

Socio-demographic, economic and mental health problems were risk factors for suicidal ideation among Kenyan students aged 15 plus

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Abstract

Background: Understanding the prevalence of different suicidal ideas and context appropriate wide range of risk factors in youth in particular is important because about a third of youth with suicidal ideation develop suicidal plans and about 60% of youth with suicidal plans make suicidal attempts. This study aims to provide for the first time wide ranging Kenyan data on the above so as to inform context appropriate practice and policy.

Methods: To achieve our aim, we studied a total of 9742 high school, college and university students using following self-administered instruments: - a researcher design socio-demographic questionnaire, Psychiatric Diagnostic Screening Questionnaire (PDSQ) to document psychiatric disorders and various types of suicidal ideas in previous two weeks, Washington Early Recognition Center Affectivity and Psychosis tool to assess stress, affectivity and psychosis, Wealth index questionnaire to document economic indicators based on household items for the families of the students. We used descriptive statistics to document the prevalence of suicidal ideas and socio-demographics, univariate analysis to determine associations between suicidal ideas and mental health disorders, socio-demographic characteristics and economic indicators. All the independent variables were then estimated using bivariate logistic regression, fitted to identify potential confounding factors. Variables with a p-value of less than 0.05 were entered into generalized linear models using logit links to identify independent predictors.

Results: The median age was 21.3 years (range 15-43), with a majority of males (53.5%) and 93.4% single. The overall prevalence of different types of suicidal ideation was (22.6%), the commonest of which was thinking of specific ways to take their life (19.3%) and least wanting to be dead (10.7%). Major depression was found in 20.0%. Affectivity, psychosis and stress was found in 10.4%, 8.7% and 26.0% respectively. Female gender, major depression, stress, affectivity and psychosis and being in high school were significant ($p < 0.05$) predictors of suicidal ideation.

Conclusion: We have documented the prevalence of different types of suicidal ideas and the risk factors in Kenyan students. We have therefore achieved our aims. Future studies are needed to study the progression from suicidal ideas to suicidal attempts and the factors associated with that progression.

Introduction

The prevalence of suicidal ideation varies among young people [1]. For example, the life prevalence of suicidal thoughts has been reported to be 40.9% in the Philippines, 17% in Norway [2], 10.7% in Germany [3], 65% in Belgium [4], 12.6% in Portugal, 13.59% in Nepal [5] and 17.9% in Turkey [6]. African studies have shown similar variations, including 34% in South West Ethiopia [7] and 21.3% in Ghana [8]. Several other African studies have reported the prevalence of suicidal ideation, but the time periods have varied. The 12-month prevalence rate of suicidal ideation was 19.9% in one study of Ethiopian youths [9]. Another Ethiopian study reported that the 12-month prevalence rates among youths was 22.5% and that 26.36% of those had thought about committing suicide in the last month and 24.03% had planned to commit suicide during their lifetime [10]. In nearby Tunisia, the prevalence rates were 26.9% for temporary suicidal ideation and 9.6% for serious suicidal ideation [11].

In general, age and gender are predictive indicators of suicidal thoughts. Many countries have reported that suicidal behavior starts from the age of 10 and peaks between 13 and 14 years of age, with different onset patterns for suicidal ideation, planning and attempts [3]. In general, female teenagers have been shown to be much more likely to experience suicidal ideation and attempt suicide, but males are more likely to die from suicide [5]. These trends have been found in Africa, mainly Ethiopia [10].

Mental illness significantly elevates the risk of suicidal ideation and suicidal behaviour. A major systematic review indicated that 80% to more than 90% of youths with suicidal thoughts had a major psychiatric disorder [12]. The psychiatric disorders that have been most frequently studied globally include mood disorders, substance and alcohol related disorders. They also include schizophrenia, with adolescents with an early onset of psychosis having the highest risk, [13,14], and anxiety. These studies have been conducted outside Africa [15–18] and in African countries such as Ethiopia [19], Kenya [20,21] and Nigeria [22]. Globally, depressive symptoms is the factor that is most strongly associated with increased odds of suicidal ideation [19,23,24]. Overall, psychological distress and psychiatric disorders are the main determinants of 12-month and lifetime suicidal ideation and suicide attempts [25]. Studies have also tried to explain alcohol and drug use in relation to suicide-related outcomes. One explanation is that substance abuse is a specific accelerant in adolescents, as their ability to regulate their impulsivity and restraint are not fully matured. Another explanation is that any associated mood dysregulation confers added risk [26,27]. However, some studies found that smoking was more prevalent in participants without suicide ideation [6].

Numerous environmental, psychosocial and physical factors have been associated with increased vulnerability to suicidal ideas and suicidal behavior, in addition to socio-demographic factors and mental health issues. Factors associated with suicidal thoughts include financial stress,

poor social support[7,9], losing parents[28], bullying and physical fights[6], pain, muscular tension, conduct problems and being overweight[2], disappointment with examination results, feeling hopeless or sad and being absent from school for more than three days [10].

Finally, financial resources are a key determinant of social achievement, health and wellbeing, which may, in turn, be reflected in good or poor mental health [29,30]. Estimating wealth has focused on the economic status of households [31–33] and this is regarded as a better measure of the actual status of households than gross domestic product per capita [29,34]. Household items have also been used widely to determine household wealth[35], including in rural Africa[31], and these can be divided into five quintiles that range from the lowest to highest wealth. Because of the link between mental health and suicidal thoughts, and the above-mentioned link between financial resources and mental health, it is possible that there is an association between financial resources and mental health. There is hardly any literature from Africa in general, and Kenya in particular, that demonstrate which specific household level economic indicators of poverty are related to suicidal ideas or to the matrix of suicidal thoughts of mental health issues and poverty.

It seems that there is a clear need to understand the associations between suicide ideation and social, environmental and mental health factors in young people, in order to provide a scientific background for planning tailored suicide preventive approaches in Kenya. The studies on suicidality in Kenya that have been described above focused on the prevalence of suicidal ideas in general, without detailing specific types of ideas or their socio-demographic associations. The broad objective of this study was to fill those gaps and provide data that could be compared with other countries.

Because of the rather high prevalence rates of mental health issues in Kenyan youths [36], and lower household incomes, we hypothesized that there would be a high prevalence of suicidal ideas. We also predicted that there would be an association between suicidal ideas and socio-demographic, economic and mental health indicators in our research participants. In order to test our hypotheses, we had three research aims. First, to study the prevalence of suicidal ideation among Kenyan high school, college and university students over the previous two weeks. Second, to investigate associations between suicidal ideation and socio-demographic and economic factors. Third, to study associations between suicidal ideation and mental health problems. To achieve our aims, we sought to answer two research questions: what was the prevalence of suicidal ideas in our study population and what associations were there between suicidal ideas and socio-demographic, mental health and economic indicators? Our hope was that the answers to these questions would ultimately help us to determine what could be done to address these problems.

Methods

Recruitment and data collection

This was a cross-sectional study of adolescents and young adults aged 15-25 attending high schools, colleges and universities. In Kenya students normally attend colleges and universities from 19-23 year of age, but we added two years to take account of delayed entry. However, because there was a larger number of mature students than expected, the number who were over the age of 25 was only 3.4% and we decided to include all respondents in the analysis.

