examined the factors influencing this interest. Despite efforts to promote underrepresented medical specialties through curriculum revisions and enhanced exposure, these initiatives have not sufficiently addressed the critical gap of clinical pharmacologists.^{4,17} To the best of our knowledge, this is among the few studies in the country in general to assess interest in the future career goal of medical students particularly interest in clinical pharmacology. Apart from revealing the interest in clinical pharmacology and associated factors, the present study also underscores critical gaps in clinical pharmacology and promotes the clinical pharmacology discipline as a viable and attractive career path for future healthcare professionals.⁴ The main findings of our study revealed that nearly half of the study participants

expressed a desire to pursue clinical pharmacology in the future. Among those who were not interested, the most common reason given was a preference for other medical specialties. Most of the students had adequate knowledge of the potential roles of clinical pharmacologists. However, only a small proportion of the participants had a positive attitude toward clinical pharmacology as a discipline. Notably, marital status and the students' academic year emerged as the only factors significantly associated with their interest in the field.

This study has found that nearly half of the surveyed students expressed interest in pursuing clinical pharmacology as a future career. The finding indicates a promising baseline level of curiosity toward clinical pharmacology in the country, which could be leveraged through targeted career guidance and exposure initiatives. In addition, this is especially important because clinical pharmacology as a subject is always perceived negatively

by most undergraduate medical students.¹⁵ The level of interest in clinical pharmacology as a career path observed in our study is twice as high as that reported among medical students in Nigeria, where an interest of 22.6% was reported.¹⁵ The observed difference could have been contributed by the number of universities involved and programs of study, where in our study we had seven universities and four programs (MD, BPharm, MD, BSc, Nursing), while a study in Nigeria had only one university and program (MBBS). Another study conducted in Uganda reported, a much lower level of interest (1.7%) in pursuing clinical pharmacology as a career path.¹ Again, in this study, they only involved the MBBS program. However, the flip side reveals that an almost equal proportion of medical students were not interested in clinical pharmacology. Among these students, the predominant reason was a preference for other specialities, suggesting that clinical pharmacology is not viewed as a first-choice field. This finding is similar to a study from Uganda where preference for specialities such as internal medicine, surgery and obstetrics and gynaecology was reported.¹ These findings could be due to limited visibility of clinical pharmacology professionals in different settings (academia, research, healthcare, regulatory authorities and early drug discovery and development), or a lack of integration of pharmacological principles into day-to-day medical practice that students observe during rotations. These findings underscore a clear need to improve the visibility and appeal of clinical pharmacology discipline as a career through structured mentorship programs, curriculum reform that uncover the clinical application of the clinical pharmacology discipline in healthcare, academia, research, regulatory authorities and drug development and highlights real-world impact of the clinical pharmacologists could foster more positive attitudes.^{12,22}

This study has also found that a good proportion of the students were knowledgeable about the potential roles of clinical pharmacologists, with academia and healthcare being the most frequently mentioned roles. This level of knowledge suggests that while students are familiar with what clinical pharmacologists do, it does not necessarily translate into career interest. The observed disconnect between knowledge and interest may reflect perceived limitations in career progression, remuneration, or clinical engagement compared to other specialities, as reported previously.¹⁶ An unexpected finding was that participants categorized as having inadequate knowledge demonstrated relatively higher interest in clinical pharmacology compared to those with adequate knowledge. This finding may suggest that career interest is not solely determined by factual understanding of the discipline. It is possible that students with limited exposure may hold more generalized or idealized perceptions of the speciality, while those with greater knowledge may also become more aware of existing challenges such as limited training opportunities and career visibility. However, this association did not remain significant in adjusted analysis and should therefore be interpreted cautiously. Perhaps the most striking result from our study is the very low proportion of students who had a positive attitude toward clinical pharmacology as a discipline. The observed negative perception may stem from multiple sources, including the theoretical and non-clinical framing of

clinical pharmacology in medical curricula, lack of clinical pharmacology role models and minimal student exposure to real-life clinical pharmacologists. Similar results have been reported in a study from Nigeria.¹⁵ A low positive attitude suggests that even among those with sufficient knowledge or interest, few may ultimately pursue clinical pharmacology unless attitudes are shifted through educational reform and advocacy. An unexpected finding was that participants categorized as having inadequate knowledge demonstrated relatively higher interest in clinical pharmacology compared to those with adequate knowledge. This finding may suggest that career interest is not solely determined by factual understanding of the discipline. It is possible that students with limited exposure may hold more generalized or idealized perceptions of the speciality, while those with greater knowledge may also become more aware of existing challenges such as limited training opportunities and career visibility. However, this association did not remain significant in adjusted analysis and should therefore be interpreted cautiously.

