Prevalence of Suicide Attempts Across the African Continent: A Systematic Review and Meta-Analysis

Abstract

Background and purpose: Over 700,000 people worldwide lose their lives through suicide every year. The prevalence of suicide has increased, especially in low- and middle-income countries such as many African countries. For every fatal suicidal attempt, there are approximately 20 other non-fatal suicide attempts within the population. The purpose of this study is to investigate the prevalence of attempts of suicides in the African continent through a systematic review and meta-analysis.

Methodology: To identify relevant sources, the PubMed, Scopus, Web of Science, Embase, ScienceDirect and Google Scholar repositories and databases were systematically searched without a lower time limit and until July 2023. The heterogeneity of the studies was checked with the I^2 index, and accordingly random effects model was adopted to perform the analysis. Data analysis was conducted within the Comprehensive Meta-Analysis software (v.2).

Findings: In the review of 48 studies with a sample size of 244,701 people, the prevalence of suicide attempts in Africa was found to be 9.9% (95%CI: 8.5%-11.6%). With the increase in the year of study, the prevalence of suicide attempt in the African continent increases. Also, with the increase in the sample size, the prevalence of suicide attempts in Africa decreases. The suicide attempt prevalence among African men and woman slightly differed with 7.6% and 8.2%, respectively.

Conclusion: Suicide attempt is an important public health concern in Africa. The findings of this study are important not only for African health policy making, but also to contribute to the accuracy of global estimates with respect to suicide attempts.

Keywords: Suicide Attempt, Suicide Ideation, Suicidal Behavior, Social Support, Self-Harm, Mental health Services

Introduction

In the 21st century and the rise in multifaceted influencing factors, suicide has become a global concern. According to the World Health Organization (WHO), more than 700,000 people worldwide die by suicide every year (1). Suicide is the second leading cause of death among young people worldwide (2). In other words, suicide accounts for 1.4% of all deaths worldwide (3). Suicide is defined as an act of “intentionally ending own’s life” (4). An issue that has caused one death every 40 seconds (5), and in 2019, one out of every hundred deaths was linked to suicide (1).

Globally, suicide rates have increased over the years, especially in low- and middle-income countries such as many African countries (6, 7). During the period of 1990-2019, a 365% increase in suicide fatalities was reported in low-middle-income countries, which is deemed to be linked to population growth and the age structure of the population (6, 7). Furthermore, the global suicide rate among men is twice that of women (1). In fact, the number of men who die by suicide is more than women in almost all countries of the world, except in the age group of 15 to 19 years (8). For this reason, it is important to take a gendered approach to understanding suicide risk factor, since the risk varies as a function of gender (9).

Additionally, millions of people experience suicidal thoughts and behaviors (STBs) every year, which is a major public health problem in population-wide (10). Research conducted to

investigate the risk factors of suicide death has shown that STBs are among the strongest predictors identified for suicide attempts and completion in the future (11). Attempting suicide, which is one of the STBs, is an alarm for predicting complete suicide in the future (12). Figure 1 shows the STBs.

Attempts to commit suicide are caused by psychiatric diseases such as depression, schizophrenia, bipolar and personality disorders, and other factors that promote suicidal behaviors such as substance abuse, financial instability, bullying, relationship stress, social injustice, and illiteracy. Genetic factors appear to account for between 38 and 55% of suicidal behaviors (13).

Every suicidal fatality impacts around 135 other people related to the individual who committed the act of suicide (14). Considering negative consequences of suicide attempts, a goal, as specified by the United Nations Sustainable Development Goals (SDGs) and the WHO 2013-2030 Mental Health Comprehensive Action Plan, is to reduce the global suicide mortality rate in 2030 by one third (15). Additionally, the literature shows that for every fatal suicide attempt, there are about 20 more non-fatal suicide attempts in the general population (8); non-fatal attempt refers to an intentional yet unsuccessful attempt to end life (13). In general, suicide attempt is defined as an act of self-harm that is instigated with some degree of intention to end life (16). Moreover, a survey of experts from 63 countries showed that committing suicide is often considered as an act with the sole intention of ending own's life (17).

Attempted suicide is the strongest known risk factor for complete suicide. According to literature, the suicide rate among people in a year after attempting suicide was almost 100 times higher than the suicide rate among people of the same age group and gender in the control group (18). On the other hand, contrary to the higher rate of fatal suicide in men compared to women, women are three times more likely to commit suicide compared to men (19). In addition, suicide may appear as an attempt to evade and break away from the realities of life (20). Despite significant progress in suicide prevention and intervention efforts (23-21), suicide attempts significantly increased from 6.3% in 2009 to 8.9% in 2019 among high school youth (14 up to 18 years old) (24).

In general, suicide attempts are not only associated with high mortality rates, but also impose a social and economic burden on the health care system (25). In addition, suicide attempts have been largely non-fatal, leading to many false-positive results or inconsistent findings across studies (26). Based on this and considering the high rate of suicide, it was decided to conduct a systematic review to pool the global prevalence of suicide attempts in the African continent. In addition, subgroup analyses based on gender were also conducted in this work to provide further insights to health policy makers.

The paper is structured as follows: Section 2 outlines the methodology used for this study. Section 3 presents the study findings, which also include meta-analyses for the general, male, and female populations, respectively. Section 4 includes a critical discussion of the findings. The paper is concluded in Section 5.

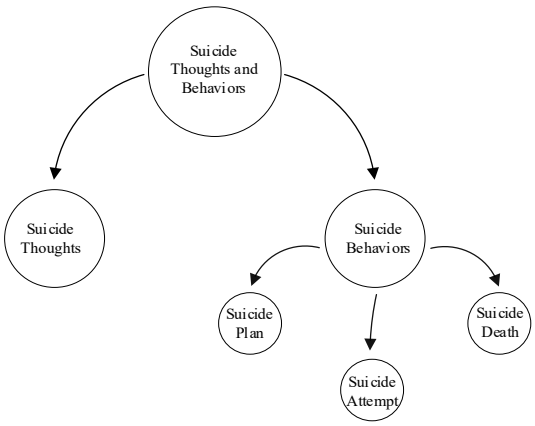


Figure 1: Classification of suicidal thoughts and behaviors (STBs)

Materials and Methods

The initial search was conducted in February 2023. Accordingly, the PubMed, Web of Science, Scopus, Embase, Science Direct and Google Scholar databases and repositories were systematically searched using the keywords of prevalence, outbreak, burden, suicide, and suicides. To ensure the comprehensiveness of the search, no limitation was applied in the year of publication of the articles. Subsequently, details of the identified articles were transferred into the EndNote reference management software. In addition, the lists of references within the identified articles were manually examined. Searches were last updated in July 2023.

Inclusion and Exclusion Criteria

Study Inclusion Criteria

Criteria considered for including studies in the systematic review are outlined below:

1. Studies that reported the prevalence of suicide attempts in the African continent in the general population,
2. Studies with the availability of their full text,
3. Studies with sufficient data with respect to sample size, and prevalence, and
4. Studies that were published in English.

Study Exclusion Criteria

Criteria that resulted in the omission of articles, i.e., exclusion criteria, are presented below:

1. Studies which entailed the prevalence of suicide attempts in other continents (other than Africa) and in a population other than the general population,
2. Case report and case series,
3. Intervention studies,
4. Review studies,
5. Duplicates,
6. Studies with insufficient data (lack of information about prevalence and sample size), and
7. Studies that were not published in English.

Study Selection

The study selection was conducted in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). Initially, studies that were repeated in various databases (duplicates) were removed. Following that, the titles and abstracts of the articles were examined based on the inclusion and exclusion criteria, and irrelevant studies were omitted. Similarly, the full texts of the remaining articles were reviewed based on the inclusion and exclusion criteria, and further irrelevant studies were excluded. To minimize any potential bias, the previous steps were carried out by two researchers independently. Cases of disagreement between two researchers regarding the exclusion or inclusion of an article, were resolved with the assistance of a third reviewer.

Quality Evaluation

The quality of the remaining articles was assessed using the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist. This checklist includes six scales: title, abstract, introduction, methods, results, and discussion. The 6 scales are comprised of 32 subscales/items including title, problem statement, study objectives, type of study, statistical population of the study, sampling method, determining the appropriate sample size, definition of variables and procedures, study data collection tools, statistical analysis methods, and findings. Any study that fulfills any of the items scores a point, and therefore the maximum score that can be obtained using the checklist is 32. Articles that obtained medium or high grades were retained for further evaluation.

Data Extraction

Data were extracted by two researchers based on a separate checklist that includes the following fields: first author's name, year of publication, study location, sample size, age group of the studied population, prevalence of suicide attempts, and study tools.

Statistical Analysis

~~Data of the final included studies were fed into the Comprehensive Meta-Analysis software (v.2)) and the I^2 test was used to examine the heterogeneity of the studies. The existence of publication bias was tested using the Egger's test at a significance level of 0.05 and corresponding Funnel plots were drawn.~~

Data of the final included studies were fed into the Comprehensive Meta-Analysis software (v.2)) and the I^2 test was used to examine the heterogeneity of the studies. The existence of publication bias was tested using the Begg and Mazumdar correlation test at a significance level of 0.1 and corresponding Funnel plots were drawn.