The participants were all Kenyans, who were recruited from Nairobi County and three counties in South Eastern Kenya: Machakos, Kitui and Makeni. We were already working with these four counties on other projects and had gained acceptance from local people, so they seemed a natural choice for this project. The high school studies were all from these areas and the college and university students came from across Kenya as admissions are handled centrally. The study comprised a convenience sample of the following:- (1) one administrative location in which there are several high schools and because of school closure we only accommodated those students who could make it to the data collection points (2) all colleges located within the four counties and were in session at the time of the data collection and (3) one public university located in one of the four counties. It was conducted from July 2016 to October 2018. The subjects were recruited from the colleges and universities and the high school students were recruited from their local communities, because the schools were closed during the study period as the result of a lengthy teachers' strike. The college and university students were approached in their classrooms after lectures, once the various institutions provided permission for their students to take part in the study. Permission to approach the high school students was obtained from local community administrators. The local administrators contacted the students and asked them to come along to local community centres at a specific time and date. Of all the 9,742 participants:- 6648(68.6%) were university students and 1534(15.8%) were college students who were approached in their classrooms agreed to take part in the study. Of the 1506(15.5%) high school students who presented themselves at the data collection points, agreed to participate. It is a Government requirement to seek permission for any activities taking place in the community so that logistical support can be provided, such as suitable meeting venues and security. The research assistants were informed of the schedules for the college and university students and the high school students were directed to specific public meeting areas, within walking distance, where they assessed them with the help of local community leaders. Participants were only included in the study if they were able to speak, read and write in English and had

voluntarily agreed to participate in the study by signing the informed consent form. Consent was obtained from parents and guardians if the participants were under 18 years of age.

We worked with the colleges and universities to make sure there was mental health support available if the students needed help because of the issues raised by the survey. Trained staff from local health center facilities, who had received training on the World Health Organization (WHO) Mental Health Gap Action Programme Intervention Guide [37] were available to support the high school students, if needed. This instrument was developed for use by non-mental health specialists to identify common mental health issues and suggest interventions that they could provide. We also informed the participants where they could seek help at institutional and community levels.

Instruments

We used several instruments

Socio-demographic characteristics. The questionnaire included questions about socio-demographic variables, including age, gender, whether they were attending high school, college or university, marital status and birth order.

Economic indicators. The respondents provided details of their household, including what items were in their home and how they accessed water and toilet facilities and cooked. They were put into one of five wealth index categories, as a reflection of their economic status[38]. The wealth index we used was based on the World Bank recommendation for low-income and middle-income countries and has been adopted by the Kenyan Government. It contains five levels, with one representing the lowest level of wealth and one indicating the highest level.

Psychiatric conditions. The Psychiatric Diagnostic Screening Questionnaire (PDSQ) was used to assess the respondents. It comprises 126 questions that assess the symptoms of 13 Axis I disorders in the Diagnostic and Statistical Manual of Mental Disorders, fifth edition[39]. These are: eating disorders (bulimia/binge-eating disorder), mood disorders (major depressive disorder), anxiety disorders (panic disorder, agoraphobia, post-traumatic stress disorder, obsessive-compulsive disorder, generalized anxiety disorder and social phobia), substance use disorders (alcohol abuse/dependence and drug abuse/dependence) and somatoform disorders (somatization disorder and hypochondriasis). It also contains a six-item psychosis screen. The disorders that were selected were the most prevalent in community-based epidemiological surveys[40,41] and the most frequently reported in large clinical samples[42–44]. In a validity study of 994 psychiatric outpatients[45], the 13 PDSQ subscales demonstrated good to excellent internal consistency. Cronbach's alpha exceeded .80 for 12 of the 13 subscales and the mean of the alpha coefficients was .86. Test-retest reliability was examined in 185 subjects who completed the PDSQ twice in one week. The test-retest reliability coefficients exceeded .80 for nine subscales and the mean of the test-retest correlation coefficients was .83. The convergent and discriminant validity of the PDSQ subscales[46] were examined in 361 patients who completed a package of questionnaires at home less than a week after completing the PDSQ. The last six questions from the PDSQ major depressive episode domain are used to measure suicidal ideation. These are related to people frequently thinking of dying in passive ways, like going to sleep and not waking up, wanting to be dead, thinking they would be better off dead, thinking about suicide, seriously considering taking their life and thinking about specific ways to take their life. The questions are coded as no (zero points) or yes (one point).

Other Measures: The Washington Early Recognition Center Affectivity and Psychosis (WERCAP) screen[47,48] was used to quantitatively assesses psychosis-risk symptoms and bipolar-risk symptoms (affectivity) based on the frequency of symptoms and their effects on functioning[48]. It has high test-retest reliability and validity, with affectivity of sensitivity of .91, specificity of .71, psychosis sensitivity .88 and specificity of .82[48]. We also used the WERC stress screen, a self-report questionnaire, to assess total stress burden and the severity of individual stressors [47,48]

Data management and statistical analysis

The coded data were checked, cleaned and exported into SPSS, version 21 IBM Corp, NY, USA

Creation of Suicidal Index scores

Data reduction techniques were used to summarize the observed suicidal ideation variables, namely the last six questions of PDSQ on depression subscale, into a few dimensions by Rasch analysis through latent variable modelling using the eRm, ltm[49] and difR[50] R packages (R Foundation, Vienna, Austria). Component internal consistency and reliability were used to compute the suicidal ideation scores, by calculating Cronbach's alpha and this was high (.776).

Before we performed the Rasch factor analysis, the correlation matrix was inspected to check for the strength of the correlation. Then the factorability was tested using exploratory factor analysis using the Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity. Exploratory factor analysis, with varimax rotation, was carried out to determine the dimensional structure suicidality using the following criteria: (a) eigenvalue >1[51], (b) variables should load >.50 on only one factor and less than 0.40 on other factors, (c) the interpretation of the factor structure should be meaningful and (d) the Scree plot should be accurate when the means of communalities are above .60 [52]. Computations were based on a covariance matrix, as all the variables received values from the same measurement scale [53]. Bartlett's test of sphericity with $p < .05$ and a Kaiser-Meyer-Olkin measure of sampling adequacy of .6 were used when performing this factor analysis. A factor was

considered as important if its eigenvalue exceeded 1.0 [51]. Pairwise associations between the six items, corresponding to two-by-two contingency tables for all possible pairs, were computed. The Cronbach's alpha of the six items was .776, with only one component loading. Factor scores were then generated because loadings were all similar. The scores had bimodal negatively skewed distribution, suggesting there were two groups. Respondents scoring less than zero were classified as not having suicidal ideation while those with more than zero were classified as having suicidal ideation.

Statistical methods

The results of the exploratory and statistical data analysis are presented in the tables. We employed descriptive statistics to estimate the prevalence of suicidality as well as the participant's characteristics. Mean prevalence rates were estimated. The outcome variable of suicidality scores were grouped into those with, and those without, suicidal ideation. Univariate associations between suicidal ideation and other variables were estimated using bivariate logistic regression, after they were fitted to identify potential confounding factors. Variables with a P-value of less than <.05 were entered into generalized linear models using logit link to identify independent predictors of suicidality. Adjusted odds ratios (aOR) with 95% confidence intervals (CI) were calculated to assess the strength and significance of the association. All tests were two-sided and statistical significance was set at $p < .05$. We did not include depression in the analysis of psychiatric disorders, because of high collinearity between depression and suicidality.

