

Prevalence and Factors Associated with Depression among Postgraduate Students in Tanzania

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Abstract

Background

Depression is a growing global health concern characterized by hopelessness, disinterest in previously enjoyable activities, and potentially suicidal thoughts. Postgraduate university students face a particularly high risk due to the challenges of balancing academics, family responsibilities, and financial pressures. This study investigated depression factors among postgraduate students at Muhimbili University of Health and Allied Sciences, addressing a critical need given this population's unique stressor.

Methods

This cross-sectional study included 377 participants selected through stratified random sampling. Data collection utilized a self-administered questionnaire featuring the Patient Health Questionnaire (PHQ-9) depression scale and the Multidimensional Scale of Perceived Social Support. Analysis was performed using Stata 18, with descriptive statistics and logistic regression employed to identify depression-related factors.

Results

Among the respondents, 90 (23.9%) had probable depression, and multivariable logistic regression revealed several factors that independently had an association with depression. Those who consumed alcohol were twice as likely to experience depression compared to non-drinkers [Adjusted odds ratio (aOR) = 2.13, 95%CI (0.91–3.46)], while students who never engaged in physical exercise faced three times higher risk than those exercising regularly [aOR = 3.09, 95%CI (1.48–6.49)]. Financial challenges nearly tripled depression likelihood [aOR = 2.86, 95%CI (1.57–5.22)], and notably, students with low social support were seven times more likely to be depressed than those with high support [aOR = 7.55, 95%CI (3.64–15.69)].

Conclusion

Nearly one in four postgraduate students exhibited probable depression. Physical inactivity, alcohol consumption, and financial difficulties significantly increased depression risk, while strong social support served as protection. This study recommends promoting regular physical activity, limiting alcohol use among postgraduate students in Tanzania and other similar contexts.

Introduction

Mental health is projected to become one of the greatest global disease burdens by 2030, increasing suffering, morbidity, and premature mortality worldwide [1, 2]. Currently, over 1 billion people experience mental health problems, with the majority residing in low- and middle-income countries (LMICs) [1]. Depression stands out as a particularly severe public health challenge, affecting 5% of adults within this population [2]. This prevalence has established depression as a major contributor to the global disease burden and the leading cause of disability worldwide [3]. This disorder manifests through feelings of despair, suicidal ideation, sleep disturbances, concentration difficulties, low self-esteem, appetite changes, and fatigue, which potentially lead to suicide in severe cases [4] and affect the individual's daily functions [4, 5].

Depression prevalence has increased significantly, affecting 29.9 million people across Africa, with Tanzania reporting a 4.1% rate [5]. University students face a particularly high risk, showing a 24.4% prevalence compared to the general population [6]. The impacts are substantial, with depression ranking as a primary contributor to disability, causing an average loss of 7.5 years of healthy life [5]. Beyond mental health consequences, depression elevates risks for suicide, diabetes, cardiovascular disease, and cancer. It also severely impacts academic performance and social relationships through withdrawal behaviors, creating widespread repercussions in multiple life domains [4].

Postgraduate students represent a unique demographic facing distinctive academic and life stressors that significantly increase depression risk [7]. This heightened vulnerability negatively impacts their academic performance and overall well-being [8]. The rising prevalence of depression among postgraduate students has become an urgent concern requiring immediate attention from educational institutions and health authorities [9].

A systematic review of studies from American and Asian countries found that the prevalence of depression among postgraduate students ranges widely from 6.2% to 84.7%, with a pooled average prevalence of approximately 34% [10]. Notably, LMICs tend to exhibit even higher rates of depression among this population [11]. Similarly, research conducted in Europe and Saudi Arabia has reported that depression affects between 39.6% and 49.6% of postgraduate students. Furthermore, these studies highlight that depression in postgraduate students is frequently underestimated, often goes unrecognized, and is inadequately addressed in these regions [12–14]. Moreover, studies that were conducted in African countries, Kenya and Nigeria, reported the prevalence of depression among postgraduate students ranging between 17.3% to 29% [15, 16].