Findings

Through searching the databases, 40,927 possible relevant articles were identified and transferred to the EndNote reference management software. A total of 20,483 articles were duplicates and were therefore omitted. In the screening stage, the titles and abstracts of the studies were evaluated, and 26,694 articles were removed based on the inclusion and exclusion criteria. In the eligibility evaluation stage, 690 articles were omitted through examination of their full text, and in accordance with the inclusion and exclusion criteria. In the quality evaluation phase, through the assessment of the full text of the articles and based on the score obtained from the STROBE checklist, studies with low methodological quality were

excluded, and finally 48 studies were retained in the final evaluation. Extracted evidence reported in these 48 studies is reported in Tables 1, 2, and 3.

Considering Table 1, the highest prevalence of suicide attempts is related to a study by Quarshie et al. in 2020, which reported the rate of 33.7% in a sample of 2,744 individuals in the age range of 10 to 24 years (27). Also, the lowest prevalence of suicide attempts is related to the study of Atwoli et al. in 2014, where 0.32% in the sample of 4,315 participants who were 18 years old and older (28). In our study, the overall pooled prevalence of suicide attempts in the African continent is found to be 9.9% (95% CI: 8.5%-11.6%).

Evidence reported in Table 2 relate to the suicide attempt data among men. Accordingly, the highest prevalence of suicide attempts in men is related to the study by Quarshie et al. in 2020, which reported 33.8% of 1,382 male participants between the ages of 12 and 17 had tried to commit suicide (29). The lowest prevalence of suicide attempts in men is related to the study of Kebede et al. in 1999, with 0.80% of 10,203 male participants who were 15 years old and older (30). Considering the result of our meta-analysis, the pooled overall pooled prevalence of suicide attempts in African men is found to be 7.6 (95%CI: 4.7%-12.1%).

Table 3 presents the extracted evidence related to suicide attempts among African women. Accordingly, the highest prevalence of suicide attempts in women is related to the study by Quarshie et al. in 2020, where 33.4% of 1,253 female participants between the ages of 12 and 17. had tried to commit suicide (29). The lowest prevalence of suicide attempts in African women is related to the study by Kebede et al. in 1999, where 0.48% of 10,203 female participants who were 15 years old and older committed suicide (30). The overall pooled prevalence of suicide attempts in African women is found to be 8.2% (95% CI: 5.4%-12.4%).

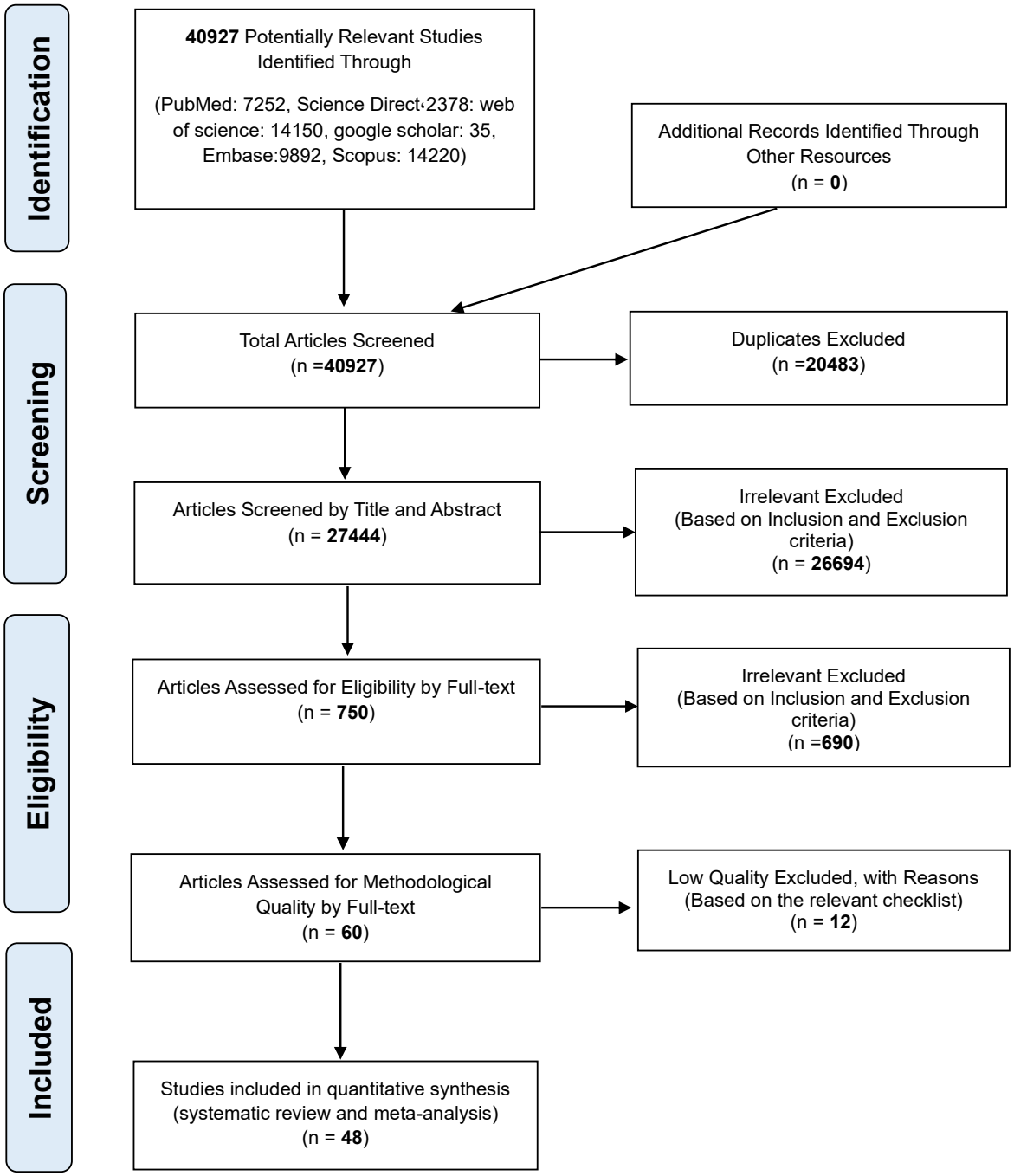


Figure 2: PRISMA Flow Diagram Outlining the Study Selection Process (PRISMA 2009).

Table 1: Summary of Characteristics of the Included Studies; Prevalence of Attempted Suicide in Africa (Continent).

Author	Year	Study type	Location	Age	Sample size	Prevalence of attempted suicide	Instrument
Abdu et al (31)	2020	Cross-Sectional	Ethiopia	21±2.2	523	4.40%	SBQ-R*

Author	Year	Study type	Location	Age	Sample size	Prevalence of attempted suicide	Instrument
Abio et al (32)	2022	cross-sectional study	African country	12–16	14,179	18.26%	Single question (Yes & No)
Aboagye et al (33)	2022	Cross-sectional	Benin, Ghana, Liberia, Mauritius, Mozambique, Namibia, Seychelles, Tanzania	19-10	14967	13.70%	GSHS**
Abozaid et al (34)	2022	Cross-Sectional	Egypt	20.8±1.9	364	11.80%	SBQ-R
Adewuya et al (35)	2019	Lagos Schools Emotional Survey	Nigeria	21-11	9441	2.80%	Single question (Yes & No)
Agoub et al (36)	2006	survey	Morocco	>15	800	2.10%	M.I.N.I. suicidality module***
Alem et al (37)	1999	Cross-Sectional	Ethiopia	25-59	10468	3.20%	5 Questions Scale
Asfaw et al (38)	2020	cross-sectional study	Ethiopia	22.71±2.62	757	3.90%	CIDI****
Amare et al (39)	2018	cross-sectional	Ethiopia	17.52±0.97	573	16.20%	CIDI
Asante et al (40)	2021	cross-sectional	Sierra Leone	…	2798	19.60%	Single question (Yes & No)
Asante et al 1 (41)	2017	cross-sectional	Ghana	11_18	1984	22.20%	Single question (7 parts)
Atwoli et al (28)	2014	Cross-sectional	South Africa	18<	4315	0.32%	Interview based Suicidality Module of WHO & CIDI
Baiden et al (42)	2018	…	Ghana	14-18	1633	21%	Single question (5 options)

Author	Year	Study type	Location	Age	Sample size	Prevalence of attempted suicide	Instrument
Bantjes et al (43)	2020	Cross-sectional	South Africa	18<	633	3.90%	Columbia Suicidal Severity Rating Scale
Bantjes et al 1 (44)	2019	cross-sectional	South Africa	19.02	1402	8.6%	Modified version of the Columbia Suicidal Severity Rating Scale
Bertolote et al (45)	2005	Cross-Sectional	South Africa	39	500	3.40%	Single question (Yes & No)
Damak et al (46)	2019	cross-sectional	Tunis	23	206	5.80%	Single question (Yes & No)
Eskin et al (47)	2018	Cross-sectional	Tunisia	21±2	707	5.00%	Two questions (Yes & No)
Eskin et al 1 (47)	2018	Cross-sectional	Egypt	20.3±1.2	653	7.10%	Two questions (Yes & No)
Fekadu et al (48)	2007	Cross-sectional	Ethiopia	15-49	68,378	14.60%	Single question (Yes & No)
Gureje et al (49)	2010	Survey study	Nigeria	>18	6752	11.60%	Single question (Yes & No)
Jenkins et al (50)	2015	Cross-Sectional	Kenya	23	1158	1.90%	Single question (Yes & No)
Joe et al (51)	2008	cross-sectional	South Africa	>18	4351	2.90%	CIDI
Kaggwa et al (52)	2022	Cross-sectional	Uganda	23.3±2.64	540	6.11%	Single question (Yes & No)
Kebede et al (30)	1999	cross sectional	Ethiopia	15<	10203	0.90%	4-item questionnaire