Overlap between suicidal ideation, depression and the wealth index

We triangulated overlaps of the poorest and highest wealth indicator (quintiles 1 and 5) and the least and most potent suicidal ideations, which were numbers seven and one on Table 3. We then further triangulated this with depression, which was the mental disorder most significantly associated with suicidal ideation in the literature. Chi-square tests were used to test whether there were significant associations between the wealth index, suicidal ideation and depression.

Results

Socio-demographic, economic and mental health characteristics of the respondents

Table 1 summarizes the wealth index and mental health characteristics of the 9742 respondents (53.5% male). Their mean and median ages were age 21.4 and 21.3 (range 15-43) years. Figure 1 summarizes the age distribution of the respondents.

Most respondents were single (93.4%), at university (68.6%) and the first or second born in their families (56.9%). All the respondents completed the questions on household items. These contributed to the wealth index, which was evenly distributed among the lowest quintiles (quintiles one to three) with the lowest proportion in the fifth quintile (highest) (16.6%). There was a wide range of mental health problems and alcohol (22.6%) and substance dependence (17.1%) were among the least prevalent.

Prevalence of suicidal ideation (During the past two weeks)

Figure 2 shows the prevalence of suicidal ideation. The most prevalent form was thinking about specific ways of taking their life (overall 19.3%, males 19.4%, females 19.1%) followed by seriously considering taking their life (overall 14.9%, males 14.8%, females 15.0%). The least prevalent was wishing to be dead (overall, 10.7%, males 9.1%, females 12.5%). The overall prevalence of suicidal ideation was 23% (95% CI 21.8%-23.5%) and it was higher for females (24.6%, 95% CI 23.4-25.9) than males (20.9%, 95% CI 19.7-22.1).

Factors associated with suicidal ideation

Table 2 summarizes the factors associated with suicidal ideation at the bivariate level. It was more common in females than males (24.6% vs 21.0%). Other factors associated with a higher prevalence of suicidal ideation ($p < .05$) were being younger than the median age of 21.3, and being single versus being married or divorced, separated or widowed, and being in university, rather than college or high school.

Figure 3 summarizes the responses on household economic indicators. The two most basic indicators of poor household wealth, firewood as the source of energy and an earth floor, were reported by 52.1% and 22.6% of the respondents.

Table 3 summarizes the associations between economic traits and suicidal ideation. Respondents in the poorest wealth quintile, had significantly higher levels of suicidal ideation (28.8%) than those in the highest (20.2%). Those in quintile three had significantly lower levels of suicidal ideation (18.2%) than those in quintile one (28.8%) and four (22.5%) ($p < .001$).

Correlations between wealth index and mental health issues

Table 4 presents the correlations between the wealth index and mental health issues. There were significant negative correlations between the wealth index scores and PDSQ scores for major depressive disorder, post-traumatic stress disorder, obsessive compulsive disorder, panic disorder, psychosis, agoraphobia and drug abuse/dependence ($p < .05$).

Multivariate analysis of factors associated with suicidal ideation

Table 5 summarizes the results from the multivariate analysis of factors associated with suicidal ideation. The risk for suicidal ideation was higher for females than males (aOR 1.317, 95% CI (1.176-1.475) and being divorced/separated/widowed than married (aOR 2.736, 95% CI 1.255- 5.964).

Being in high school rather than university (aOR 1.340, 95% CI 1.150, 1.561) was significantly associated with suicidal ideation, even after controlling for age. All psychiatric conditions were significantly associated with suicidal ideation, except agoraphobia and OCD ($P > .05$).

Participants who screened positive for all the psychiatric conditions at different cut-off points had significantly higher proportions of suicidal ideation than those who screened negative ($p < .001$).

Overlaps between depression, poverty and suicidal thoughts

Of the 1042 (10.7%) who wished they were dead, 1.4% came from the highest wealth index quintile (five) and more than double that percentage (3.1%) came from the poorest quintile (one), which was a significance difference ($p = .038$). Of the 1880 (19.3%) who had thought about specific ways of taking their life, 3.0% and 5.3% were from quintiles five and one, respectively ($p < .001$). When the overlaps between the wealth index, specific ways to commit suicide and depression were computed, there was a higher proportion of participants in quintile one than five (2.8% vs. 1.5%), which was a significant difference ($p = .039$). No significant differences were observed between the wealth index and depression and wishing to be dead.

Discussion

Nearly a quarter (23%) of the participants in this study reported suicidal ideation in the last two weeks. It is not possible draw direct comparisons with suicidal ideation rates in other studies, due to different definitions and study periods. However, other studies have also reported different types of suicidal ideation and relatively high rates, without specifying the time limit. The exception is [10] who found that 26.36% of their Ethiopian sample had thought about committing suicide in the last one month, rather than the two weeks in our study. That figure was higher than average 23% reported by other studies. It was even higher than the 19.3% in our study, which asked if respondents had thought of a specific way to take their life. This was a significant finding, because it has been reported to be highly predictive of suicide attempts [10] and Kenya has very few resources to recognize and manage suicide attempts. We did not ask respondents about suicide attempts, because it was not included in instrument we used.

Suicidal ideation and socio-demographics

Suicidal ideation and mental disorders

To our knowledge, this was the first study report a wide range of different mental health issues, studied at the same time, and their association with suicidal ideas. High risk scores for stress, bipolar and schizophrenia and most of the PDSQ disorders, including alcohol and substance dependence, were significantly ($p < .05$) associated with suicidal ideation in this study. Similar results were reported by Bowen et al., who found that anxiety, depression/low mood and anger/irritability were important predictors of suicidal thoughts [56]. In our study, schizophrenia was significantly associated with suicidality ($p < .001$, aOR 1.02 95% CI 1.01-1.02, in agreement with previous findings[57]. Although the prevalence of the different types of mental health issues, alcoholic and substance dependence, were not the primary focus of our study, it was noteworthy that alcohol and drug dependence in this study were lower than in Western settings[58–60]. We speculate that this may have been a reflection of stronger cultural restraint of these substances and parenting that goes beyond 18 years.

Suicidal ideation and wealth

When it came to economic measures, the wealth index quintiles were almost equally distributed, which suggests that the students in this study reflected the whole economic range in Kenyan society. The highest quintile was the least common, as expected, because wealthy families can send their children to private institutions. Nearly two-third of the respondents (63.7%) had electricity, which reflects the Kenyan Government policy that all rural electricity is very highly subsidized, regardless of socio-economic status. This policy came after electricity was considered as an economic

indicator. But since this happened to all Kenyans, electricity as an indicator balances out in all study participants. Other indicators that depend on electricity, such as refrigerators and TVs, can be viewed in the same way. More than half of the respondents (52%) used firewood as a source of energy and only 32% had piped water. These, plus earth floors at home, or even more basic than that, are the most clear indicators of poverty. Despite this, all the negative responses to most of the other economic indicators were associated with suicidal ideation.

Our study clearly demonstrated that poverty, mental health issues and severe suicidality were interlinked and this calls for both public health-oriented and individual suicide preventive measures[61].

