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The Prevalence of Depression among Tertiary Students in Ghana: A Descriptive and a Predictive Approach.

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Abstract

Depression among tertiary students is a growing concern worldwide, significantly impacting their academic performance and overall well-being. In Ghana, limited research exists on the prevalence and predictors of depression in university settings, warranting further investigation.This study aimed to assess the prevalence of depression among tertiary students in Ghana and examine the association between depression and demographic variables such as age, gender, program of study, academic level, and various institutions. A cross-sectional study was conducted with 150 university students using the Center for Epidemiologic Studies Depression Scale (CES-D) to measure depressive symptoms. Descriptive statistics summarized the prevalence of depression, while chi-square tests and logistic regression analyses explored associations and predictors.The results showed the prevalence of depression among students was 68%, with higher rates observed among males (74.4%), students in Applied Sciences (83.3%), and those attending UCC (83.3%), and level 100 students (82.4%). However, chi-square tests showed no statistically significant associations between depression and demographic variables. Logistic regression indicated that none of the predictors had a significant influence on depression status. Despite a good model fit suggested by the Hosmer and Lemeshow test, the predictors did not improve the model's predictive power.This study highlights the high prevalence of depression among tertiary students in Ghana and underscores the need for targeted interventions. Awareness campaigns and counseling programs should be prioritized to address mental health challenges. Future research should explore additional factors, such as academic and financial stress, to develop effective prevention and intervention strategies.

Keywords: ***prevalence; depression; depressive disorder; mental health; logistic regression***

1 Introduction

Mental health challenges, particularly depression, have emerged as a global concern, impacting individuals across all demographics. Depression, a prevalent mental disorder, manifests through persistent sadness, loss of appetite, disrupted sleep patterns, diminished interest in activities, low self-esteem, and feelings of anger. The World Health Organization (WHO) estimates that over 280 million people worldwide suffer from depression, emphasizing the urgent need for effective interventions to address this growing public health issue (WHO, 2023).

Tertiary institutions, accommodating a significant proportion of the population, are witnessing alarming rates of depression among students. This trend can be attributed to factors such as academic pressure, examination stress, financial constraints, and family challenges. Studies have highlighted the critical nature of this issue. Song (2008) demonstrated a significant rise in depression among tertiary students, correlating this with increased global suicide rates. Similarly, Raghunathan (2019) reported a 26.9% prevalence of depression among dental students, while Shrestha et al. (2019) found a prevalence of 27.2% among medical students.

Family problems, as noted by Gul et al. (2009), remain a common trigger for depression, affecting 21.8% of students surveyed. Additionally, Adewuya et al. (2006) linked depression among university students to heavy smoking, especially among females. Recognizing depression as a leading global disability (Ustun et al., 2002), Tonsing et al. (2022) observed that 40.2% of university students exhibit severe depressive symptoms, often due to stress and inadequate support systems.

In Ghana, the situation is no different. A study by Nakua (2023) in Kumasi revealed that approximately two million Ghanaians suffer from mental health disorders, including depression, with a prevalence rate of 42.1% being most prominent among females. The rise in depression is particularly evident in tertiary institutions, which are often perceived as environments fostering personal development. However, heightened academic pressure, intense competition, and financial challenges have contributed to significant mental strain among students (Amu et al., 2021). Sarokhani et al. (2013) further estimated that 3.8% of the global population experiences depression, with higher rates among women (6%) and adults over 60 years (5.7%).

Several factors contribute to depression, including inadequate social support, traumatic experiences, heavy alcohol consumption, loneliness, interpersonal mistrust, and neuroticism (Asante et al., 2015; Rich & Scovel, 1987). Among tertiary students, academic challenges such as low grades, demanding syllabi, difficult assignments, and project work, as well as issues related to living arrangements, exacerbate depressive symptoms (Gul et al., 2009; Asif et al., 2020). Alarmingly, while many students suffer from depression, only a minority seek help (Gul et al., 2009; Asif et al., 2020).

This study addresses the pressing issue of depression among university students in Ghana. Utilizing a cross-sectional approach, it aims to analyze the prevalence of depression and examine variations across different socio-demographic groups within the student population. By shedding light on the correlates of depression, this research seeks to inform strategies for intervention and support tailored to the unique needs of Ghanaian tertiary students.