Author	Year	Study type	Location	Age	Sample size	Prevalence of attempted suicide	Instrument
Madu et al (53)	2003	Cross-sectional	South Africa	15-19	435	21%	Single question (Yes & No)
Mashego et al (54)	2009	Cross-sectional	South Africa	12_19	142	14.8%	Single question (Yes & No)
Nii-Boye Quarshie et al (55)	2020	cross-sectional	Ghana	17-12	1437	27.60%	GSHS
Omigbodun et al (56)	2008	cross-sectional	Nigeria	17-10	1429	11.68%	DISC****
Oppong Asante et al (57)	2017	Cross-Sectional	Ghana	>11	317	22.20%	Single question (Yes & No)
Oppong Asante et al 1 (58)	2021	Survey study	Sierra Leone	>10	2,798	19.60%	Single question (Yes & No)
Owusu-Ansah et al (59)	2020	cross-sectional	Ghana	20.5±5.95	1003	6.30%	Single question (Yes & No)
Peltzer et al (60)	2017	Cross-sectional	Sierra Leone	15	2798	19.10%	Single question (Yes & No)
Pengpid et al (61)	2020	Cross-sectional	Mozambique	15±3	1918	18.00%	Single question (Yes & No)
Quarshie et al (62)	2020	Cross-Sectional	Ghana	12.0-17.0	1437	27.60%	Single question (Yes & No)
Quarshie et al 1 (27)	2020	Cross-Sectional	Liberia	24-10	2744	33.70%	Single question (Yes & No)
Quarshie et al 2 (29)	2020	Cross-Sectional	Eswatini	>12	2513	15.50%	Single question (Yes & No)
Randall et al (63)	2014	cross-sectional	West Africa	16-11	2690	28.30%	GSHS
Seidu et al (64)	2020	cross-sectional	Mozambique	17-11	1918	18.50%	Single question (5 parts)

Author	Year	Study type	Location	Age	Sample size	Prevalence of attempted suicide	Instrument
Shayo et al (65)	2019	cross sectional	Tanzania	13-17	3793	11.3%	GSHS
Shilubane et al (66)	2013	survey study	South Africa	13-19	10,270	21.80%	YRBSS******
Shilubane et al 1 (66)	2013	Cross-Sectional	South Africa	13-19	10699	18.50%	Single question (Yes & No)
Swahn et al (67)	2012	cross-sectional	Uganda	14 -24	457	19.80%	Interview
Tetteh et al (68)	2021	Cross-sectional	10 African countries	>14	32802	6.60%	Single question (Yes & No)
Thornton et al (69)	2019	Cross-sectional	South Africa	18-11	175	7.37%	Single question (Yes & No)
Tolulope et al (70)	2019	Cross-sectional	Nigeria	14.84 ±1.38	1,015	3%	SBQ-R
Wu et al (71)	2022	Survey study	Mali	16.1 ±2.4	606	9.70%	Single question (Yes & No)
Zarrouq et al (72)	2015	cross-sectional	Morocco	23-11	3020	10.50%	Single question (Yes & No)

* Suicidal Behaviors Questionnaire Revised
** Global School-Based Student Health Survey
*** Mini International Neuropsychiatric Interview
**** Composite International Diagnostic Interview
*****Diagnostic Interview Schedule for Children
****** Youth Risk Behavior Surveillance System

Table 2: Summary of Characteristics of the Included Studies; Prevalence of Attempted Suicide in Males in Africa (Continent).

Author	Year	Study type	Location	Age	Sample size	Prevalence of attempted suicide	Instrument
Adewuya et al (35)	2019	Lagos Schools Emotional Survey	Nigeria	21-11	4684	1.70%	Single question (Yes & No)

Author	Year	Study type	Location	Age	Sample size	Prevalence of attempted suicide	Instrument
Agoub et al (36)	2006	survey	Morocco	>15	400	1.50%	M.I.N.I. suicidality module
Asante et al (40)	2021	cross-sectional	Sierra Leone	…	1240	20.90%	Single question (Yes & No)
Jenkins et al (50)	2015	Cross-Sectional	Kenya	23	597	1.84%	Single question (Yes & No)
Kebede et al (30)	1999	Cross-sectional	Ethiopia	15<	10203	0.80%	4-item questionnaire
Kebede et al 1 (30)	1999	Cross-Sectional	Ethiopia	15-24	4597	0.84%	4-questions scale
Nii-Boye Quarshie et al (55)	2020	a cross-sectional	Ghana	17-12	750	26.40%	GSHS
Oppong Asante et al (58)	2021	Cross-Sectional	Sierra Leone	>10	1258	20.58%	Single question (Yes & No)
Quarshie et al (62)	2019	Cross-sectional	Ghana	18–35	28	3.60%	SBQ-R
Quarshie et al 1 (29)	2020	Cross-Sectional	Liberia	12.0-17.0	1382	33.80%	Single question (Yes & No)
Quarshie et al 2 (29)	2020	Cross-Sectional	Eswatini	>12	1083	15.00%	Single question (Yes & No)
Shayo et al (65)	2019	Cross-sectional	Tanzania	13-17	1819	10.55%	GSHS
Zarrouq et al (72)	2015	cross-sectional	Morocco	23-11	1602	7.80%	Single question (Yes & No)
Mashego et al (54)	2009	Cross-sectional study	South Africa	12_19	56	12.5%	Single question (Yes & No)
Nii-Boye Quarshi	2020	cross-sectional	Ghana	17-12	750	26.40%	GSHS

Author	Year	Study type	Location	Age	Sample size	Prevalence of attempted suicide	Instrument
e et al (55)							
Pengpid et al (61)	2020	Cross-sectional	Mozambique	15±3	966	17.60%	Single question (Yes & No)
Shayo et al (65)	2019	cross sectional	Tanzania	13-17	1825	10.6%	GSHS
Zarrouq et al (72)	2015	cross-sectional	Morocco	23-11	1602	7.80%	Single question (Yes & No)

Table 3: Summary of Characteristics of the Included Studies; Prevalence of Attempted Suicide in Females in Africa (Continent).

Author	Year	Study type	Country	Age range	Sample size	Prevalence of attempted suicide	Instrument
Adewuya et al (35)	2019	Lagos Schools Emotional Survey	Nigeria	21-11	4757	3.70%	Single question (Yes & No)
Agoub et al (36)	2006	survey	Morocco	>15	400	2.70%	M.I.N.I. suicidality module
Asante et al (40)	2021	cross-sectional	Sierra Leone	…	1465	17.80%	Single question (Yes & No)
Beksinska et al (73)	2021	longitudinal study	Kenya	33.7	1003	2.60%	Single question (Yes & No)
Jenkins et al (50)	2015	Cross-Sectional	Kenya	23	536	1.86%	Single question (Yes & No)
Kebede et al (30)	1999	cross sectional	Ethiopia	15<	10203	0.48%	4-item questionnaire
Kebede et al 1(30)	1999	Cross-Sectional	Ethiopia	15-24	5606	0.87%	4 questions, scale

Author	Year	Study type	Country	Age range	Sample size	Prevalence of attempted suicide	Instrument
Nii-Boye Quarshie et al (55)	2020	cross-sectional	Ghana	17-12	687	28.80%	GSHS
Oppong Asante et al (58)	2021	Cross-Sectional	Sierra Leone	>10	1484	17.58%	Single question (Yes & No)
Quarshie et al 1 (29)	2020	Cross-Sectional	Liberia	12.0-17.0	1253	33.40%	Single question (Yes & No)
Quarshie et al 2 (29)	2020	Cross-Sectional	Eswatini	>12	1430	15.90%	Single question (Yes & No)
Shayo et al (65)	2019	cross sectional	Tanzania	13-17	1974	12%	GSHS
Zarrouq et al (72)	2015	cross-sectional	Morocco	23-11	1418	13.50%	Single question (Yes & No)
Beksinska et al (73)	2021	longitudinal study	Kenya	33.7	1003	2.60%	Single question (Yes & No)
Mashego et al (54)	2009	Cross-sectional	South Africa	12_19	86	16.3%	Single question (Yes & No)
Nii-Boye Quarshie et al (55)	2020	cross-sectional	Ghana	17-12	687	28.80%	GSHS
Pengpid et al (61)	2020	Cross-sectional	Mozambique	15±3	845	20.00%	Single question (Yes & No)
Shayo et al (65)	2019	cross sectional	Tanzania	13-17	1968	11.8%	GSHS
Zarrouq et al (72)	2015	cross-sectional	Morocco	23-11	1418	13.50%	Single question (Yes & No)

The Entire Population

A total of 48 studies with a sample size of 244,701 were examined. Considering the results of the I^2 test, the heterogeneity of studies was found to be high (I^2: 99.4), therefore, the analysis was performed using the random effects method. According to the meta-analysis, the pooled prevalence of suicide attempts in the African continent is found to be 9.9% (95% CI: 8.5%-

11.6%) (Figure 3). The results of the Begg and Mazumdar correlation test showed the presence of publication bias in the studies (p: 0.002) (Figure 4).