Need for interventions

The findings of this study, particularly the fact that 19.3% of participants had thought of specific ways to commit suicide, calls for urgent and innovative interventions using existing resources. These include making communities and educational establishments more aware, integrated youth-centered approaches that identify those at highest risk and match them with much-needed help and training frontline workers to help the identified high risk youth to manage suicidal behavior. The WHO Mental Health Gap Action Programme Intervention Guide[37] provides psychosocial and clinical interventions for suicidal behavior. We have demonstrated that frontline workers trained using this Guide can manage suicidal behavior and make referrals[62]. These potential interventions support the recommendations by the WHO on suicide prevention [63], particularly during and after the COVID-19 pandemic [64], as the pandemic is expected to lead to increased levels of suicidal behaviour in all age groups[65].

Strengths and limitations of the present study The study had a number of strengths and we believe it is unique with regard to studies in low-income and middle-income countries. It had the largest sample size of any single study using the same protocol. The study compared three kinds of educational establishments at the same time. Students from high schools, technical colleges and universities, ranging from 15-43 years of age, answered a wide range of questions on demographics, mental health and suicide. Another strength was that the colleges and university students came from diverse regions of Kenya, as admissions were handled centrally. In contrast, all the high school students came from the local communities. There was a nationwide closure of high schools at the time of the study and therefore if this closure had any effect on the results then it was the same across the country. This is not to say that if the study had been carried out when the schools had not been closed it could not have produced different results, as the mental health consequences could have been greater during closure. A third strength was the high response rates to the questions. These all exceeded 99%, with the exception of religion, which scored exactly 99%. High response rates are common in Kenyan community-based education survey[66,67]. Students and parents place immense value on such surveys, as education is regarded as the best investment, with the highest potential to propel children into successful futures and help them and their families escape from poverty. Kenyan people feel that surveys help to improve education. However, we should point out that we approached colleges and university students at specific time points, but high school students had to come to the community centers. We do not know whether this affected our findings.

Future research

There is need to go beyond cross-sectional studies and conduct prospective studies to determine progression from suicidal ideas to actual suicide attempts and completed suicides and to assess what kind of suicidal ideas most strongly predict these.

Conclusions

There was high prevalence of suicidal ideas in our study population, particularly specific thoughts about how to commit suicide. This calls for interventions. Suicidal ideation has been associated with a wide range of socio-demographic factors, mental health issues, alcohol and substance dependence and poverty. We have also seen overlaps between suicidal ideas, mental health issues and poverty and these highlights the need for integrated approaches. We recommend that the WHO evidence-based suicide prevention strategies should be adapted, particularly during and after the COVID-19 pandemic. Our findings supported our hypotheses and answered our research questions. However, there is still a need for prospective research to determine the factors that link suicidal ideas to suicide attempts.

Declarations

Ethics approval and consent to participate: Ethical approval was granted by the Maseno University Ethics Review Board in Kenya (IRB number MSU/DRPI/MUERC/00344/16).

Consent for publication: Not applicable

Availability of data and materials: On request

Competing interests: None

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Authors' contributions: DMN - conceptualization and oversight of the study; drafting of the paper; VNM - oversight on data collection; drafting of the paper; JRW - critique of final draft; CAO - literature review; CM - Ethical conduct of the study and data management; ENM - literature review; TLO - critique of final draft; AS - critique of final draft; DW - critique of final draft; DM - conceptualization of the study.

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References

1. Rudd MD. The prevalence of suicidal ideation among college students. *Suicide Life-Threatening Behav.* 1989;19(2):173–83.
2. Strandheim A, Bjerkeset O, Gunnell D, Bjørnelv S, Holmen TL, Bentzen N. Risk factors for suicidal thoughts in adolescence—a prospective cohort study: the Young-HUNT study. *BMJ Open.* 2014;4(8).
3. Voss C, Ollmann TM, Miché M, Venz J, Hoyer J, Pieper L, et al. Prevalence, onset, and course of suicidal behavior among adolescents and young adults in Germany. *JAMA Netw open.* 2019;2(10):e1914386–e1914386.
4. Mortier P, Demyttenaere K, Auerbach RP, Cuijpers P, Green JG, Kiekens G, et al. First onset of suicidal thoughts and behaviours in college. *J Affect Disord.* 2017;207:291–9.
5. Pandey AR, Bista B, Dhungana RR, Aryal KK, Chalise B, Dhimal M. Factors associated with suicidal ideation and suicidal attempts among adolescent students in Nepal: Findings from Global School-based Students Health Survey. *PLoS One.* 2019;14(4):e0210383.
6. Canbaz S, Terzi Ö. The prevalence of suicidal ideation in adolescents and associated risk factors: an example from Turkey. *Adv Ther.* 2018;35(6):839–46.
7. Abdu Z, Hajure M, Desalegn D. Suicidal behavior and associated factors among students in Mettu University, South West Ethiopia, 2019: an institutional based cross-sectional study. *Psychol Res Behav Manag.* 2020;13:233.
8. Quarshie EN, Cheataa-Plange HV, Annor F, Asare-Doku W, Lartey JKS. Prevalence of suicidal behaviour among nursing and midwifery college students in Ghana. *Nurs open.* 2019;6(3):897–906.
9. Dachew BA, Biffu BB, Tiruneh BT, Anlay DZ, Wassie MA. Suicidal thoughts among university students in Ethiopia. *Ann Gen Psychiatry.* 2016;17(1):1.
10. Amare T, Meseret Woldeyhanes S, Haile K, Yeneabat T. Prevalence and associated factors of suicide ideation and attempt among adolescent high school students in Dangila town, Northwest Ethiopia. *Psychiatry J.* 2018;2018.
11. Guedria-Tekari A, Missaoui S, Kalai W, Gaddour N, Gaha L. Suicidal ideation and suicide attempts among Tunisian adolescents: prevalence and associated factors. *Pan Afr Med J.* 2019;34.
12. Akka SO, Yuncu O, Aydin Z. Mental status and suicide probability of young people: a cross-sectional study. *Rev Assoc Med Bras.* 2018;64(1):32–40.
13. Crumlish N, Whitty P, Kamali M, Clarke M, Browne S, McTigue O, et al. Early insight predicts depression and attempted suicide after 4 years in first-episode schizophrenia and schizophreniform disorder. *Acta Psychiatr Scand.* 2005;112(6):449–55.
14. Dassori AM, Mezzich JE, Keshavan M. Suicidal indicators in schizophrenia. *Acta Psychiatr Scand.* 1990;81(5):409–13.
15. Cavanagh JTO, Carson AJ, Sharpe M, Lawrie SM. Psychological autopsy studies of suicide: a systematic review. *Psychol Med.* 2003;33(3):395–405.
16. Fleischmann A, Bertolote JM, Belfer M, Beautrais A. Completed suicide and psychiatric diagnoses in young people: a critical examination of the evidence. *Am J Orthopsychiatry.* 2005;75(4):676–83.
17. Mann JJ, Apter A, Bertolote J, Beautrais A, Currier D, Haas A, et al. Suicide prevention strategies: a systematic review. *Jama.* 2005;294(16):2064–74.
18. Marttunen MJ, Aro HM, Lönnqvist JK. Adolescence and suicide: a review of psychological autopsy studies. *Eur Child Adolesc Psychiatry.* 1993;2(1):10–8.
19. Fekadu A, Medhin G, Selamu M, Shiferaw T, Hailemariam M, Rathod SD, et al. Non-fatal suicidal behaviour in rural Ethiopia: a cross-sectional facility-and population-based study. *BMC Psychiatry.* 2016;16(1):75.
20. Khasakhala LI, Ndeti DM, Mathai M. Suicidal behaviour among youths associated with psychopathology in both parents and youths attending outpatient psychiatric clinic in Kenya. *Ann Gen Psychiatry.* 2013;12(1):13.
21. Wanyoike BW. Depression as a cause of suicide. *J Lang Technol Entrep Africa.* 2014;5(2):58–68.