Several studies have reported depression as a significant global mental health concern that disproportionately affects university students, with postgraduate students experiencing particularly high rates due to unique academic and social stressors [17, 18]. Studies indicate that the prevalence of depressive symptoms among postgraduate students ranges widely [12, 18]. Despite this, depression among this demographic remains frequently underestimated, unrecognized, and inadequately addressed, especially in LMIC settings such as Tanzania, where mental health resources are limited and access to care is often constrained [18]. Postgraduate students face intense academic pressures, social

isolation, and socioeconomic challenges that may exacerbate mental health problems. Yet, research is scarce on the prevalence and determinants of depression within this group in Tanzania [19]. Given that untreated depression can impair academic performance, reduce quality of life, and result in severe consequences such as suicidality, addressing this gap is urgent and requires frequent exploration to inform available interventions. There is a critical need for context-specific data to inform effective mental health interventions and policy decisions, which can be applied in other similar contexts. Therefore, this research aims to fill this knowledge gap by examining the prevalence and factors associated with depression among postgraduate students using the Muhimbili University of Health and Allied Sciences (MUHAS) case study. This study will provide evidence essential for developing targeted prevention and support strategies to improve student well-being and academic outcomes in this studied population.

Materials and methods

Study design and area

This study was a cross-sectional study that started from April to June 2024. This study was conducted in MUHAS, a public university in Tanzania. MUHAS is located in West Panga, established in 1963 and initially opened as Dar es Salaam Medical School. MUHAS is dedicated to health science education, research, and service. MUHAS provides undergraduate and postgraduate programs in Medicine, Ophthalmology, Dentistry, Pharmacy, Nursing, Public Health, and Traditional Medicine [20].

Sampling technique

A stratified sampling procedure was used to divide the study participants according to the schools available at MUHAS. There were six schools: medicine, nursing, dentistry, pharmacy, public health and social science, and the Institute of Traditional Medicine. Then, a proportionate-to-size method was used to obtain the number of participants from each school according to the overall count or number of students. Finally, within the stratum, the participants were selected randomly.

Sample size

The study sample size was determined using the formula for cross-sectional study designs [21]. Based on a 95% confidence interval, 5% margin of error, and a prevalence of 29.6% from a similar study conducted in Kenya [15], the calculated minimum sample size was 320 participants. An additional 10% was added to this figure to account for potential non-response, bringing the final minimum sample size to 352 participants for this study. This study successfully recruited 377 participants, more than 100% respondent rate.

Data collection process

Data were collected over twelve weeks using a self-administered questionnaire, which assessed depression symptoms through the PHQ-9 score and gathered information on individual, postgraduate training-related, and socioeconomic factors. The participants were located in classes and clinical areas where they were given all the information about the research study. Those who consented were given the questionnaires to fill in.

Study variables and measurements

In this study, depression served as the dependent variable. It was assessed using the PHQ-9 score, a tool developed in 1999 by Dr. Robert Kroenke for screening, diagnosing, and measuring the severity of depression [22]. The PHQ-9 consists of nine questions reflecting depressive symptoms, each offering four response options scored from 0 to 3. These options indicate the frequency of symptoms experienced: 0 for “not at all,” 1 for “several days,” 2 for “more than half the days,” and 3 for “nearly every day”. A score of 10 and above was regarded as probable depression, as it has been documented to have 88% sensitivity and 88% specificity for depressive disorder [22]. This score range was adopted in this study to help categorize participants into probable depression and no depression.

The social support was assessed using the 12-item Multidimensional Scale of Perceived Social Support. This scale evaluates an individual's perception of social support, with scores expressed as mean values categorized into three levels: a mean score between 1 and 2.9 indicates low support, scores from 3 to 5 represent moderate support, and scores ranging from 5.1 to 7 signify high support [23].