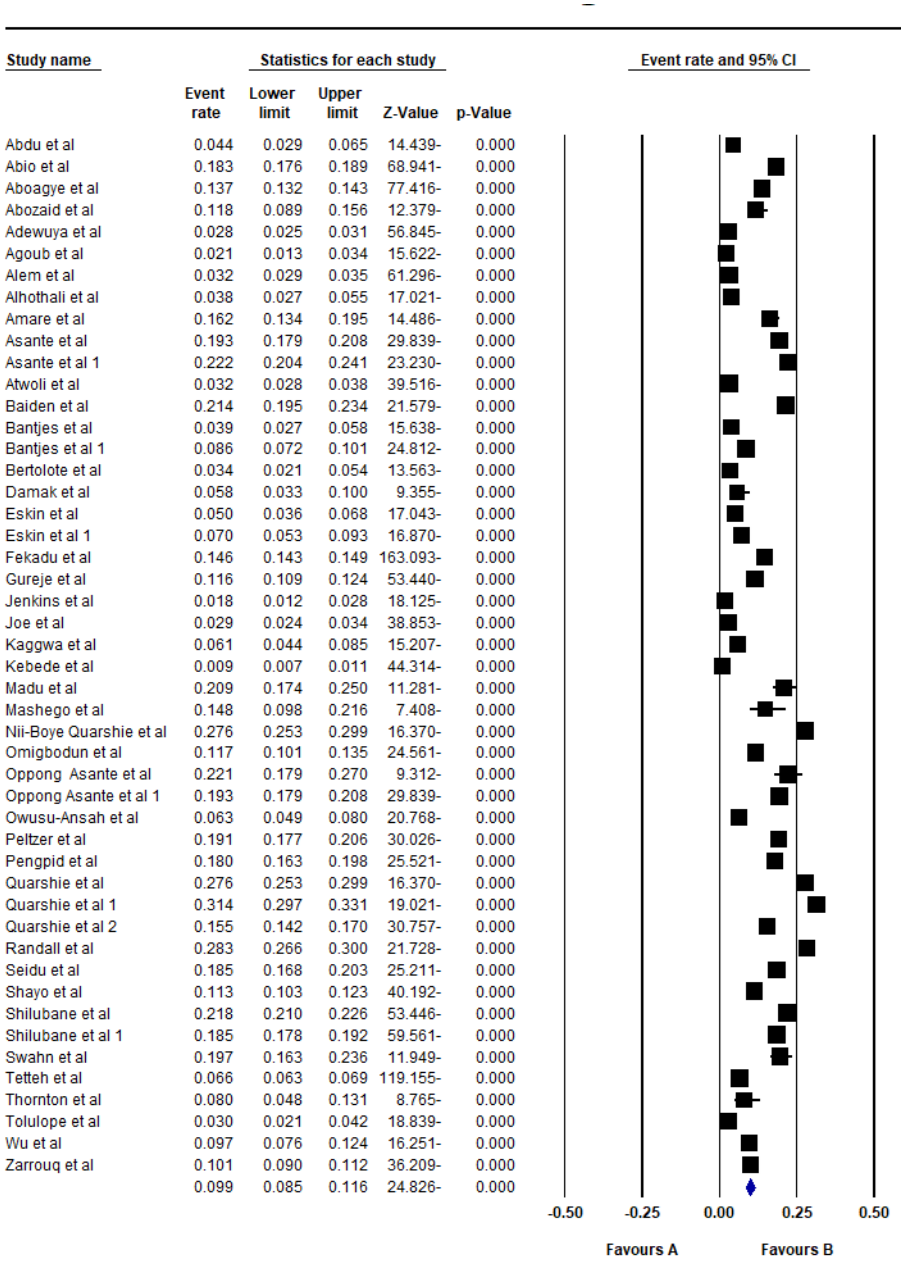


Figure 3: Forest Plot of the Prevalence of Suicide Attempts in the African Continent Based on the Random Effects Method.

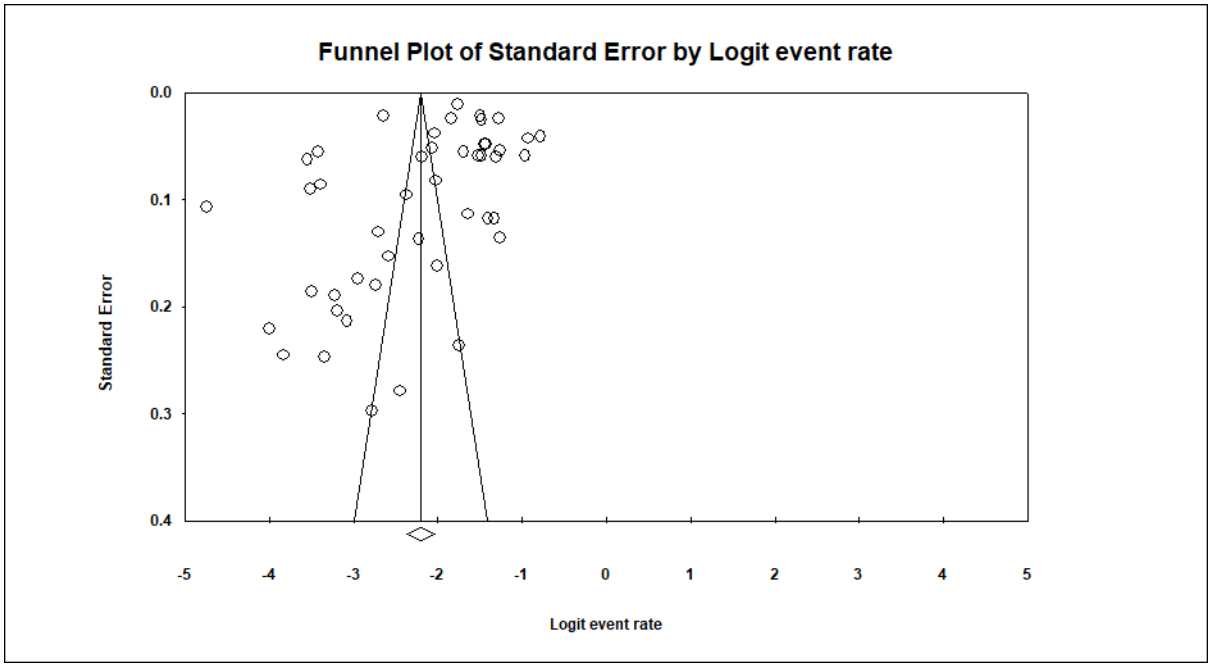


Figure 4: Funnel Plot of Publication Bias in the Reviewed Studies.

The meta-regression analyses to examine the effects of the sample size and year of publication showed that with the increase of the sample size, the prevalence of suicide attempts in the African continent decreased ($p<0.05$) (Figure 5); yet, with the increase in the year of publication, the prevalence of suicide attempts in the African continent increased ($p<0.05$) (Figure 6).

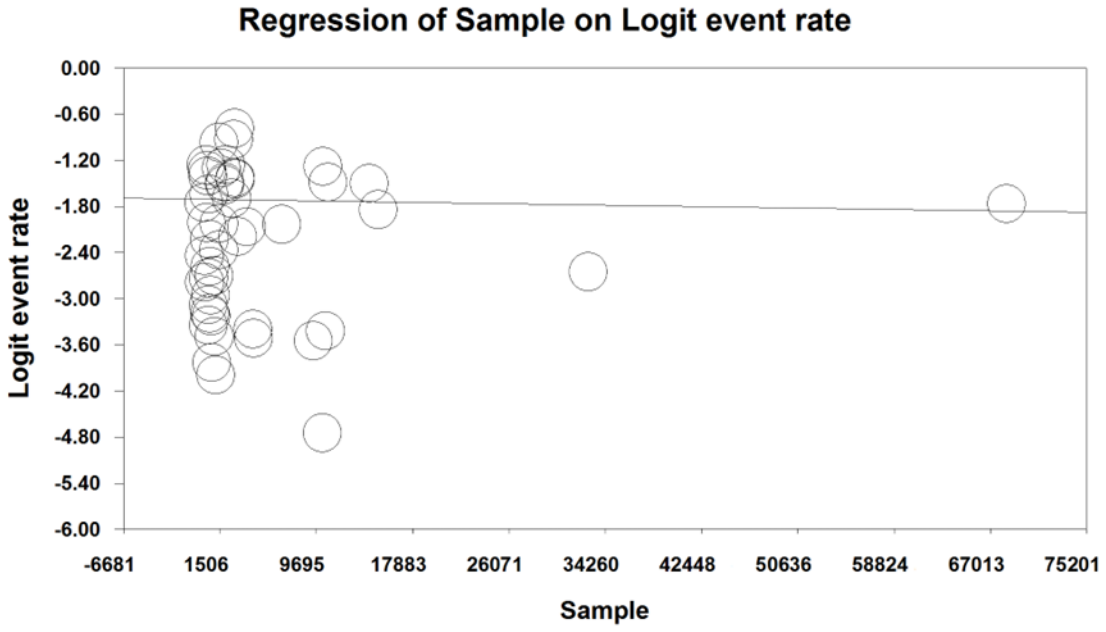


Figure 5: Meta-Regression of the Effect of Sample Size on the Prevalence of Suicide Attempts in the African Continent.