22. Oladele AO, Oladele IT. Depression and Suicidal Ideation among College Students with and without Learning Disabilities in Nigeria. Online Submiss. 2016;16:2084–100.
23. Fredriksen KJ, Schoeyen HK, Johannessen JO, Walby FA, Davidson L, Schaufel MA. Psychotic depression and suicidal behavior. *Psychiatry*. 2017;80(1):17–29.
24. Handley T, Rich J, Davies K, Lewin T, Kelly B. The challenges of predicting suicidal thoughts and behaviours in a sample of rural Australians with depression. *Int J Environ Res Public Health*. 2018;15(5):928.
25. Inder KJ, Handley TE, Johnston A, Weaver N, Coleman C, Lewin TJ, et al. Determinants of suicidal ideation and suicide attempts: parallel cross-sectional analyses examining geographical location. *BMC Psychiatry*. 2014;14(1):208.
26. Canetto SS, Sakinofsky I. The gender paradox in suicide. *Suicide Life-Threatening Behav*. 1998;28(1):1–23.
27. McLoughlin AB, Gould MS, Malone KM. Global trends in teenage suicide: 2003–2014. *QJM An Int J Med*. 2015;108(10):765–80.
28. Eskin M, Sun J-M, Abuidhail J, Yoshimasu K, Kujan O, Janghorbani M, et al. Suicidal behavior and psychological distress in university students: a 12-nation study. *Arch Suicide Res*. 2016;20(3):369–88.
29. Lynch J, Smith GD, Harper SAM, Hillemeier M, Ross N, Kaplan GA, et al. Is income inequality a determinant of population health? Part 1. A systematic review. *Milbank Q*. 2004;82(1):5–99.
30. Wilkinson RG. Socioeconomic determinants of health: Health inequalities: relative or absolute material standards? *Bmj*. 1997;314(7080):591.
31. Morris SS, Carletto C, Hoddinott J, Christiaensen LJM. Validity of rapid estimates of household wealth and income for health surveys in rural Africa. *J Epidemiol Community Heal*. 2000;54(5):381–7.
32. Beegle K, De Weerd J, Friedman J, Gibson J. Methods of household consumption measurement through surveys: Experimental results from Tanzania. The World Bank; 2010.
33. Wolff EN. The Level and Distribution of Global Household Wealth* James B. Davies Susanna Sandström Anthony Shorrocks. *Econ J*. 2010;121(551).
34. Deaton A. Measuring poverty in a growing world (or measuring growth in a poor world). *Rev Econ Stat*. 2005;87(1):1–19.
35. Harttgen K, Vollmer S. Using an asset index to simulate household income. *Econ Lett*. 2013;121(2):257–62.
36. Osborn TL, Venturo-Conerly KE, Wasil AR, Schleider JL, Weisz JR. Depression and anxiety symptoms, social support, and demographic factors among Kenyan high school students. *J Child Fam Stud*. 2020;29(5):1432–43.
37. World Health Organization. mhGAP intervention guide - For mental, neurological and substance abuse disorders in non-specialized health settings: Mental Health Gap Action Programme [Internet]. World Health Organization. 2010. 1–121 p. Available from: <http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:mhGAP+Intervention+Guide#1%5Cnhttp://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:mhGAP+intervention+guide#1>
38. Smits J, Steendijk R. The international wealth index (IWI). *Soc Indic Res*. 2015;122(1):65–85.
39. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th ed. Arlington VA: American Psychiatric Association; 2013. 1–947 p.
40. Kessler RC, McGonagle KA, Zhao S, Nelson CB, Hughes M, Eshleman S, et al. Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: results from the National Comorbidity Survey. *Arch Gen Psychiatry*. 1994;51(1):8–19.
41. Robins LN. Psychiatric disorders in America. Epidemiol catchment area study. 1991;
42. Shear MK, Greeno C, Kang J, Ludewig D, Frank E, Swartz HA, et al. Diagnosis of nonpsychotic patients in community clinics. *Am J Psychiatry*. 2000;157(4):581–7.
43. Koenigsberg HW, Kaplan RD, Gilmore MM, Cooper AM. The relationship between syndrome and personality disorder in DSM-III: experience with 2,462 patients. *Am J Psychiatry*. 1985;
44. Mezzich JE, Fabrega H, Coffman GA, Haley R. DSM-III disorders in a large sample of psychiatric patients: frequency and specificity of diagnoses. *Am J Psychiatry*. 1989;
45. Zimmerman M, Mattia JI. The Psychiatric Diagnostic Screening Questionnaire: development, reliability and validity. *Compr Psychiatry*. 2001;
46. Campbell DT, Fiske DW. Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychol Bull*. 1959;56(2):81.
47. Hsieh CJ, Godwin D, Mamah D. Utility of Washington early recognition center self-report screening questionnaires in the assessment of patients with schizophrenia and bipolar disorder. *Front psychiatry*. 2016;7:149.
48. Mamah D, Owoso A, Sheffield JM, Bayer C. The WERCAP screen and the WERC stress screen: psychometrics of self-rated instruments for assessing bipolar and psychotic disorder risk and perceived stress burden. *Compr Psychiatry*. 2014;55(7):1757–71.
49. Rizopoulos D. Irm: An R package for latent variable modeling and item response theory analyses. *J Stat Softw*. 2006;17(5):1–25.
50. Magis D, Beland S, Raiche G, Magis MD. Package 'difR.' 2020;
51. Kaiser HF. The application of electronic computers to factor analysis. *Educ Psychol Meas*. 1960;20(1):141–51.