Data analysis

Data cleaning, coding, and all statistical analyses were performed using STATA version 18.5 (STATA Corp, College Station, TX) [24]. Descriptive statistics were used to summarize the data, including means and standard deviations (SD) for continuous variables and frequencies and proportions for categorical variables. The prevalence of depression was determined by calculating the proportion of postgraduate students with a PHQ-9 score of 10 or above, the categories used in a previous study [25]. To explore the association between depression and various factors, logistic regression was employed. Bivariate logistic regression was used to estimate the crude odds ratios (cOR), and variables with a p-value below 0.2 were included in a multivariable logistic regression to identify independent associations to estimate adjusted odds ratios (aOR). Odds ratios and 95% confidence intervals (CIs) were reported, with statistical significance at $p < 0.05$.

Results

Social demographic characteristics of the study participants

This study included 377 postgraduate students, and their median age was 32 years, ranging from 25 to 55 years. Slightly over half of the students were male (n = 210; 55.7%), and about half (n = 193; 51.2%) were in their first year of study. The largest proportion of the respondents (n = 220; 58.4%) reported being married, while nearly half of the students stated they had more than one child (n = 163; 43.2%). Regarding substance use, more than one-third of them reported using alcohol (n = 145; 38.5%). (Table 1).

Table 1
Social demographic characteristics of participants

Variable	Frequency (n)	Percentage (%)
Age		
≥ 30 years	309	82
< 30 years	68	18
Sex		
Female	167	44.3
Male	210	55.7
Marital Status		
Single	133	35.3
Married/ Cohabiting	236	62.6
Divorced/Widowed	8	2.1
Number of children		
None	134	35.5
One child	80	21.2
More than one	163	43.2
Year of Study		
First	193	51.2
Second	137	36.3
Third	47	12.5
Schools		
Public Health	103	27.3
*Medicine	205	54.4
Pharmacy	11	2.9
Nursing	47	12.5
Dentist	9	2.4
**Traditional Med	2	0.53
Employment Status		

Variable	Frequency (n)	Percentage (%)
Age		
Employed	299	79.3
Not employed	78	20.7
Physical Activity		
Never	80	21.2
Rarely	176	46.7
Regular	121	32.1
Social Support		
Low	57	15.1
Medium	109	28.9
High	211	56.0

Key: *college, **institution

Prevalence of depression among postgraduate students

Overall, 90 (23.9%) of the 377 postgraduate students who participated in this study were depressed during the survey.

Factors associated with depression among postgraduate students

The bivariate logistic regression analysis identified associations between depression and several factors, including sex, alcohol, tobacco use, physical exercise, history of mental illness, and chronic diseases. However, the multivariable analysis revealed several significant factors associated with depression among postgraduate students. Those who consumed alcohol were twice as likely to experience depression compared to non-drinkers [aOR = 2.13, 95%CI (0.91–3.46)], while students who never engaged in physical exercise faced three times higher risk than those exercising regularly [aOR = 3.09, 95%CI (1.48–6.49)]. Financial challenges nearly tripled depression likelihood [aOR = 2.86, 95%CI (1.57–5.22)], and notably, students with low social support were seven times more likely to be depressed than those with high support [aOR = 7.55, 95%CI (3.64–15.69)]. All results are presented in Table 2.

Table 2
Bivariate and multivariable analysis of individual factors associated with depression

