Introduction and Background
Depression is a significant contributor to the global burden of disease with almost 20% of global population live with depression and affects people in all communities across the world [1,2]. 12.9% of university students have been found with depressive symptoms globally [3] with up to 10% of student’s experiencing depression and suicidal ideation [4]. The prevalence is more higher among medical students and different studies have estimated it between 20% and 50% [5]. Medical school is known to be
stressful environment for students and hence increase the risk for depressive symptoms [6]. Academic performance, pressure to succeed and post-graduation plans have been identified as main concerns among university students [7]. Students who experience depression doubt their abilities or appear less confident, may have a hard time concentrating, learning and making decisions [8], may withdraw from others, become irritable and/or aggressive towards other students, take a lot of time off, which if not intervened might end up with poor class-room performance, supplementary, failure and/or dropouts from school [9,8].

The failure to prevent, recognize and treat mental health problems in college and university has an impact on students, their families, the teaching institution and the community generally, and is associated with increased academic impairment, learning disabilities, relationship difficulties, smoking and alcohol use, suicide, and increased costs [10,11].

**Study design and settings**

The study was conducted at Catholic University of Health and Allied Sciences (CUHAS), a private teaching institution located in Mwanza, North-western Tanzania. It has more than 2500 undergraduate students taking medicine, pharmaceutical sciences, nursing and medical laboratory sciences. Medical students comprise about 1/3 of all students.

**Sample size, participants’ enrolment and data collection**

The study population involved all medical students from Catholic University of Health and Allied Sciences (CUHAS). A sample size of 353 was estimated using Cochrane’s formula.

**Inclusion criteria**

Medical student, 18 years of age and above willing to participate in the study and sign a written informed consent.

**Exclusion criteria**

Non-medical students, known to have mental disorders.

Participants were approached from hostels, classes or cafeteria and invited to participate in the study where a briefing of the nature and aim of the study was reviewed and then inclusion and exclusion criteria were applied. Participants who met the inclusion criteria and sign the informed consent were asked to complete self-administered research questionnaires starting with the socio-demographic followed by patient health questionnaire-9 (PHQ-9). There were no drop outs.

**Data analysis**

Data was analyzed using Stata version 13 software for Windows where categorical variables were summarized using frequencies and percentages and continuous variables were summarized using medians with IQR. Descriptive analysis was conducted to describe the socio-demographic characteristics, the prevalence and severity of depression which was primary outcome in this study and participants were regarded to have depression if scored above 4 on the patient health questionnaire-9 [12].

Logistic regression was conducted to assess the association between socio-demographic characteristics, and depression, controlling for possible confounders. Variables in the univariate analysis that showed a significant effect on the dependent variable were included in the multivariable analysis. Unadjusted and Adjusted Odds ratio (AOR) with 95% confidence interval (95% CI) were computed and reported where appropriate.

**Ethics**

Ethics approval to conduct and publish the findings from this study was thought from Catholic University of health and Allied Sciences/Bugando Medical Centre joint ethical committee. Permission to conduct the study was granted by BMC/CUHAS administrations. No names were used.

**Results**

**Socio demographic characteristics**

A total of 353 students were recruited in this study. Of the participants, 54% (n=190) were males and 62% (n=220) of the participants were staying off-campus. 93.2% of the study participants were not married, with almost two-third (71.39%) of the study participants being sponsored by the Higher Education Students Loans Board (HESLB) while 23.51 were self-sponsored and 5.10% were receiving grants from the Ministry of health. Table 1 summarizes the socio-demographic characteristics of the study participants.

**Prevalence of depression and suicide ideation**

Overall, the prevalence of depression was 41.1%, the severity of depression were found to be as follows: 26.35% were found to have mild depression, 12.76% had moderate depression, 3.68% had moderately-severe depression, and 0.57% had severe depression. 35.7% of the participants found it hard for them to cope with their studies with 11.6% of the participants reported to have suicide and self-hurting ideation where by 8.2% reported to have suicidal ideas several days in a week, 2.3% more than half of the days of a week and 1.1% nearly every day. Table 2 summarizes the severity of...
depression, suicidal ideation and occupational difficulties among the study participants.

Table 2: Depression, suicide ideation and occupational difficulty described by the participants.

| Variable                  | Frequency (n) | Percentage (%) |
|---------------------------|---------------|----------------|
| **Depressive symptoms**   |               |                |
| No depression             | 207           | 58.64          |
| Mild depression           | 93            | 26.35          |
| Moderate depression       | 38            | 10.76          |
| Moderately severe depression | 13         | 3.68           |
| Severe depression         | 2             | 0.57           |
| **Suicide ideation**      |               |                |
| Not at all                | 312           | 88.4           |
| Several days              | 29            | 8.2            |
| More than half of the days | 8          | 2.3            |
| Nearly every day          | 4             | 1.1            |
| **Difficulty on studies** |               |                |
| Not difficult             | 227           | 64.3           |
| Somehow difficult         | 125           | 35.4           |
| Extremely difficult       | 1             | 0.3            |

Factors associated with depression
In an unadjusted model, year of study and accommodation type were significantly associated with depression with UOR 4.4, 95% CI: 2.2, 8.6, p-value=0.00 and UOR 1.6, 95% CI: 1.19, 2.5, p-value=0.045 respectively. After adjusting for other covariates year two of study was significantly more likely to develop depression (AOR 4.1, 95% CI: 1.9, 8.5, p-value=0.000) compared to other years.