52. Hakstian AR, Rogers WT, Cattell RB. The behavior of number-of-factors rules with simulated data. *Multivariate Behav Res.* 1982;17(2):193–219.
53. Morrison DF. *Multivariate analysis of variance.* Wiley Online Library; 2005.
54. Kenya National Bureau of Statistics (KNBS). 2019 KENYA POPULATION AND HOUSING CENSUS VOLUME IV: Distribution of Population by Socio-Economic Characteristics [Internet]. Na; 2019. Available from: <https://www.knbs.or.ke/?wpdmpro=2019-kenya-population-and-housing-census-volume-iv-distribution-of-population-by-socio-economic-characteristics>
55. KNBS. VOLUME II: Distribution of Population by Administrative Units [Internet]. 2019 Kenya Population and Housing Census. 2019. Available from: <http://www.knbs.or.ke>
56. Bowen R, Balbuena L, Peters EM, Leuschen-Mewis C, Baetz M. The relationship between mood instability and suicidal thoughts. *Arch Suicide Res.* 2015;19(2):161–71.
57. Kelleher I, Cannon M. Psychotic-like experiences in the general population: characterizing a high-risk group for psychosis. *Psychol Med.* 2011;41(1):1–6.
58. McCance-Katz EF. The national survey on drug use and health: 2017. *Subst Abus Ment Heal Serv Adm* [Internet]. 2019;7. Available from: https://www.samhsa.gov/data/sites/default/files/cbhsq-reports/Assistant-Secretary-nsduh2018_presentation.pdf
59. European Monitoring Centre for Drugs and Drug Addiction(EMCDDA). *European Drug Report.* European Union Publications Office. 2017. 1–94 p.
60. Inter-American Drug Abuse Control Commission (CICAD), Organization of American States (OAS). *REPORT N DRUG USE IN THE AMERICAS 2019* [Internet]. 2019. Available from: <http://www.cicad.oas.org/main/pubs/Report>
61. Wasserman D. Difficulties in preventing suicidal behaviours in spite of existing evidence-based preventive methods—An overview. *Arch Psychiatry Psychother.* 2019;1:7–12.
62. Mutiso VN, Pike KM, Musyimi CW, Gitonga I, Tele A, Rebello TJ, et al. Feasibility and effectiveness of nurses and clinical officers in implementing the WHO mhGAP intervention guide: Pilot study in Makueni County, Kenya. *Gen Hosp Psychiatry.* 2019;59:20–9.
63. World Health Organization. *Preventing suicide: a global imperative: executive summary.* Geneva WHO. 2014;
64. Wasserman D, Iosue M, Wuestefeld A, Carli V. Adaptation of evidence-based suicide prevention strategies during and after the COVID-19 pandemic. *World Psychiatry* [Internet]. 2020;19(3):294–306. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/32931107>
65. Ndeti DM, Mutiso V, Musyimi C, Kameti F. Psychosocial Response to COVID-19 in Africa, with Special Reference to Kenya. *World Soc Psychiatry.* 2020;2(2):97.
66. Ndeti DM, Khasakhala LI, Mutiso V, Ongecha-Owuor FA, Kokonya DA. Patterns of drug abuse in public secondary schools in Kenya. *Subst Abus.* 2009;30(1):69–78.
67. Ndeti DM, Khasakhala LI, Mutiso V, Ongecha-Owuor FA, Kokonya DA. Drug use in a rural secondary school in Kenya. *Subst Abus.* 2010;31(3):170–3.

Tables

Table 1: Socio-demographic economic and mental health characteristics of the 9742 respondents

Variable	Category	Number (N=9742)	%
Gender	Male	5173	53.5
	Female	4500	46.5
	<i>Missing</i>	69	0.7
Age	Mean and standard deviation, median; range	21.4 ±2.4; 21.3; 15-43	
Marital status	Married	607	6.3
	Single	9057	93.4
	Other (Divorced, separated, widowed)	38	0.4
	<i>Missing</i>	40	0.4
Religion	Protestant	5512	57.1
	Catholic	3359	34.8
	Muslim	410	4.2
	Other	368	3.8
	<i>Missing</i>	93	1.0
Birth order	1-2	5539	56.9
	3-5	3271	33.6
	6+	920	9.5
	<i>Missing</i>	12	0.1
Level of Education	High School	1506	15.5
	College	1534	15.8
	University	6648	68.6
	<i>Missing (Students who did not respond)</i>	54	0.6
Wealth Index	Quintile 1 (lowest)	2044	21.0
	Quintile 2	1865	19.1
	Quintile 3	2002	20.6
	Quintile 4	2214	22.7
	Quintile 5 (highest)	1617	16.6
Condition screened positive for (PDSQ)	Obsessive compulsive disorder	6308	64.8
	Social phobia	4885	50.1
	Psychosis	4040	41.5
	Agoraphobia	3351	34.4
	Post-traumatic stress disorder	2652	27.2
	Hypochondriasis	2646	27.2
	Somatization disorder	2504	25.7
	Alcohol abuse/dependence	2198	22.6
	Major depressive disorder	2040	20.9
	Panic disorder	1894	19.4
	Drug abuse/dependence	1670	17.1

Generalized anxiety disorder	1301	13.4
Bulimia/binge eating disorder	316	3.2

Table 2: Socio-demographic factors associated with suicidality at the bivariate level

Parameter	Category	Suicidal ideation		chi-square	d.f	P-value
		No	Yes			
Gender	Male	4089 (79.0%)	1084 (21.0%)	17.8	1	<.001
	Female	3395 (75.4%)	1105 (24.6%)			
Age		21.4 ±2.4	21.3 ±2.4	2.6	9740	.011
Marital status	Married	488 (80.4%)	119 (19.6%)	13.8	2	.001
	Single	7003(77.3%)	2054(22.7%)			
	Divorced/separated/widowed	21 (55.3%)	17 (44.7%)			
Religion	Protestant	4302 (78.0%)	1210 (22.0%)	2.7	3	0.445
	Catholic	2575 (76.7%)	784 (23.3%)			
	Muslim	315 (76.8%)	95 (23.2%)			
	Other	281 (76.4%)	87 (23.6%)			
Birth order	1-2	4251 (76.7%)	1288 (23.3%)	4.7	2	.094
	3-5	2573 (78.7%)	698 (21.3%)			
	6+	704 (76.5%)	216 (23.5%)			
Level of Education	High school	1063 (70.6%)	443 (29.4%)	51.5	2	<.001
	College	1173 (76.5%)	361 (23.5%)			
	University	5258 (79.1%)	1390 (20.9%)			

[1] D.f= degree of freedom

Table 3: Economic indicators associated with suicidal ideation in the study participants

Characteristics*	Suicidal ideation		chi-square	D.f	P-value
	No	Yes			
Household items					
Electricity	4875 (64.7%)	1333 (60.5%)	13.0	1	<.001
Radio	6268 (83.2%)	1775 (80.5%)	8.1	1	.004
Television	4691 (62.2%)	1308 (59.3%)	6.0	1	.014
Refrigerator	1804 (23.9%)	486 (22.1%)	3.4	1	.067
Cell phone	5732 (76.0%)	1629 (73.9%)	4.2	1	.041
Bicycle	3011 (39.9%)	836 (37.9%)	2.9	1	.089
Motorcycle	1568 (20.8%)	414 (18.8%)	4.3	1	.039
Motor vehicle	1468 (19.5%)	424 (19.2%)	0.1	1	.805
Homes source of water					
Piped water	2452 (32.7%)	635 (29.0%)	15.2	4	.004
Public water	1016 (13.6%)	316 (14.4%)			
Well water	2048 (27.3%)	622 (28.4%)			
Surface water	1857 (24.8%)	570 (26.0%)			
Other source	117 (1.6%)	50 (2.3%)			
Home floor					
Earth floor	1630 (21.6%)	569 (25.8%)	17.2	1	<.001
Cement floor	4349 (57.7%)	1183 (53.7%)	11.2	1	.001
Tile floor	1445 (19.2%)	398 (18.1%)	1.4	1	.241
Wood floor	126 (1.7%)	55 (2.5%)	6.3	1	.012
Other floor material	22 (0.3%)	8 (0.4%)	0.3	1	.596
Homes toilet					
No toilet	87 (1.2%)	61 (2.8%)	37.4	3	<.001
Pit latrine	5556 (73.8%)	1622 (73.6%)			
Flush toilet	1718 (22.8%)	455 (20.6%)			
Other toilet facility	165 (2.2%)	66 (3.0%)			
Household cooking method					
Firewood	3891 (51.6%)	1184 (53.8%)	11.3	5	.045
Charcoal	1049 (13.9%)	290 (13.2%)			
Kerosene stove	255 (3.4%)	93 (4.2%)			
Gas stove	2060 (27.3%)	547 (24.8%)			
Electric stove	199 (2.6%)	57 (2.6%)			
Other	80 (1.1%)	31 (1.4%)			
Wealth index					
Quintile one	1455 (71.2%)	589 (28.8%)	72.7	4	<.001
Quintile two	1439 (77.2%)	426 (22.8%)			
Quintile three	1638 (81.8%)	364 (18.2%)			
Quintile four	1716 (77.5%)	498 (22.5%)			
Quintile five	1290 (79.8%)	327 (20.2%)			