Variables	Crude		Adjusted		
	N	cOR (95% CI)	p-value	aOR (95% CI)	p-value
Individual factors					
Age					
≥ 30years	309	Reference			
<30 years	68	1.42(0.79–2.56)	0.238		
Sex					
Female	167	1.43 (0.89–2.31)	0.137	1.27(0.74–2.18)	0.394
Male	210	Reference		Reference	
Marital status					
Single	133	2.31 (0.69–1.88)	0.284		
Married/Cohabiting	236	Reference			
Divorced/ Widowed	8	3.45(0.84–14.27)	0.087		
No of children					
More than one	163	1.32 (0.77–2.25)	0.304		
One child	80	0.8 (0.40–1.59)	0.528		
None	134	Reference			
Alcohol consumption					
Yes	145	2.11 (1.30–3.41)	0.002	2.13 (0.91–3.46)	0.007*
No	232	Reference		Reference	
Tobacco use					
Yes	30	3.12 (1.46–6.68)	0.003	2.13 (0.91–4.97)	0.081
No	247	Reference		Reference	
Physical activity					
Never	80	4.29 (2.18–8.47)	< 0.001	3.09 (1.48–6.49)	0.003*
Rarely	176	1.79 (0.97–3.35)	0.06	1.48 (0.77–2.85)	0.234
Regular	126	Reference		Reference	

Variables	Crude			Adjusted	
	N	cOR (95% CI)	p-value	aOR (95% CI)	p-value
Individual factors					
History of mental illness					
Yes	20	4.3 (1.72–10.75)	0.002	2.28 (0.85–6.22)	0.103
No	357	Reference		Reference	
Presence chronic illness					
Yes	31	3.39 (1.60–7.17)	0.001	2.17 (0.95–4.95)	0.060
No	146	Reference		Reference	
Socioeconomic factors					
Financial challenge					
Yes	197	4.77 (2.73–8.34)	< 0.001	2.86 (1.57–5.22)	0.001
No	180	Reference		Reference	
Employment status					
Employed	299	Reference			
Not employed	78	0.95(0.53–1.71)	0.850		
Social support					
Low	57	10.61 (5.29–21.25)	< 0.001	7.55 (3.64–15.69)	< 0.001
Medium	109	5.54 (3.03–10.12)	< 0.001	4.35 (2.32–8.15)	< 0.001
High	211	Reference		Reference	

Postgraduate training- related factors associated with depression

The postgraduate training-related factors did not have any statistic significant association with depression. However, students in the school of nursing had twice the likelihood of developing depression, but it was not statistically significant.

Discussion

This study aimed to assess the prevalence and factors associated with depression among postgraduate students in Dar es Salaam, Tanzania, using a case study of MUHAS. The study found that nearly one in four postgraduate students had probable depression, which aligns with global findings. Still, in contrast,

related studies conducted in countries like Nigeria, China, and the USA showed a lower prevalence than this current study [9, 16, 26]. Nevertheless, studies conducted in Kenya, South Africa, and Saudi Arabia showed a higher prevalence than the current study [12, 15, 27]. The difference in depression prevalence could potentially be due to differences in methodology, study setting, and tools used to measure the outcome, which is depression [12, 15]. Moreover, the variation in depression prevalence observed in this study may stem from using the PHQ-9 scale, a self-reporting instrument. As a result, participants might have underreported or overreported their depressive symptoms, which could cause the prevalence to appear either higher or lower.

Regarding the factors associated with depression, this study found that physically inactive postgraduate students are more likely to experience depression, which is consistent with studies from the USA and Kenya, which suggest that regular physical activity is a protective factor against depression [15, 28]. Furthermore, physical activity programs are among the preventive programs encouraged in depression prevention as they reduce depression risk by enhancing mood, reducing anxiety, and improving sleep quality [4].

The findings in this study also showed that there is a significant association between alcohol use and depression, whereby students who use alcohol had an increased risk of depression in comparison to non-users. These findings align with previous studies, which also suggested an increase in the likelihood of depression among alcohol users [15, 29]. Additionally, the World Health Organization (WHO) indicated that there is a causal relationship between alcohol use and mental health disorders, including depression [30].

This study found that low and medium social support significantly increased the likelihood of depression, with high social support acting as a protective factor, a pattern also observed in research from various countries like Kenya and South Africa [15, 27], as did studies conducted in the USA [9, 31], the UK [14]. Among others, WHO also indicated that having social support, including friends and family with whom you can interact with including sharing personal feelings and solving problems, can help to reduce the risk of developing depression or even help in the treatment of those who are already depressed [4].