2 Methods and Material

This study employed a cross-sectional design conducted in October 2024 among university students in Ghana. The focus was exclusively on university students across the country. To ensure ethical compliance, all participants were assured of the confidentiality of their information prior to data collection.

2.1 Study Instrument

The study utilized a structured questionnaire comprising two sections: demographics and a depression scale. The demographic section collected data on four variables: gender, tertiary level, age, and program of study. The depression scale was derived from the Center for Epidemiologic Studies Depression Scale (CES-D) developed by Radloff (1977), a widely used tool for assessing depressive symptoms. The CES-D contains 20 items covering dimensions such as appetite, emotional well-being, concentration, and more. The CES-D scale was found to have high reliability, validity, internal consistency, and repeatability (Kaplan & Saccuzzo, 2001; Radloff, 1977). In the current study, the Cronbach' alpha was found to be .853 indicating strong internal consistency and reliability

Each item on the CES-D is rated on a 4-point scale:

- Rarely or none of the time (less than one day) = 0
- Some or a little of the time (1-2 days) = 1
- Occasionally or a moderate amount of time (3-4 days) = 2

- Most or all of the time (5-7 days) = 3

The total score ranges from 0 to 60, with questions 4, 8, 12, and 16 being reverse-scored as per Radloff (1977). Before data collection, the questionnaire was piloted with three students from different universities to ensure clarity and address any potential ambiguities (Gul et al., 2009).

2.2 Data Collection Procedure

The questionnaire was distributed online using Google Forms. A convenience sampling method was employed, with a sample size of 150 students from various universities in Ghana. This approach was chosen due to the accessibility and widespread use of social media platforms, email, and student groups among university students (Asante et al., 2014). The targeted population included undergraduate students from universities, technical universities, polytechnics, and training colleges. The data collection spanned four weeks.

2.3 Data Preparation and Analysis

After data collection, the responses were imported into Excel for cleaning and preparation before being exported to SPSS for analysis. Descriptive statistics such as frequency, percentages, percentile ranks, mean, median, and, standard deviation were used to summarize demographic characteristics and depression prevalence. Frequency and percentages were specifically used to summarize the prevalence rate of depression and mean, median, standard deviation, and percentile ranks were used to summarize the prevalence score. An inferential statistical analysis was conducted using the chi-square test and a predictive analysis was conducted using the logistic regression:

1. **Chi-square Test:** To evaluate associations between depression and categorical variables such as gender, program of study, and age. A p-value of 0.05 was considered significant.
2. **Logistic Regression:** To predict the likelihood of depression based on predictor variables. The logistic regression model used with a cut-off point of 0.5 is:

$$\log\left(\frac{P(Y=1)}{1-P(Y=1)}\right) = \beta_0 + \beta_k X_k,$$

Where:

- $P(Y=1)$**:** Probability of depression
- β_0**:** Intercept coefficient
- β_k**:** Regression coefficient for predictor variables
- X_k: Predictor variables (age, gender, level of study, type of institution, and program of study)

Hence, from the logistic regression, any individual with a probability of depression to be less than 0.5 will be grouped as ‘not depressed’, otherwise ‘depressed’.

The results from these analyses will explain the factors associated with depression among university students in Ghana.

3 Results

3.1 Demographic Characteristics

A total of 150 students from universities across Ghana participated in the study. Of these, 82 (54.7%) were male and 68 (45.3%) were female. The average age of the respondents was 21.8 years. Indicating that there were young adults. The largest group consisted of 55 students at the

second-year level (Level 200). The distribution across other levels was as follows: 34 in Level 100, 24 in Level 300, and 37 in Level 400.

The participating institutions included the University of Ghana (UG) and the Kwame Nkrumah University of Science and Technology (KNUST), which contributed 51 students each. An additional 16 students were from various technical universities, 6 from the University of Cape Coast (UCC), and 26 from other universities within the country.