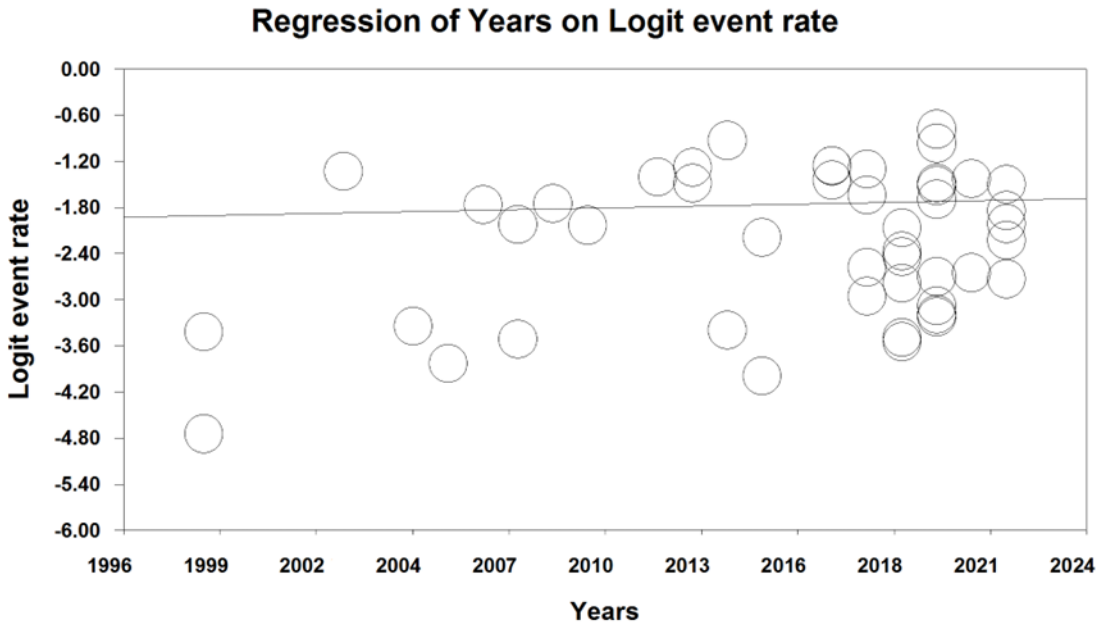
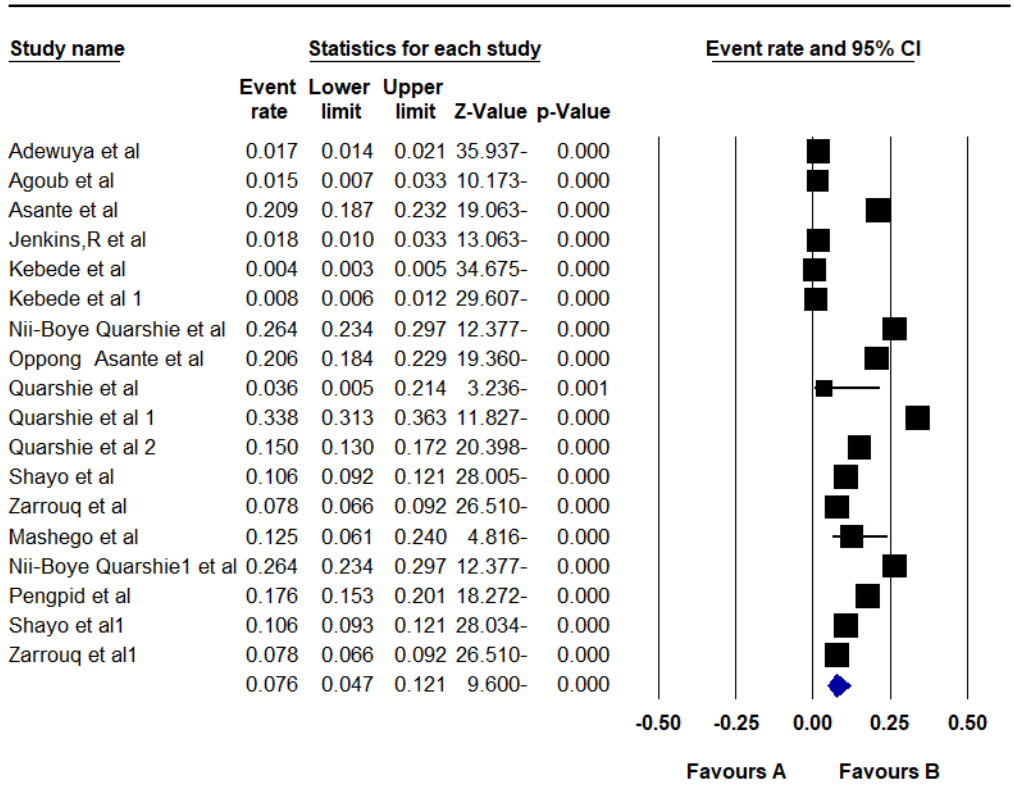


Figure 6: Meta-Regression of the Effect of the Study Year on the Prevalence of Suicide Attempts in the African Continent.

Attempts in the Male Population

As part pf the subgroup analyses based on gender, 18 studies with a pooled sample size of 34,842 people were examined. Considering the I^2 test, the heterogeneity among selected studies was high (I^2: 99.2), and therefore, the analysis was performed using the random effects method. According to the meta-analysis, the pooled prevalence of suicide attempts in African men is found as 7.6% (95%CI: 4.7%-12.1%) (Figure 7). The results of the Begg and Mazumdar correlation test showed the presence of publication bias in the studies (p: 0.01) (Figure 8).



Meta Analysis

Figure 7: Forest Plot of Prevalence of Suicide Attempts in African Men Based on Random Effects Method.

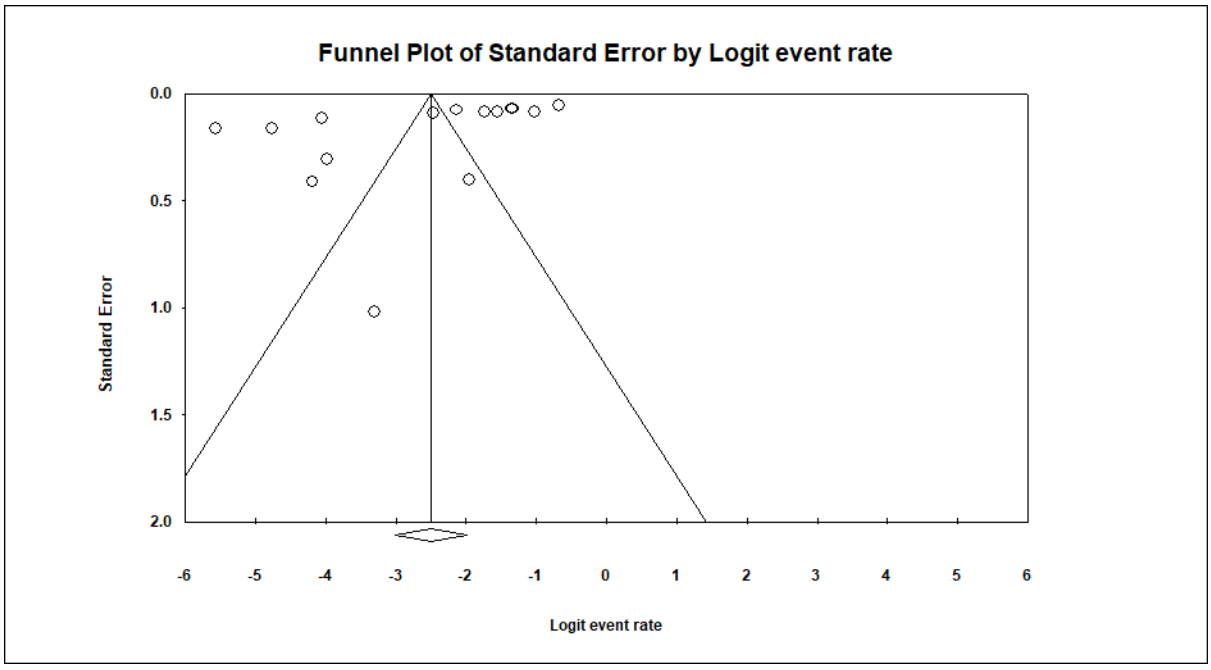


Figure 8: Funnel Plot of Publication Bias in Reviewed Studies (Male population).

Attempts in the Female Population

The subgroup analyses of 19 studies, that had focused on the prevalence suicide attempt among African women, a pooled total of 38,223 people were examined. Considering the respective I^2 test, the heterogeneity was found to be high (I^2: 99.2), thus, the analysis was performed using the random effects method. According to our meta-analysis, the pooled prevalence of suicide attempts in African women is 8.2% (95%CI: 5.4%-12.4%) (Figure 9). The results of the Begg and Mazumdar correlation test showed the presence of publication bias in the studies (p: 0.08) (Figure 10).