Furthermore, the study found a significant link between financial problems and depression, with students facing economic challenges being more likely to develop depression. This finding aligns with the previous research, which also showed increased odds of depression among students with financial problems [31]. Studies in Australia and Kenya further supported this, attributing the link to the high cost of living, student loans, and limited funding for postgraduate students [15, 32].

Regarding postgraduate training-related factors, this study found no significant association between the year of study or the specific school attended and depression, with students across all years and schools at similar risk. This aligns with findings from Saudi Arabia and the UK, suggesting that academic challenges are uniformly experienced regardless of year or department [14, 33]. In contrast, a study from Serbia found higher depression rates in second-year students, and a Kenyan study indicated varying

depression risks among different courses [15, 34]. The current study's results may be due to the shared academic challenges faced by students across different years and schools.

Strengths and limitations

Its focus on a specific and vulnerable population within a Tanzanian setting is a key strength. It addresses a critical gap in mental health research by providing context-specific data on postgraduate students who are future health professionals. Moreover, using a validated screening instrument such as the PHQ-9 enhances the reliability of the depression assessment, while incorporating a range of socioeconomic and demographic variables allows for a comprehensive analysis of associated factors. However, the study is limited by the reliance on the PHQ-9 as a self-report tool, which may lead to underreporting or overreporting of depressive symptoms, potentially affecting prevalence estimates. Additionally, the cross-sectional design restricts causal inference between the associated factors and depression, and potential selection bias could influence the sample's representativeness. Lastly, the absence of clinical diagnostic confirmation and limited detail on the mental health service context may constrain the applicability of findings for intervention planning.

Conclusion

This study revealed that nearly one in four of the postgraduate students had probable depression, underscoring a significant mental health concern. Physical activity and the use of alcohol were identified as individual factors that have a significant association with depression. Likewise, having financial challenges appeared to have a substantial link with having depression. Additionally, social support emerged as a protective factor, whereby having a high level of social support correlated with a lower depression rate. Therefore, the recommendations include encouraging postgraduate students to engage in regular physical activities and limit alcohol consumption, implementing mental health policies targeting academic institutions, and introducing comprehensive mental health programs at MUHAS. We recommend conducting a qualitative study to explore factors linked to depression among postgraduate students.

Abbreviations

aOR

Adjusted odds ratio

cOR

Crude odds ratio

CI

Confidence interval

LMIC

Low- and middle-income countries

PHQ

Patient Health Questionnaire
MUHAS
Muhimbili University of Health and Allied Sciences
SD
Standard deviation
SSA
Sub-Saharan Africa
WHO
World Health Organization

Declarations

Acknowledgement

We want to express our heartfelt gratitude to everyone who contributed to this research's success. We are also thankful to my research participants for their time, cooperation, and willingness to share their experiences; this study would not have been possible without them.

Ethics approval

Ethical approval for the study was obtained from the Institutional Review Board (IRB) of the Muhimbili University of Health and Allied Sciences (MUHAS) (Ref. No. DA.282/298/01.C/2232), and permission to conduct the study was granted by the relevant university authorities. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Consent to participate

Participants were fully informed about the study objectives, procedures, potential risks, and benefits, and informed consent was obtained from all participants before their participation in the study. Participation was voluntary, and participants were informed of their right to withdraw from the study at any time without penalty. To ensure confidentiality, numerical codes were used instead of participants' names during data collection and analysis, and no personally identifiable information was retained in the study records.

Availability of data and materials

Data and materials are available to the corresponding author upon reasonable request.

Consent for publication

Not applicable.

Authors' Contribution

SKM and ATK conceptualised the study, collected data, and performed the analysis. SKM, EB, EES, MJM, AAN, IHM, and ATK interpreted the results, drafted the manuscript, and reviewed all versions. All authors read and approved the final manuscript.

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Conflict of interest

We declare that there is no conflict of interest in this study.

Clinical trial number: Not applicable

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