The present work has also found that demographic and academic characteristics influence interest. Middle-year students may have had recent exposure to clinical pharmacology as a subject in medical curriculum, but may not yet have fully committed to a speciality path (unrealistic choice), making them more open to considering clinical pharmacology. Married participants demonstrated lower interest in clinical pharmacology compared to unmarried participants. This finding may reflect differences in career priorities and professional expectations among students with greater family responsibilities. Specialties perceived to have less clearly established career pathways or limited employment visibility may be considered less attractive among individuals prioritizing financial stability and long term career certainty. However, the relatively small number of married participants warrants cautious interpretation of this finding. Notably, knowledge on the potential roles of clinical pharmacology and attitude towards clinical pharmacology did not predict interest in clinical pharmacology.

CONCLUSIONS

The interest in clinical pharmacology as a future career path among Tanzanian medical students is modest but promising. Despite a relatively high proportion of participants demonstrating knowledge of the potential roles of clinical pharmacology in health care, academia, drug development and regulation, only a small fraction exhibited a positive attitude toward the clinical pharmacology discipline. Marital status and year of study were the only demographic and academic variables significantly associated with career interest in this field. These findings provide preliminary insights into medical students' interest in clinical pharmacology and highlight the need for further studies using more representative sampling approaches to inform educational and workforce planning strategies.

Study Strengths and Limitations Study Limitations.

This study has several limitations that should be considered when interpreting the findings. First, participants were recruited using a non-probability convenience sampling approach through online academic communication

platforms. As participation was voluntary, selection bias may have occurred, with students who had stronger academic engagement or greater interest in clinical pharmacology potentially being more likely to participate. Consequently, the findings may not be fully representative of all medical students in Tanzania, thereby limiting generalizability.

Second, data were collected using a self-administered online questionnaire, which may have introduced response bias and social desirability bias. Additionally, attitudes and career interests were assessed using self-reported measures that may reflect temporary perceptions rather than stable long term career intentions.

Third, the cross-sectional design limits the ability to establish causal or temporal relationships between the identified factors and interest in clinical pharmacology as a future career choice.

Study Strengths

Despite these limitations, the study included participants from multiple universities and health related academic programs across Tanzania, providing important preliminary insights into medical students' perceptions and interest toward clinical pharmacology in a setting where limited evidence currently exists.