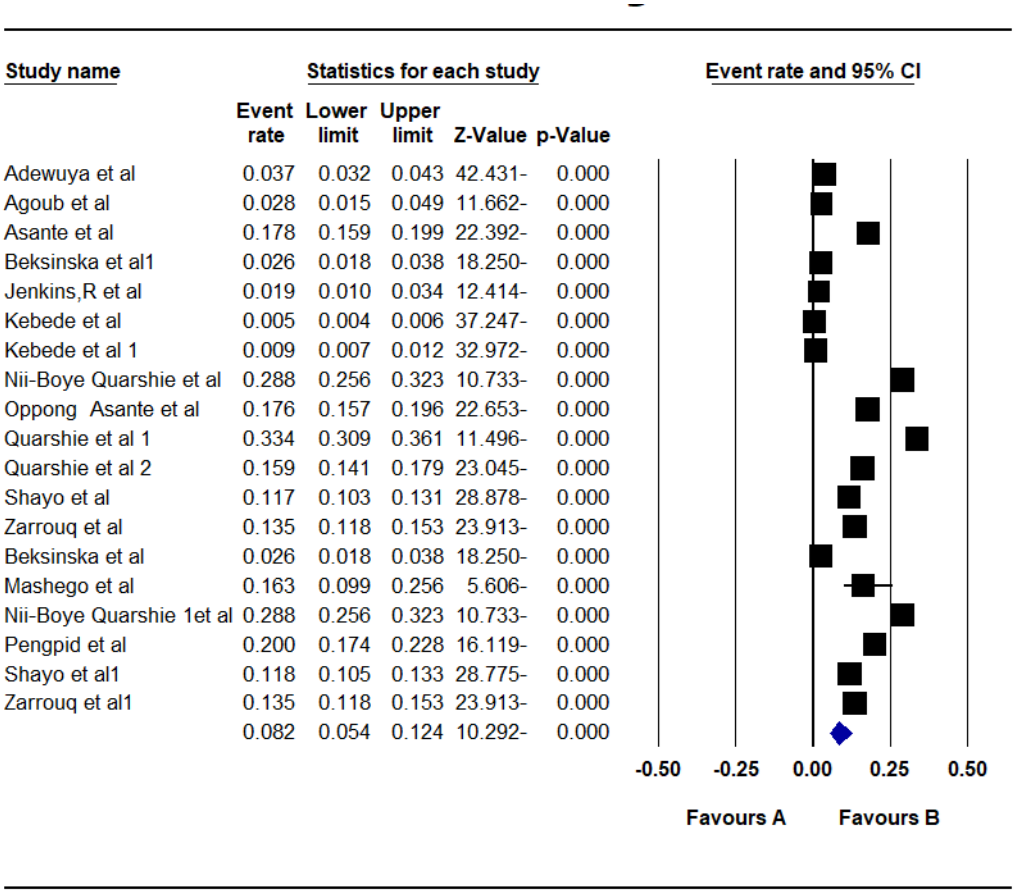


Figure 9: Forest Plot of Prevalence of Suicide Attempts in African Women Based on Random Effects Method.

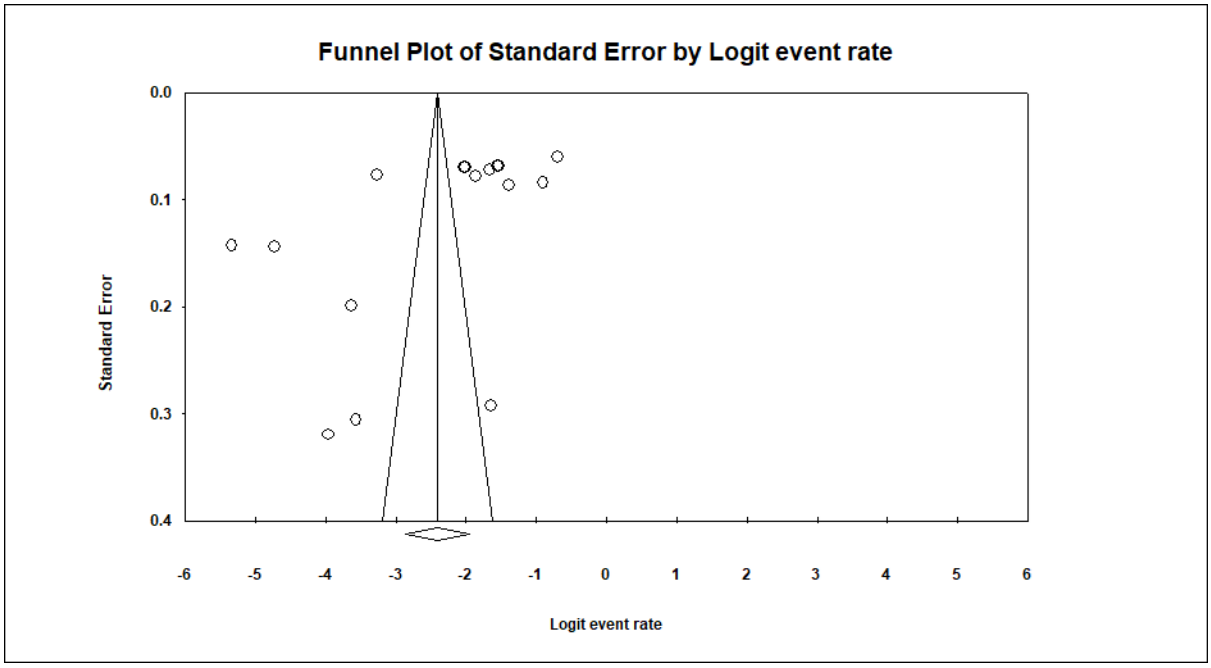


Figure 10: Funnel Plot of Publication Bias in Reviewed Studies (Female Population).

Discussion

This study was conducted with the aim of investigating the pooled prevalence of suicide attempts in Africa. Accordingly, the pooled prevalence of suicide attempts in African is found to be 9.9%. In addition, with the increase in year of study, the prevalence of suicide attempts in the African continent increased, however, with the increase in the sample size, the prevalence of suicide attempts decreases. The results of our study also showed that in the African continent, women commit more suicide attempts compared to men.

Not all suicide attempts lead to death, and there are also varying underlying reasons that result in a suicide attempt. Among the factors that contribute to individuals' suicide attempts are instances of experience of shocks and traumatic events, and emotions of guilt or responsibility. These factors affect mental health as well as the likelihood of future suicide attempts (74).

Several of the included studies in this systematic review had examined suicide attempts among young individuals. Also, research shows that the young generation in Africa still face many challenges that expose them to risky health behaviors (75-77). As an instance, while underage use of cannabis and alcohol is illegal in African countries, enforcement of such laws remains a critical challenge and is often neglected (75, 78, 79). At the same time, the use of such substances leads to high impulsivity, which can result in acute life-threatening behaviors such as suicide attempts (80).

Conversely, inactive, and sedentary behavior has become a prevalent issue in numerous low- and middle-income nations, including several African countries (81). As a risk factor, leisure-time sedentary behavior is associated with high levels of depressive symptoms, which in turn increases the risk of suicidal behavior among youth (80, 83). There is also supporting evidence suggesting that social and interpersonal adversity can lead to internal emotional difficulties such as self-blame and self-disapproval, depression, and feelings of shame and guilt, which may lead to self-harm and suicidal attempts (84). Accordingly, psychological well-being is known as a factor that promotes resilience for suicide prevention (74).

Almost everywhere in the world, the rate of non-fatal suicidal behavior is higher in women than in men (85). In our study, the prevalence of suicide attempts in women was 8.2% compared to 7.6% in men. Although it has long been recognized that female suicide is more prominent in low- and middle-income countries than in high-income countries, few studies have shown what might contribute to the relationship between country income level and suicide (85). Despite this, some studies, using various methods e.g., ethnography, survey, ecological examination, with either cross-sectional and longitudinal time horizon, have shown that discrimination and harassment that women experience in their families and communities is a factor that can result in a suicide attempt (86, 87). Considering the recent improvements of social norms in terms gender equality and woman's active participation in the workplace, the trivial gap between the rate of suicide attempts among women and men in our study can be justified. This is also argued in the study of Cai et al. (88).

A limitation of this meta-analysis is that the included studies were limited to research published in English, overlooking possible related studies published in other languages. Additionally, some studies were excluded from the study due to low quality, e.g., due to lack of reporting prevalence or low sample size. Moreover, the number of studies that examined the prevalence of suicide attempts by gender was not frequent. Therefore, future work for a study such as this one could focus on the reported rates of suicide attempts based on gender.

Conclusion

Understanding the prevalence of suicide attempts in Africa holds significance not just for policymaking within the African continent, but also for contributing to the worldwide research concerning the rates of suicide attempts. According to our findings, suicide attempts are an important public health concern in Africa. Nonetheless, it is worth noting that the documented statistics may even underestimate the actual suicide numbers. This discrepancy could stem from the reluctance and hesitance of affected individuals to report the attempts. Thus, it appears imperative to prioritize further research aimed at exploring the psychological challenges individuals face following non-fatal suicide attempts. In addition, further analyses of suicide attempts based on gender, age, and socio-economic contexts are encouraged.

References

1. World Health Organization, "Suicide," 2021, September 2022, https://www.who.int/news-room/fact-sheets/detail/suicide.

2. Glenn CR, Kleiman EM, Kellerman J, Pollak O, Cha CB, Esposito EC, et al. Annual Research Review: A meta-analytic review of worldwide suicide rates in adolescents. Journal of child psychology and psychiatry. 2020;61(3):294-308.

3. Smith L, Jackson SE, Vancampfort D, Jacob L, Firth J, Grabovac I, et al. Sexual behavior and suicide attempts among adolescents aged 12-15 years from 38 countries: A global perspective. Psychiatry Res. 2020;287:112564.

4. Turecki G, Brent D, Gunnell D, O'Connor R, Oquendo M, Pirkis J, et al. Suicide and suicide risk. Nature reviews Disease primers, 5 (1), 1-22. 2019.

5. Ari H, Mari S-T. Suicide motives and protective factors-contributions from a hikikomori discussion board. Issues in mental health nursing. 2021;42(5):417-29.

6. World Health Organisation (2021). Suicide rate estimates, crude estimates by country. Retrieved on 13 February 2022 from: https://apps.who.int/gho/data/node.main.MHSUICIDE.

7. Yip PSF, Zheng Y, Wong C. Demographic and epidemiological decomposition analysis of global changes in suicide rates and numbers over the period 1990–2019. Injury prevention. 2022;28(2):117-24.

8. Naghavi M. Global burden of disease self-harm collaborators: global, regional, and national burden of suicide mortality 1990 to 2016: systematic analysis for the global burden of disease study 2016. BMJ. 2019;364(194):1958-72.