A significant proportion of the students were pursuing programs in the Humanities (50%), including Political Science, Sociology, Languages, and Geography. The demographics characteristics are summarized in **Table 1**

Table 1: Demographic Characteristics of Tertiary Students

Variables	Numbers (Average)	Percentage
Age	(21.8)	-
Levels		
100	34	22.7
200	55	36.7
300	24	16.0
400	37	24.7
Gender		
Female	68	45.3
Male	82	54.7
Tertiary institution		
UCC	6	4.0
UG	51	34.0
KNUST	51	34.0
Technical Universities	16	10.7
Other Universities	26	17.3
Program		
Engineering	11	7.3
Physical Sciences (Biology, Chemistry, Physics, etc)	5	3.3
Applied Sciences (Mathematics, Actuarial Science, Statistics, etc)	24	16.0
Humanities (Political Science, Sociology, Languages, Geography, etc.)	75	50.0
Others	35	23.3

3.2 Exploratory Data Analysis

Table 2 presents the descriptive statistics of depression scores among the 150 students in the study. The minimum depression score was 0, indicating that at least one student exhibited no depressive symptoms. The maximum depression score was 57, just three points below the

highest possible score of 60 on the scale, reflecting a severe level of depressive symptoms in at least one individual. The most frequent depression score (mode) was 31, while the mean and median depression scores were 22.87 and 23, respectively. A standard deviation of 10.52 indicates the extent of variation in depression scores around the mean, reflecting substantial differences in individual depression levels.

Table 2: Descriptive Statistics of Depression Scores Among University Students

Depression Score	N	Minimum	Maximum	Mean	Mode	Median	SD
	150	0	57	22.87	31	23	10.52

The percentile rank analysis categorized students based on intervals of depression scores, assuming a normal distribution of depression scores. The (1–4)th percentile included scores ranging from 0 to 6, while the (5–11)th percentile covered scores from 7 to 10. Scores between 11 and 14 fell within the (12–23)th percentile, and those between 15 and 19 were in the (24–40)th percentile. Scores from 20 to 27 were within the (41–60)th percentile, 28 to 31 in the (61–77)th percentile, and 32 to 34 in the (78–89)th percentile. The (90–96)th percentile included scores from 35 to 39, while the highest scores (40–57) fell within the (97–100)th percentile.

The results, illustrated in Figure 1, show that 25% of the students fell within the (41–60)th percentile, corresponding to depression scores of 20–27, which include the mean (22.87) and median (23) scores. This was followed by 20% of the students in the (24–40)th percentile, with scores ranging from 15–19, and 18% in the (61–77)th percentile, with scores of 28–31. Notably, 7% of the students were in the bottom 4% (1–4th percentile), and 5% were in the top 4% (97–100th percentile). These findings indicate that most students have depression scores within the 20–27 range, consistent with the central tendency measures. The implication of this is that students with depression score ranging from 20-27 have their scores to be higher than 41-60 percent of the students.