Discussion
As observed in this study males continue to dominates the number of admissions in medical schools, the findings are the same to what was found in a previous study in the northern part of Tanzania [13]. Accommodation facilities continues to be a challenge among most East African universities, in this study majority of the participants were staying off-campus, the same findings observed in the same setting study in university of Nairobi [14].

Chart 1.1: Prevalence of depression and suicide ideation; sponsor and residence.

Chart 1.2: Prevalence of depression and suicide ideation; year of study and marital status.
Depression and suicidality among university students remain an alarming concern in sub-Saharan Africa, in this study the prevalence of depression was found to be 41.1% which is higher to what was observed in the same study settings in the northern part of Tanzania [13], Nairobi [14] and in developed countries [15]. The suicidality prevalence of 11.6% observed in this study was the same to what was observed in a previous meta-analysis study by L. S. Rotenstein et al. where the prevalence was found to be 11.1% [16] while D. Eisenberg et al. observed a lower suicidality prevalence of 2% [17]. Findings from this study was lower comparing to the prevalence of 53% for depression and 9% for suicidality among college students observed by Furr et al [10].

Though not statistically significant female students were more depressed than male student (42% female vs 40% males), the same study findings observed in previous studies where females continue to be more vulnerable for depression and suicidality [10,13,14,17]. Students on their first years of study were more prone to develop depression comparing to those in their final years of study, in this study the second years were statistically more likely to develop depression, the same study findings observed in Nairobi [14] and Karachi [18] but different to what was observed in Saudi Arabia where the fifth years have an increased level of depression probably due to being loaded with clinical schedules [19]. Staying off-campus has been statistically associated with depression in this study and other previous studies [14,17].

Table 3: Association between socio demographic characteristics and depression.

| Variable | Depression | Unadjusted OR (95% CI) | Adjusted OR (95% CI) |
|----------|------------|------------------------|----------------------|
| Gender   |            |                        |                      |
| Female   | 70 (42.94) | 93 (57.06)             | 1.0                  |
| Male     | 76 (40.00) | 114 (60.00)            | 0.8 (0.6-1.3)        | 0.575 | 0.7 (0.5-1.2) | 0.192 |
| Year of study | | |                      |
| Year 1   | 17 (24.29) | 53 (75.71)             | 1.0                  |
| Year 2   | 58 (58.59) | 41 (41.41)             | 4.4 (2.2-8.6)        | 0.000 | 4.1 (1.9-8.5) | 0.000 |
| Year 3   | 45 (48.91) | 47 (51.09)             | 2.9 (1.5-5.9)        | 0.002 | 2.8 (1.6-6.1) | 0.007 |
| Year 4   | 16 (39.02) | 25 (60.98)             | 1.9 (0.8-4.5)        | 0.104 | 1.8 (0.7-4.4) | 0.223 |
| Year 5   | 10 (19.61) | 41 (80.39)             | 0.7 (0.3-1.8)        | 0.542 | 0.7 (0.2-1.9) | 0.454 |
| Sponsor  |            |                        |                      |
| Self-sponsored | 41 (49.40) | 42 (50.60)             | 1.0                  |
| Grant    | 6 (33.33)  | 12 (66.67)             | 0.5 (0.2-1.4)        | 0.221 | 1.2 (0.3-4.0) | 0.807 |
| HESLB    | 99 (39.29) | 153 (60.71)            | 0.7 (0.4-1.1)        | 0.106 | 0.8 (0.4-1.4) | 0.503 |
| Residence |          |                        |                      |
| Campus   | 46 (34.59) | 87 (65.41)             | 1.0                  |
| Off campus | 100 (45.45) | 120 (54.55)        | 1.6 (1.1-2.5)        | 0.045 | 1.2 (0.3-4.1) | 0.454 |
| Marital status |   |                        |                      |
| Married  | 12 (50.00) | 12 (50.00)             | 1.0                  |
| Not married | 134 (40.73) | 195 (59.27)        | 0.6 (0.2-1.5)        | 0.376 | 0.6 (0.2-1.5) | 0.282 |

Conclusion
Depression and suicidal behaviors among medical students is an alarming concern. Students support center is essential in higher institutions of learning for earlier detection, prevention and intervention to reduce morbidity.

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