9. Turecki G, Brent DA, Gunnell D, O'Connor RC, Oquendo MA, Pirkis J, et al. Suicide and suicide risk. Nature reviews Disease primers. 2019;5(1):74.

10. Centers for Disease Control and Prevention. Suicide data and statistics. June 28, 2022. Accessed

November 23, 2022. https://www.cdc.gov/suicide/suicide-data-statistics.html.

11. Castellví P, Lucas-Romero E, Miranda-Mendizábal A, Parés-Badell O, Almenara J, Alonso I, et al. Longitudinal association between self-injurious thoughts and behaviors and suicidal behavior in adolescents and young adults: A systematic review with meta-analysis. J Affect Disord. 2017;215:37-48.

12. Kim SH, Kim HJ, Oh SH, Cha K. Analysis of attempted suicide episodes presenting to the emergency department: comparison of young, middle aged and older people. International Journal of Mental Health Systems. 2020;14(1):46.

13. Kanwal S, Perveen S, Sumbla Y. Causes and severity of suicide in developed nations of East Asia. JPMA The Journal of the Pakistan Medical Association. 2017;67(10):1588-92.

14. Cerel J, Brown MM, Maple M, Singleton M, van de Venne J, Moore M, et al. How Many People Are Exposed to Suicide? Not Six. Suicide Life Threat Behav. 2019;49(2):529-34.

15. World Health Organization. Mental Health Action Plan 2013–2030. 2013. https://www.who.int/publications/i/item/97892415060. Accessed 1 Aug 2021.

16. Naguy A, Elbadry H, Salem H. Suicide: A Précis! Journal of Family Medicine and Primary Care. 2020;9(8):4009-15.

17. De Leo D, Goodfellow B, Silverman M, Berman A, Mann J, Arensman E, et al. International study of definitions of English-language terms for suicidal behaviours: a survey exploring preferred terminology. BMJ open. 2021;11(2):e043409.

18. Kim SH, Kim HJ, Oh SH, Cha K. Analysis of attempted suicide episodes presenting to the emergency department: comparison of young, middle aged and older people. International Journal of Mental Health Systems. 2020;14(1):46.

19. Ivey-Stephenson AZ, Crosby AE, Hoenig JM, Gyawali S, Park-Lee E, Hedden SL. Suicidal thoughts and behaviors among adults aged≥ 18 years—United States, 2015–2019. MMWR Surveillance Summaries. 2022;71(1):1.

20. "Suicide as an escape from the self Psychology Today Canada," September 2022, https://www.psychologytoday.com/ca/blog/toward-less-egoic-world/201806/suicide-escape-the-self. [

21. Busby DR, Hatkevich C, McGuire TC, King CA. Evidence-based interventions for youth suicide risk. Current psychiatry reports. 2020;22:1-8.

22. Glenn CR, Esposito EC, Porter AC, Robinson DJ. Evidence base update of psychosocial treatments for self-injurious thoughts and behaviors in youth. Journal of Clinical Child & Adolescent Psychology. 2019;48(3):357-92.

23. Robinson J, Bailey E, Witt K, Stefanac N, Milner A, Currier D, et al. What works in youth suicide prevention? A systematic review and meta-analysis. EClinicalMedicine. 2018;4:52-91.

24. Ivey-Stephenson AZ, Demissie Z, Crosby AE, Stone DM, Gaylor E, Wilkins N, et al. Suicidal ideation and behaviors among high school students—youth risk behavior survey, United States, 2019. MMWR supplements. 2020;69(1):47.

25. Iqbal J, Hussain M, Hussain A, Ghafoor MB. PARAPHYLENE DIAMINE/KALA PATHAR POISONING;: TO STUDY THE DEMOGRAPHIC PROFILE, CLINICAL MANIFESTATIONS AND OUTCOME OF PARAPHYLENE DIAMINE/KALA PATHAR POISONING AT SHEIKH ZAYED HOSPITAL RAHIM YAR KHAN. The Professional Medical Journal. 2019;26(05):825-30.

26. Velupillai S, Hadlaczky G, Baca-Garcia E, Gorrell GM, Werbeloff N, Nguyen D, et al. Risk assessment tools and data-driven approaches for predicting and preventing suicidal behavior. Frontiers in psychiatry. 2019;10:36.

27. Quarshie ENB, Onyeaka HK, Oppong Asante K. Suicidal behaviours among adolescents in Liberia. BMC Psychiatry. 2020;20(1).

28. Atwoli L, Nock MK, Williams DR, Stein DJ. Association between parental psychopathology and suicidal behavior among adult offspring: results from the cross-sectional South African Stress and Health survey. BMC PSYCHIATRY. 2014;14.

29. Quarshie ENB, Atorkey P, García KPV, Lomotey SA, Navelle PL. Suicidal Behaviors in a Nationally Representative Sample of School-Going Adolescents Aged 12–17 Years in Eswatini. Trends in Psychol. 2022;30(1):3-32.

30. Kebedei D, Alem A. Suicide attempts and ideation among adults in Addis Ababa, Ethiopia. Acta Psychiatrica Scandinavica. 1999;100(SUPPL.S397):35-9.

31. 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;13:233-43.

32. Abio A, Owusu PN, Posti JP, Bärnighausen T, Shaikh MA, Shankar V, et al. Cross-national examination of adolescent suicidal behavior: a pooled and multi-level analysis of 193,484 students from 53 LMIC countries. Soc Psychiatry Psychiatr Epidemiol. 2022;57(8):1603-13.

33. Aboagye RG, Mireku DO, Nsiah JJ, Ahinkorah BO, Frimpong JB, Hagan JE, Jr., et al. Prevalence and psychosocial factors associated with serious injuries among in-school adolescents in eight sub-Saharan African countries. BMC Public Health. 2022;22(1):853.

34. Abozaid MMES, Aboserea MM, Metwally SM, AbElkhalek HA. Prevalence, psychosocial correlates of youths' suicidal behaviors and perspectives on the phenomena at Zagazig University: a mixed-methods study. Middle East Curr Psychiatry. 2022;29(1).

35. Adewuya AO, Oladipo EO. Prevalence and associated factors for suicidal behaviours (ideation, planning, and attempt) among high school adolescents in Lagos, Nigeria. Eur Child Adolesc Psychiatry. 2020;29(11):1503-12.

36. Agoub M, Moussaoui D, Kadri N. Assessment of suicidality in a Moroccan metropolitan area. J Affect Disord. 2006;90(2-3):223-6.

37. Alem A, Kebede D, Jacobsson L, Kullgren G. Suicide attempts among adults in Butajira, Ethiopia. Acta Psychiatrica Scandinavica. 1999;100(SUPPL.S397):70-6.

38. Asfaw H, Yigzaw N, Yohannis Z, Fekadu G, Alemayehu Y. Prevalence and associated factors of suicidal ideation and attempt among undergraduate medical students of Haramaya University, Ethiopia. A cross sectional study. PLoS One. 2020;15(8):e0236398.

39. Amare T, Meseret Woldeyhannes 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;2018:7631453.

40. Asante KO, Quarshie ENB, Onyeaka HK. Epidemiology of suicidal behaviours amongst school-going adolescents in post-conflict Sierra Leone. JOURNAL OF AFFECTIVE DISORDERS. 2021;295:989-96.

41. Asante KO, Kugbey N, Osafo J, Quarshie ENB, Sarfo JO. The prevalence and correlates of suicidal behaviours (ideation, plan and attempt) among adolescents in senior high schools in Ghana. SSM-POPULATION HEALTH. 2017;3:427-34.

42. Baiden P, Kuuire VZ, Shrestha N, Tonui BC, Dako-Gyeke M, Peters KK. Bullying victimization as a predictor of suicidal ideation and suicide attempt among senior high school students in Ghana: Results from the 2012 Ghana Global School-Based Health Survey. JOURNAL OF SCHOOL VIOLENCE. 2019;18(2):300-17.

43. Bantjes J, Breet E, Lochner C, Roos J, Kessler RC, Stein DJ. Reducing nonfatal suicidal behaviour among university students: actuarial analysis of potential effects of treating common mental disorders. SOUTH AFRICAN JOURNAL OF PSYCHOLOGY. 2021;51(1):21-34.

44. Bantjes J, Saal W, Lochner C, Roos J, Auerbach RP, Mortier P, et al. Inequality and mental healthcare utilisation among first-year university students in South Africa. International Journal of Mental Health Systems. 2020;14(1).

45. Bertolote JM, Fleischmann A, De Leo D, Bolhari J, Botega N, De Silva D, et al. Suicide attempts, plans, and ideation in culturally diverse sites: the WHO SUPRE-MISS community survey. Psychol Med. 2005;35(10):1457-65.

46. Damak R, Fekih-Romdhane F, Feki R, Feki A, Cheour M. The relationship between depression and percevied social support among university students. European Psychiatry. 2019;56:S375.

47. Eskin M, AlBuhairan F, Rezaeian M, Abdel-Khalek AM, Harlak H, El-Nayal M, et al. Suicidal Thoughts, Attempts and Motives Among University Students in 12 Muslim-Majority Countries. PSYCHIATRIC QUARTERLY. 2019;90(1):229-48.

48. Fekadu A, Alem A, Medhin G, Shibre T, Cleare A, Prince M, et al. Utility of the concept of minor depressive disorder: evidence from a large rural community sample in a developing country setting. J Affect Disord. 2007;104(1-3):111-8.

49. Gureje O, Uwakwe R, Oladeji B, Makanjuola VO, Esan O. Depression in adult Nigerians: Results from the Nigerian Survey of Mental Health and Well-being. Journal of Affective Disorders. 2010;120(1):158-64.