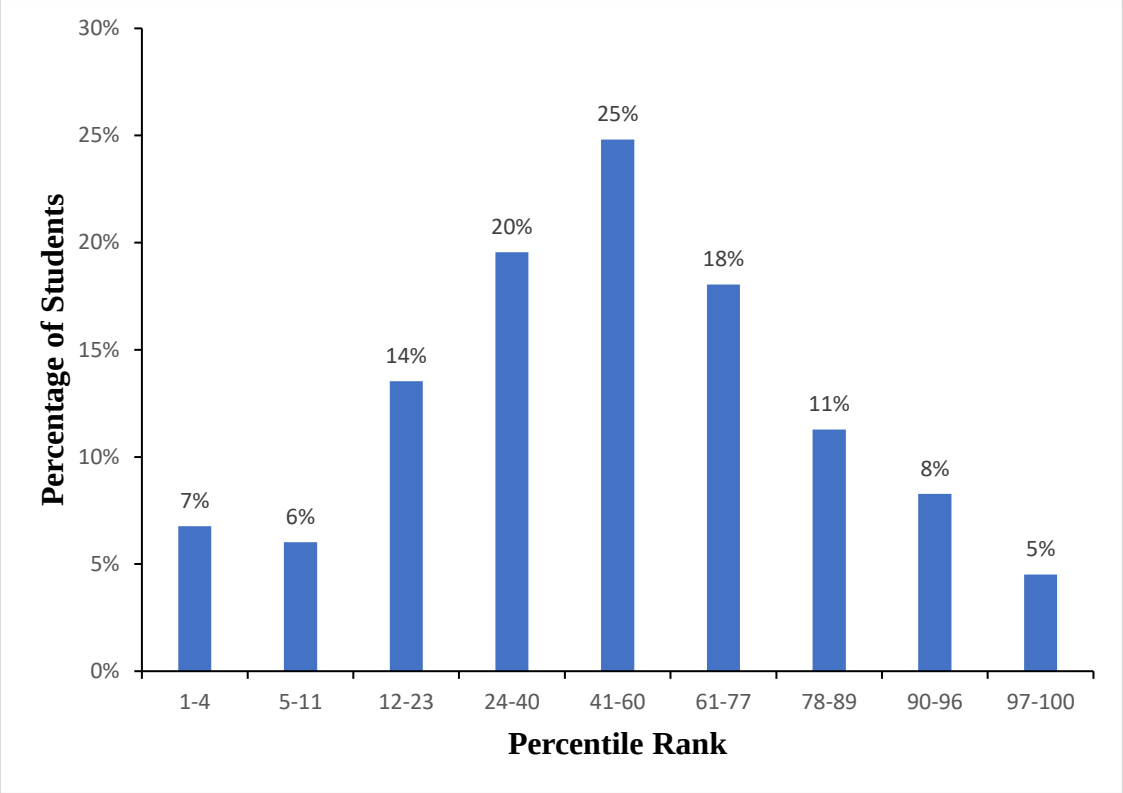

Figure 1: Percentage Rank of Depression Score Among Students

3.3 Prevalence of Depression

Among the 150 student participants, 68% reported experiencing depressive symptoms within the week preceding the study. These symptoms included poor appetite, restless sleep, feelings of loneliness, crying spells, and other indicators of depression. Conversely, 32% of the participants did not exhibit any symptoms indicative of a depressive disorder. The prevalence of depression among the participants is illustrated in **Figure 2**.