* This table uses row percentages. For example 64.7% of those who answered no to suicide ideation and 60.5% who said yes lived in a house with electricity. Bold figures indicate significance. D.f represents degree of freedom

Table 4: Economic indicators associated with mental health issues in the study participants

Pearson Correlations	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Wealth index Score	1													
2. Major depressive disorder	-.037**	1												
3. Post-traumatic stress disorder	-.020*	.514**	1											
4. Bulimia/binge eating disorder	-.017	.488**	.412**	1										
5. Obsessive compulsive disorder	-.028**	.426**	.391**	.377**	1									
6. Panic disorder	-.037**	.497**	.449**	.442**	.526**	1								
7. Psychosis	-.051**	.467**	.443**	.466**	.476**	.563**	1							
8. Agoraphobia	-.026**	.432**	.389**	.396**	.461**	.502**	.472**	1						
9. Social phobia	.011	.462**	.376**	.363**	.469**	.453**	.425**	.573**	1					
10. Alcohol abuse/dependence	-.007	.316**	.269**	.380**	.211**	.298**	.334**	.284**	.275**	1				
11. Drug abuse/dependence	-.024*	.295**	.267**	.371**	.199**	.258**	.312**	.247**	.233**	.617**	1			
12. Generalized anxiety disorder score:	.001	.519**	.413**	.376**	.425**	.486**	.424**	.468**	.556**	.275**	.276**	1		
13. Somatization disorder	-.017	.411**	.333**	.344**	.301**	.391**	.354**	.377**	.377**	.298**	.290**	.424**	1	
14. Hypochondriasis	-.018	.397**	.339**	.350**	.304**	.424**	.383**	.376**	.365**	.305**	.314**	.451**	.525**	1

Note: **Correlation is significant at the p<.01 level; *Correlation is significant at the p<.05 level.

Table 5: Independent Predictors of suicidal ideation

Parameter	Category	A.O.R	95% CI		Sig.
			Lower	Upper	
Gender	Male	Ref.			
	Female	1.317	1.176	1.475	<.001
Age		0.990	0.966	1.014	0.403
Marital status	Married	Ref.			
	Single	1.229	0.967	1.561	.092
	Divorced/separated/widowed	2.736	1.255	5.964	.011
Level of Education	High School	1.340	1.150	1.561	<.001
	College	1.018	0.876	1.182	0.817
	University	Ref.			
Wealth Index	Quintile 1	1.396	1.172	1.662	<.001
	Quintile 2	1.035	0.862	1.242	0.716
	Quintile 3	0.828	0.688	0.997	.047
	Quintile 4	1.091	0.915	1.300	0.334
	Quintile 5	Ref.			
Stress (WERCAP)†		1.005	1.003	1.008	<.001
Bipolar (WERCAP)†		1.028	1.019	1.036	<.001
Schizophrenia (WERCAP)†		1.016	1.009	1.023	<.001
post-traumatic stress disorder		1.490	1.316	1.688	<.001
Bulimia/binge eating disorder		1.993	1.522	2.609	<.001
Obsessive compulsive disorder		1.133	0.980	1.309	.091
Panic disorder		1.275	1.111	1.464	.001
Psychosis		1.422	1.247	1.622	<.001
Agoraphobia		0.946	0.832	1.077	0.403
Social Phobia		1.308	1.146	1.494	<.001
Alcohol abuse/dependence:		1.534	1.324	1.778	<.001
Drug Abuse/Dependence		1.284	1.095	1.505	.002
Generalized anxiety disorder:		1.286	1.107	1.496	.001
Somatization disorder:		1.189	1.047	1.352	.008
Hypochondriasis:		1.260	1.105	1.435	.001

Note: †High scores reflect higher risk.

The PDSQ score for major depression is not in the table because the scale we used to measure suicidality was obtained from the subset questions that measure depression (last six questions out of 22).Not following this. Please revisit. This means that there was there was higher collinearity and variance inflation when it was included in the model.