50. Jenkins R, Othieno C, Omollo R, Ongeri L, Sifuna P, Ongecha M, et al. Tedium vitae, death wishes, suicidal ideation and attempts in Kenya-prevalence and risk factors. BMC Public Health. 2015;15:759.

51. Joe S, Stein DJ, Seedat S, Herman A, Williams DR. Non-fatal suicidal behavior among South Africans: results from the South Africa Stress and Health Study. Soc Psychiatry Psychiatr Epidemiol. 2008;43(6):454-61.

52. Kaggwa MM, Arinaitwe I, Muwanguzi M, Nduhuura E, Kajjimu J, Kule M, et al. Suicidal behaviours among Ugandan university students: a cross-sectional study. BMC Psychiatry. 2022;22(1):234.

53. Madu SN, Matla MP. The prevalence of suicidal behaviours among secondary school adolescents in the Limpopo Province, South Africa. SOUTH AFRICAN JOURNAL OF PSYCHOLOGY. 2003;33(2):126-32.

54. Mashego TAB, Madu SN. Suicide-related behaviours among secondary school adolescents in the Welkom and Bethlehem areas of the Free State province (South Africa). SOUTH AFRICAN JOURNAL OF PSYCHOLOGY. 2009;39(4):489-97.

55. Nii-Boye Quarshie E, Andoh-Arthur J. Suicide Attempts Among 1,437 Adolescents Aged 12-17 Years Attending Junior High Schools in Ghana. Crisis. 2022;43(1):8-17.

56. Omigbodun O, Dogra N, Esan O, Adedokun B. Prevalence and correlates of suicidal behaviour among adolescents in southwest Nigeria. Int J Soc Psychiatry. 2008;54(1):34-46.

57. Oppong Asante K, Kugbey N, Osafo J, Quarshie ENB, Sarfo JO. The prevalence and correlates of suicidal behaviours (ideation, plan and attempt) among adolescents in senior high schools in Ghana. SSM - Population Health. 2017;3:427-34.

58. Oppong Asante K, Quarshie EN, Onyeaka HK. Epidemiology of suicidal behaviours amongst school-going adolescents in post-conflict Sierra Leone. J Affect Disord. 2021;295:989-96.

59. Owusu-Ansah FE, Addae AA, Peasah BO, Asante KO, Osafo J. Suicide among university students: prevalence, risks and protective factors. HEALTH PSYCHOLOGY AND BEHAVIORAL MEDICINE. 2020;8(1):220-33.

60. Peltzer K, Yi SY, Pengpid S. Suicidal behaviors and associated factors among university students in six countries in the Association of Southeast Asian Nations (ASEAN). ASIAN JOURNAL OF PSYCHIATRY. 2017;26:32-8.

61. Pengpid S, Peltzer K. Suicide attempt and associated factors among in-school adolescents in Mozambique. JOURNAL OF PSYCHOLOGY IN AFRICA. 2020;30(2):130-4.

62. Quarshie ENB, Andoh-Arthur J. Suicide attempts among 1,437 adolescents aged 12–17 years attending junior high schools in Ghana. Crisis. 2022;43(1):8-17.

63. Randall JR, Doku D, Wilson ML, Peltzer K. Suicidal behaviour and related risk factors among school-aged youth in the Republic of Benin. PLoS One. 2014;9(2):e88233.

64. Seidu AA, Amu H, Dadzie LK, Amoah A, Ahinkorah BO, Ameyaw EK, et al. Suicidal behaviours among in-school adolescents in Mozambique: Cross-sectional evidence of the prevalence and predictors using the Global School-Based Health Survey data. PLoS One. 2020;15(7):e0236448.

65. Shayo FK. Co-occurrence of risk factors for non communicable diseases among in-school adolescents in Tanzania: an example of a low-income setting of sub-Saharan Africa for adolescence health policy actions. BMC PUBLIC HEALTH. 2019;19(1).

66. Shilubane HN, Ruiter RA, van den Borne B, Sewpaul R, James S, Reddy PS. Suicide and related health risk behaviours among school learners in South Africa: results from the 2002 and 2008 national youth risk behaviour surveys. BMC Public Health. 2013;13:926.

67. Swahn MH, Bossarte RM, Elimam DM, Gaylor E, Jayaraman S. Prevalence and correlates of suicidal ideation and physical fighting. Applied Public Health: Examining Multifaceted Social or Ecological Problems and Child Maltreatment: Nova Science Publishers, Inc.; 2012. p. 17-29.

68. Tetteh J, Ekem-Ferguson G, Quarshie EN, Swaray SM, Ayanore MA, Seneadza NAH, et al. Marijuana use and suicidal behaviours among school-going adolescents in Africa: assessments of prevalence and risk factors from the Global School-Based Student Health Survey. Gen Psychiatr. 2021;34(4):e100558.

69. Thornton VJ, Asanbe CB, Denton EGD. Clinical risk factors among youth at high risk for suicide in South Africa and Guyana. DEPRESSION AND ANXIETY. 2019;36(5):423-32.

70. Tolulope O, Olutayo A, Babatunde S, Adesanmi A. Suicidality in a Non-Clinical Sample of Nigerian Adoloscents: Prevalence and Correlates. SUICIDOLOGY ONLINE-SOL. 2019;10.

71. Wu YD, Coulibaly SP, Sidibe AM, Hesketh T. Self-Harm, Suicidal Ideation and Attempts among School-Attending Adolescents in Bamako, Mali. CHILDREN-BASEL. 2022;9(4).

72. Zarrouq B, Bendaou B, Elkinany S, Rammouz I, Aalouane R, Lyoussi B, et al. Suicidal behaviors among Moroccan school students: prevalence and association with socio-demographic characteristics and psychoactive substances use: a cross-sectional study. BMC Psychiatry. 2015;15:284.

73. Beksinska A, Shah P, Kungu M, Kabuti R, Babu H, Jama Z, et al. Longitudinal experiences and risk factors for common mental health problems and suicidal behaviours among female sex workers in Nairobi, Kenya. Glob Ment Health (Camb). 2022;9:401-15.

74. Teismann T, Brailovskaia J, Margraf J. Positive mental health, positive affect and suicide ideation. International Journal of Clinical and Health Psychology. 2019;19(2):165-9.

75. Patton GC, Sawyer SM, Santelli JS, Ross DA, Afifi R, Allen NB, Arora M,

Azzopardi P, Baldwin W, Bonell C. Our future: a lancet commission on

adolescent health and wellbeing. Lancet. 2016;387(10036):2423–78. https://

doi.org/10.1016/S0140-6736(16)00579-1.

76. McLean ML, editor. West African youth challenges and opportunity

pathways. Cham: Palgrave MacMillan; 2020.

77. Breet E, Goldstone D, Bantjes J. Substance use and suicidal ideation and

behaviour in low-and middle-income countries: a systematic review. BMC

Public Health. 2018;18(1):549. https://doi.org/10.1186/s12889-018-5425-6.

78. Ferreira-Borges C, Esser MB, Dias S, Babor T, Parry CD. Alcohol control

policies in 46 African countries: opportunities for improvement. Alcohol

Alcohol. 2015;50(4):470–6. https://doi.org/10.1093/alcalc/agv036.

79. WHO. Global status report on alcohol and health 2018. Geneva: WHO; 2018.

80. Borges G, Loera CR. Alcohol and drug use in suicidal behaviour. Curr Opin Psychiat. 2010;23(3):195–204. https://doi.org/10.1097/YCO.0b013e3283386322.

81. Vancampfort D, Damme TV, Firth J, Hallgren M, Smith L, Stubbs B, Rosenbaum S, Koyanagi A. Correlates of leisure-time sedentary behavior among 181,793 adolescents aged 12-15 years from 66 low- and middleincome countries. PLoS One. 2019;14(11):e0224339. https://doi.org/10.1371/journal.pone.0224339.

82. Vancampfort D, Stubbs B, Mugisha J, Firth J, Van Damme T, Smith L, Koyanagi A. Leisure-time sedentary behavior and suicide attempt among 126,392 adolescents in 43 countries. J Affect Disord. 2019;250:346–53. https://doi.org/10.1016/j.jad.2019.03.053.

83. Vancampfort D, Stubbs B, Firth O, Damme TV, Koyanagi A. Sedentary behavior and depressive symptoms among 67,077 adolescents aged 12–15 years from 30 low- and middleincome countries. Int J Behav Nutr Phys Act. 2018;15(73). https://doi.org/10.1186/s12966-018-0708-y.

84. Page RM, West JH. Suicide ideation and psychosocial distress in sub-Saharan African youth. Am J Health Behav. 2011;35(2):129–41. https://doi.org/10.5993/ajhb.35.2.1.

85. Cai Z, Canetto SS, Chang Q, Yip PSF. Women's suicide in low-, middle-, and high-income countries: Do laws discriminating against women matter? Social Science & Medicine. 2021;282:114035.

86. Canetto SS. Women and suicidal behavior: a cultural analysis. American Journal of Orthopsychiatry. 2008;78(2):259-66.

87. Devries KM, Mak JY, Bacchus LJ, Child JC, Falder G, Petzold M, et al. Intimate partner violence and incident depressive symptoms and suicide attempts: a systematic review of longitudinal studies. PLoS medicine. 2013;10(5):e1001439.

88. Cai Z, Chen M, Ye P, PSF Y. Socio-economic determinants of suicide rates in transforming China: a spatial-temporal analysis from 1990 to 2015. Lancet Reg Health West Pac. 2022;19:100341.