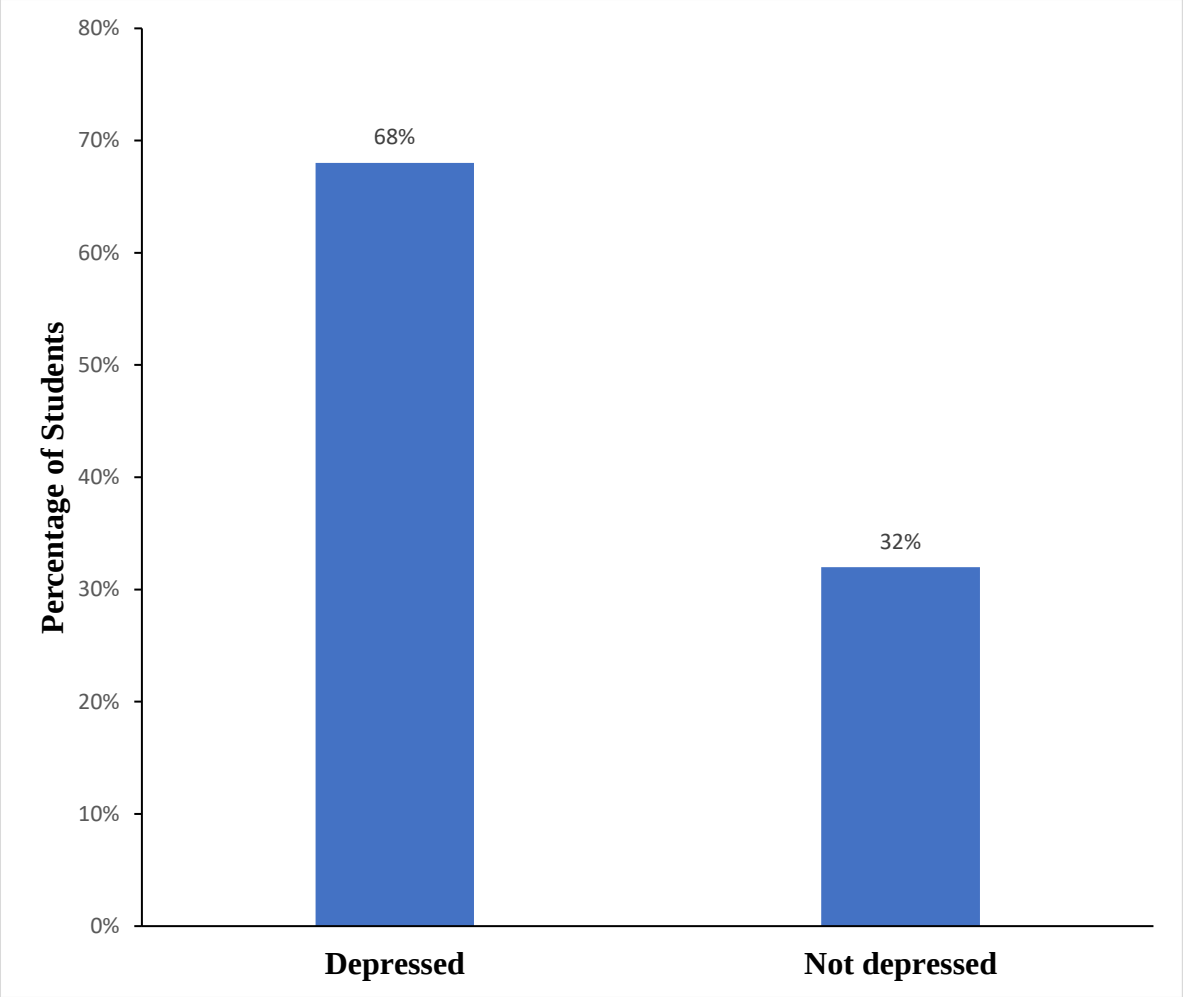

Figure 2: Prevalence of Depression Among Tertiary Students

3.4 Association Between Depression and Different Demographic Characteristics

An analysis was performed to investigate the relationship between the type of tertiary institution and the depression status of students. The findings indicated that 83.3% of students from the University of Cape Coast (UCC) reported experiencing depression, followed by 75% of students from technical universities. Despite these observations, the association between depression status and the type of tertiary institution was not statistically significant ($\chi^2 = 3.919, df = 4, p = 0.417$). This result suggests that, within the context of this study, depression status of individuals is not associated with the tertiary institution attended. The results are represented in **Table 3**

Table 3: Association Between Types of Tertiary Institution and Depression Status

School	Not Depressed (%)	Depressed (%)	Total (%)
UCC	1(16.7)	5(83.3)	6(100)
UG	19(37.3)	32(62.7)	51(100)
KNUST	13(25.5)	38(74.5)	51(100)
Technical Universities	4(25.0)	12(75.0)	16(100)
Other Universities	11(42.3)	15(57.7)	26(100)
Total	48(32.0)	102(68.0)	150(100)

$\boldsymbol{\chi^2 = 3.919, df = 4, p = 0.417}$

An analysis was conducted to examine the association between students' program of study and their depression status. The results in **Table 4** revealed that 83.3% of students in Applied Sciences programs (e.g., Mathematics, Actuarial Science, Statistics) reported experiencing depression, followed by 72.7% of Engineering students. However, the chi-squared test indicated that the association between the program of study and depression status was not statistically significant ($\chi^2 = 3.944, df = 4, p = 0.414$). These findings suggest that, the program of study does not have a significant association with the likelihood of students experiencing depression.

Table 4: Association Between Program of Studies and Depression Status

Program	Not Depressed (%)	Depressed (%)	Total (%)
Engineering	3 (27.3)	8 (72.7)	11(100)
Physical Sciences (Biology, Chemistry, Physics, etc.)	2(40)	3(60)	5(100)
Applied Sciences (Mathematics, Actuarial Science, Statistics, etc.)	4(16.7)	20(83.3)	24(100)
Humanities (Political Science, Sociology, Languages, Geography, etc.)	25(33.3)	50(66.7)	75(100)
Others	14(32)	21(68)	35(100)
Total	48(32)	102(68)	150(100)

$\boldsymbol{\chi^2 = 3.944, df = 4, p = 0.414}$

An analysis was conducted to examine the association between students' gender and their depression status. The results, as presented in **Table 5**, indicated that 74.4% of male students reported experiencing depression, compared to 60.3% of female students. Despite these differences, the chi-squared test revealed that the association between gender and depression status was not statistically significant ($\chi^2 = 3.394, df = 4, p = 0.065$).

Table 5: Association Between Gender and Depression Status

Gender	Not depressed	Depressed	Total
Female	27(39.7)	41(60.3)	68(100)
Male	21(25.6)	61(74.4)	82(100)
Total	48(32.0)	102(68.0)	150(100)

$\boldsymbol{\chi^2 = 7.452, df = 4, p = 0.059}$

An analysis was conducted to assess the association between students' academic level and their depression status. The results in **Table 6** showed that 82.4% of level 100 students reported experiencing depression, followed by 79.2% of level 300 students. However, the chi-squared test indicated that the association between academic level and depression status was not statistically significant ($\chi^2 = 7.452, df = 4, p = 0.059$).