REFERENCES

- Bongomin F, Olum R, Kajimu J, et al. Factors Associated with Medical Students' Career Choices Regarding Internal Medicine in Uganda. *Adv Med Educ Pract*. 2022;13(October):1293-1304. doi:10.2147/AMEP.S381161
- Seyoum N, Biluts H, Bekele A, Seme A. Medical students' choice of specialty and factors determining their choice: A cross-sectional survey at the Addis Ababa University, School of Medicine, Ethiopia. *Ethiop Med J*. 2014;52(3):129-135.
- Astudillo W, Salinas A, O Oyebola F, Silbermann M, Rivilla F, Mendiñeta C. Situation Analysis of Health Care Workers in Sub-Saharan Africa. *J Palliat Care Med*. 2022;12(2). doi:10.4172/2165-7386.1000441
- Wenning L, Pillai G (Colin), Knepper TC, Ilic K, Ali AM, Hibma JE. Clinical Pharmacology Worldwide: A Global Health Perspective. *Clin Pharmacol Ther*. 2021;110(4):946-951. doi:10.1002/cpt.2274
- Walubo A, Barnes K, Kwizera E, Greeff O, Rosenkranz B, Maartens G. Clinical pharmacology becomes a specialty in South Africa. *South African Med J*. 2013;103(3):150-151. doi:10.7196/SAMJ.6639
- MUHAS. MUHAS Selected PG Candidates FOR 2024/2025.; 2024. https://www.google.com/url?sa=i&source=web&rct=j&url=https://muhas.ac.tz/wp-content/uploads/2024/06/MUHAS-Selected-PG-Candidates-FOR-2024-2025_compressed.pdf&ved=2ahUKewiCxyUGOLaUAxXlSKQEHXswKo-8QqYcPegolAggACAAIBAD&opi=89978449&cd&psig=AOvVaw3XlNKmzOuNhW. Accessed on 2 July 2026
- MUHAS. Selected Applicants for Postgraduate Programmes for 2025/2026.; 2025. <https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://muhas.ac.tz/wp-content/uploads/2025/06/Selected-Applicants-for-Postgraduate-Programmes-for-2025-2026.pdf&ved=2ahUKewjld2GOLaUAxVpUaQEHTzZl6YQFnoEC-B4QAQ&usg=AOvVaw0li4UblXRS43lxQ8eb>. Accessed on 2 July 2026
- Williams D. Monitoring medicines use: the role of the clinical pharmacologist. *Br J Clin Pharmacol*. 2012;74(4):685-690. doi:10.1111/j.1365-2125.2012.04316.x
- Samajdar SS, Sen S. Urgent need for reevaluation of clinical pharmacologist qualifications in private hospitals. *Natl J Pharmacol Ther*. 2024;2(1):56-58. doi:10.4103/NJPT.NJPT_14_24
- Crescioli G, Bonaiuti R, Corradetti R, Mannaioni G, Vannacci A, Lombardi N. Pharmacovigilance and Pharmacoepidemiology as a Guarantee of Patient Safety: The Role of the Clinical Pharmacologist. *J Clin Med*. 2022;11(12):3552. doi:10.3390/jcm11123552
- Rim JH, Kim Y gon, Kim S, et al. Clinical Pharmacogenetic Testing and Application: 2024 Updated Guidelines by the Korean Society for Laboratory Medicine. *Ann Lab Med*. 2025;45(2):121-132. doi:10.3343/alm.2024.0572
- Ronald R. The Role of Pharmacology in Modern Medicine: From Drug Discovery to Clinical Applications. *J Pharm Toxicol*. 2023;6(2):36-39. doi:10.37532/jpt.2023.6(2).36-39
- Potlog Shchory M, Goldstein LH, Arcavi L, Shihmanter R, Berkovitch M, Levy A. Increasing adverse drug reaction reporting—How can we do better? Cohen K, ed. *PLoS One*. 2020;15(8):e0235591. doi:10.1371/journal.pone.0235591
- Sawan D, Alrefaei GM, Alesawi A, Abualross O, Alsuwaida SA, Meer N. Preferences, Career Aspects, and Factors Influencing the Choice of Specialty by Medical Students and Interns in Saudi Arabia: A Cross-Sectional Study. *Cureus*. 2023;15(8). doi:10.7759/cureus.43018
- Umar M, Zauro R. Perception of clinical year medical students on teaching and learning of pharmacology in a second-generation university in Northern Nigeria. *Niger J Basic Clin Sci*. 2018;15(2):152. doi:10.4103/njbc.njbc_22_18
- Center for Health Workforce studies. Specialty Choices Among Second Year Medicine and Pediatric Residents. https://www.chwsny.org/wp-content/uploads/2002/02/pgy22002_Final_reduced.pdf. Accessed on 2 July 2026
- Ngassapa OD, Kaaya EE, Fyfe M V., et al. Curricular transformation of health professions education in Tanzania: The process at Muhimbili University of Health and Allied Sciences (2008–2011). *J Public Health Policy*. 2012;33(S1):S64-S91. doi:10.1057/jphp.2012.43
- MUHAS. Muhimbili University of Health and Allied Sciences Application for Postgraduate Degree Studies for Academic Year 2025/2026.; 2026. <https://muhas.ac.tz/wp-content/uploads/2025/01/Postgraduate-Application-Advert-Regular-Window-2025-2026.pdf>. Accessed on 2 July 2026

19. Conroy R. Sample size A rough guide. Royal College of Surgeons in Ireland; 2018:1-30. <https://www.ndi.org/sites/default/files/samplesizecalculation.pdf>. Accessed 22 June 2026
20. Batul M, Kim E, Hartstone-Rose A, Mulvey KL. STEM career interests of Ghanaian adolescents in the context of social cognitive career theory. *Int J Educ Vocat Guid*. 2026;(0123456789).doi:10.1007/s10775-025-09787-7
21. Bakken LL, Byars-Winston A, Wang M fen. Viewing Clinical Research Career Development Through the Lens of Social Cognitive Career Theory. *Adv Heal Sci Educ*. 2006;11(1):91-110.doi:10.1007/s10459-005-3138-y
22. Aronson JK. What do clinical pharmacologists do? A questionnaire survey of senior UK clinical pharmacologists. *Br J Clin Pharmacol*. 2012;73(2):161-169. doi:10.1111/j.1365-2125.2011.04079.x
23. Shideman FE. Clinical Pharmacology: Its Scope and Responsibilities. *Postgrad Med*. 1969;45(6):75-77. doi:10.1080/00325481.1969.11697165
24. Council for International organizations of medical sciences. Clinical Pharmacology in Health Care, Teaching and Research. https://cioms.ch/wp-content/uploads/2017/01/Clinical_Pharmacology_in_Health_Care_Teaching_and_Research_.pdf. Accessed on 2 July 2026

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