Figures

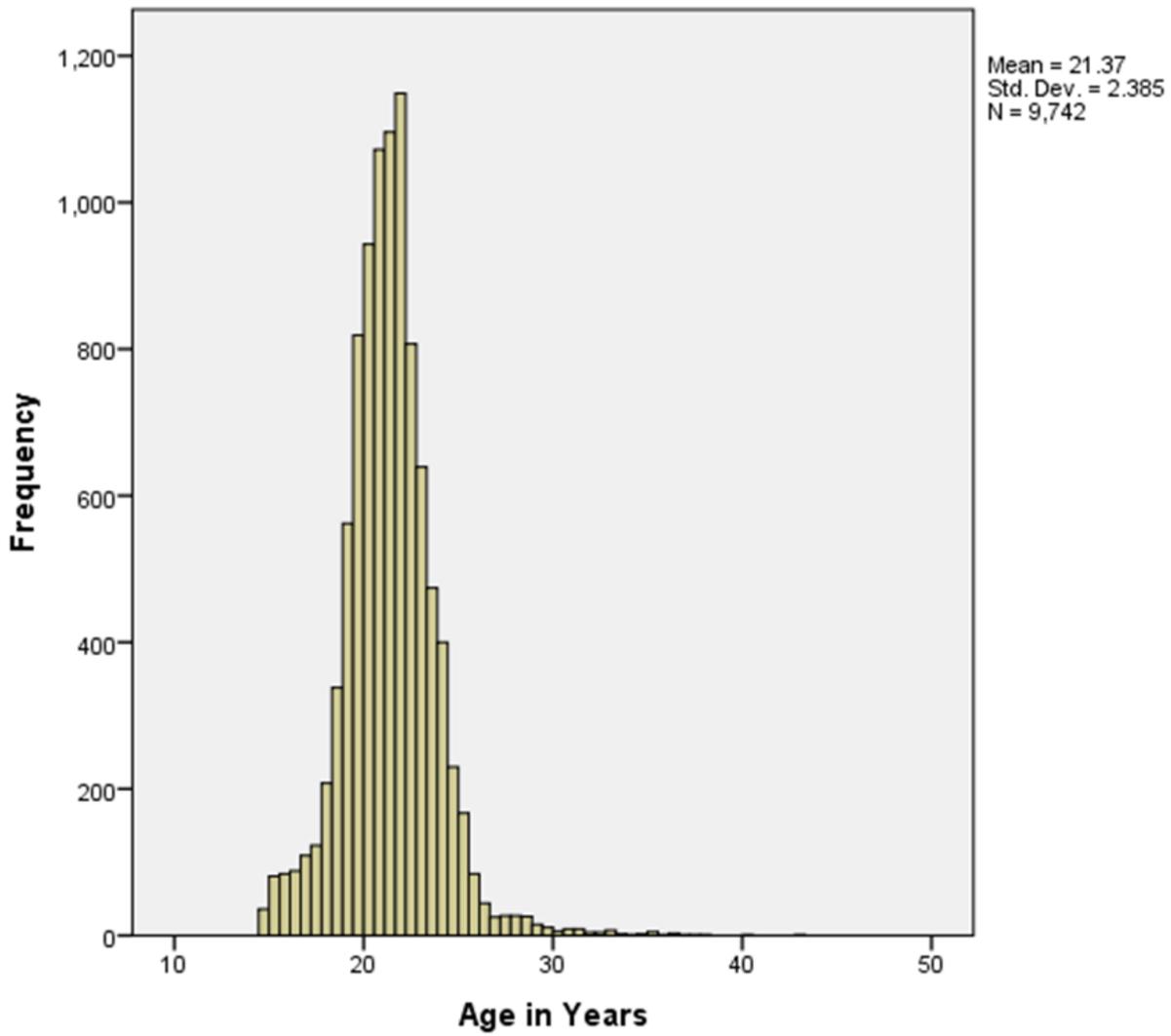


Figure 1

The age distribution curve of the respondents. Lower case y for years

Suicidal Ideation

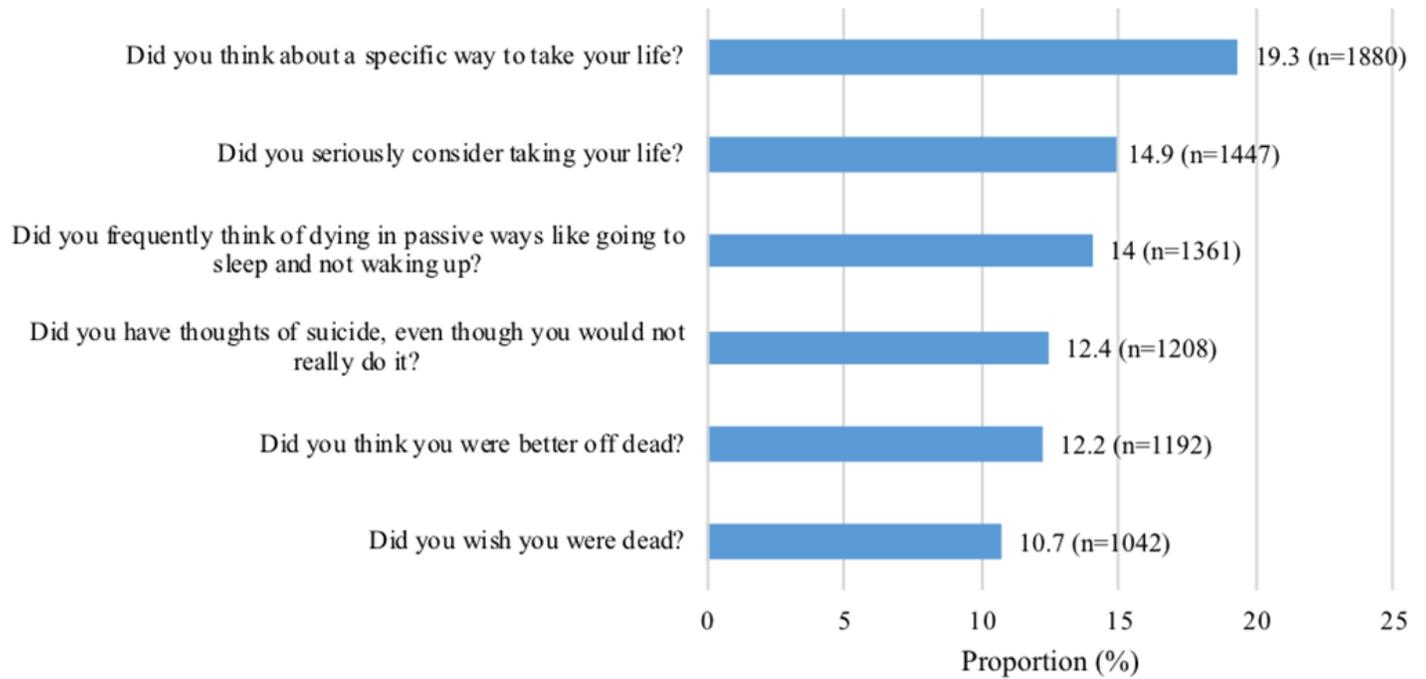


Figure 2

Prevalence of suicidal ideation during past two weeks. Lower case I for ideation

Socio-economic Indicators

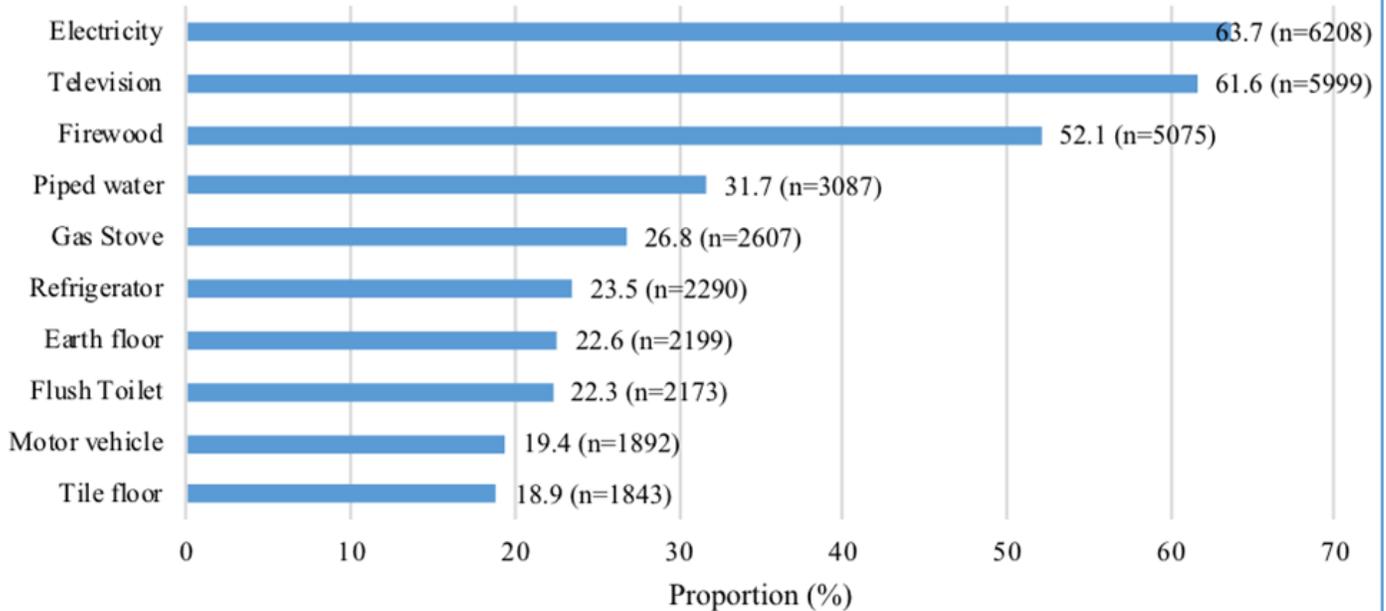


Figure 3

The prevalence of socio-economic indicators in the study participants. Lower case i for indicators