Table 6: Association Between Gender and Depression Status

Level	Not Depressed	Depressed	Total
100	6(17.6)	28(82.4)	34(100)
200	22(40.0)	33(60.0)	55(100)
300	5(20.8)	19(79.2)	24(100)
400	15(40.5)	22(59.5)	37(100)
Total	48(32.0)	102(68.0)	150(100)

$\boldsymbol{\chi^2 = 7.452, df = 4, p = 0.059}$

3.5 Factors Influencing Prevalence of Depression

A logistic regression analysis was conducted to examine the effects of age, gender, program of study, academic level, and the educational institution on the likelihood of experiencing depression (**Table 7**). The model assessed the contribution of these predictors to an individual's depression status.

The results revealed that none of the predictors had a p-value less than 0.05, indicating that none were statistically significant in predicting depression status within the scope of this study. The analysis suggested that as age increases, the likelihood of experiencing depression decreases. Additionally, females had slightly higher odds (OR= 0.555) of experiencing depression compared to males; however, this result was not statistically significant, precluding any definitive conclusion about the effect of gender on depression status.

Regarding the program of study, students in Engineering, Physical Sciences (e.g., Biology, Chemistry, Physics), Applied Sciences (e.g., Mathematics, Actuarial Science, Statistics), and Humanities (e.g., Political Science, Sociology, Languages, Geography) exhibited slightly higher odds of experiencing depression, with odds ratios of 1.212, 1.078, 3.862, and 1.989, respectively, compared to students in other programs. Nevertheless, none of these findings were statistically significant.

Similarly, results for academic level and the institution one attends were not statistically significant. For instance, level 300 students have a greater odd ratio, 3.602 of depressive symptoms than those in level 400. Notably, students from technical universities had higher odds (OR = 4.361) of experiencing depressive symptoms compared to students in training colleges and other tertiary institutions (excluding UG, KNUST, and UCC). However, these findings were also not statistically significant.

Table 7 Results of the Binary Logistic Regression Analysis

Variable	β	S.E (β).	Wald	df	Sig.	OR	95% C.I. for OR Lower	Upper
Constant	-0.36	1.406	0.065	1	0.799	0.699		
Age	-0.02	0.051	0.112	1	0.738	1.017	0.920	1.125
Female	0.588	0.414	2.022	1	0.155	0.555	0.247	1.249
Male	-	-	-	-	-	-	-	-
Engineering	0.193	0.837	0.053	1	0.818	1.212	0.235	6.248
Physical Sciences	0.075	1.070	0.005	1	0.944	1.078	0.132	8.778
Applied Sciences	1.351	0.761	3.156	1	0.076	3.862	0.870	17.153
Humanities	0.688	0.650	1.118	1	0.290	1.989	0.556	7.115
Others	-	-	-	-	-	-	-	-
UCC	0.023	0.539	0.002	1	0.965	1.024	0.356	2.945
UG	-0.41	0.728	0.320	1	0.572	0.662	0.159	2.761
KNUST	0.341	0.944	0.131	1	0.718	1.407	0.221	8.944
Technical Universities	1.473 -	1.334 -	1.219	1 -	0.269 -	4.361 -	0.319 -	59.549 -
Other universities								
100	1.078	0.723	2.223	1	0.136	2.938	0.712	12.116
200	0.183	0.556	0.109	1	0.741	1.201	0.404	3.569

300	1.281	0.731	3.077	1	0.079	3.602	0.860	15.079
400	-	-	-	-	-	-	-	-

- Reference point, OR-Odd Ratio, $p = .05$

Hence a student's depression status can be predicted by using the formula in equation 1 and making p the subject as:

$$p = \frac{1}{e^{-(\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\beta_5X_5)} + 1}$$

Where p is the probability of being depressed, X_1 represents, age, X_2, gender, X_3, program of study, X_4, institution, and X_5 level with their respective regression coefficient, β. If p is <0.05, then one is not depressed otherwise, one is predicted to be depressed.

3.6 Diagnostic Tests of the Logistic Regression

To evaluate the logistic regression model, several diagnostic tests were conducted, including the omnibus test of model coefficients (**Table 8**), the classification table (confusion matrix) shown in **Table 9**, and the Hosmer and Lemeshow test (**Table 10**). The omnibus test revealed a p-value greater than 0.05, indicating that the predictors in the logistic regression are not statistically significant in predicting an individual's depression status. The confusion matrix indicated a true negative result of 8, a true positive of 96, a false positive of 6, and a false negative of 40, resulting in an overall classification accuracy of 69.3%. That is the logistic regression correctly classified 57% of those who are not depressed and correctly identified 71% of the individuals who are depressed. However, the logistic regression misclassified 43% of the individuals who not depressed as depressed and incorrectly predict 29% of the individuals who are depressed as not depressed. The Hosmer and Lemeshow test suggested that the model has a good fit. However, despite the good fit, the results of the omnibus test indicate that the predictors do not significantly contribute to improving the model. This implies that while the model fits the data well, it is not effective or useful for predicting the depression status of students. A good fit alone does not guarantee practical predictive value.

Table 8: Omnibus Tests of Model Coefficients

	Chi-square	**df**	**Sig.**
Step	16.590	13	.219
Block	16.590	13	.219
Model	16.590	13	.219

$p = .05$

Table 9: Confusion Matrix

	Predicted		
Observed	**Not depressed**	**Depressed**	**Percentage Correct**
Not depressed	8	40	16.7
Depressed	6	96	94.1
Overall Percentage			69.3

Table 10: Results of Hosmer and Lemeshow Test

Step	**Chi-square**	**df**	**Sig.**
1	3.904	8	.866

$p = .05$

4 Discussion

This study investigated the prevalence of depression among students in tertiary institutions in Ghana using a cross-sectional design. Data on depression and demographic information were collected using the CES-D scale. The findings revealed that 68% of university students in Ghana reported experiencing depression. This prevalence is comparable to similar studies, such as Naushad et al. (2006), which reported a higher depression rate of 79.2% among college students in Mangalore, and Shrestha (2019), which reported a lower prevalence of 27.2%. Wong et al. (2006) found a depression rate of 21% among first-year tertiary students, while this study observed a higher rate of 28% among level 100 students.

The findings suggest that the institution one attends does not significantly influence depression status, aligning with other studies that highlight broader issues such as limited facilities, lower quality educational systems, and reduced opportunities for social engagement as contributors to student depression (Naushad et al., 2006). This underscores the need for heightened attention to depression among university students in Ghana.

The study faced limitations, including the narrow scope of demographic variables and the reliance solely on the CES-D scale, which restricted the identification of potential predictors of depression. Additionally, the limited timeframe of the research posed constraints. Future research could address these limitations by investigating factors such as academic pressure, financial challenges, health issues, and relationship problems among tertiary students in Ghana and beyond. This would provide a more comprehensive understanding of the determinants of student depression and inform targeted interventions. The lack of significance of these predictors could be associated with small sample size. Further study can consider increasing the sample size or this research can be expanded when resources to do so are available in the future.

5 Conclusion

The study revealed a high prevalence of depression among tertiary students in Ghana, with high prevalence of depression observed among males, students in Applied Sciences (e.g., Mathematics, Actuarial Science, Statistics), and those attending UCC, and Level 100 students. These findings emphasize the urgent need for interventions to address student mental health.

Counselling programs should be introduced to help students navigate the challenges associated with their academic pursuits and personal lives. Awareness campaigns should inform students about the potential stressors linked to their chosen fields of study and provide them with coping strategies. Establishing dedicated mental health support systems, such as departmental counsellors or accessible on-campus agents, can ensure that students experiencing symptoms of depression receive timely assistance. Many students may be unaware of the availability of mental health support or hesitant to seek help. Therefore, institutions should actively promote their counseling services through awareness campaigns, workshops, and visible on-campus initiatives. This proactive approach can help mitigate the risk of severe consequences, such as self-harm or suicide, thereby fostering a healthier and more supportive educational environment.

Data Availability Statement

The data used in the various analyses in this study will be made available without any form of hesitation

Ethics Statement

Ethical clearance not required

Author Contributions

Fred M. Amenu: Data curation, Writing – original draft, Writing – review & editing, Methodology, Validation, Supervision.

Desther Keteku: Data curation, Conceptualization, Original draft, Methodology, Investigation, Project administration

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Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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