Received: 19 March 2024 | Revised: 19 February 2025 | Accepted: 26 February 2025

DOI: 10.1111/dar.14040

COMPREHENSIVE REVIEW

Drug and Alcohol REVIEW APSAD WILEY

Tobacco smoking in Sub-Saharan Africa: A systematic review and meta-analysis

Habte Belete[1,2] | **Tesfa Mekonen**[3] | **Jason P. Connor**[3,4] | **Gary Chan**[3] | **Leanne Hides**[2,3] | **Janni Leung**[2,3]

[1]Department of Psychiatry, Bahir Dar University, Bahir Dar, Ethiopia

[2]School of Psychology, The University of Queensland, Brisbane, Australia

[3]National Centre for Youth Substance Use Research, The University of Queensland, Brisbane, Australia

[4]Discipline of Psychiatry, The University of Queensland, Brisbane, Australia

Correspondence
Habte Belete, National Centre for Youth Substance Use Research, 31 Upland Road, St Lucia, QLD 4067, Australia.
Email: h.gobie@uq.net.au

Abstract

Introduction: Population-level smoking (cigarette or tobacco or nicotine use) has reduced in high-income nations, but not proportionally compared to less developed regions. This study aimed to estimate smoking prevalence in Sub-Saharan Africa (SSA).

Approach: Databases searched included PubMed, EMBASE, PsycINFO, African Journal Online, the Global Health Data Exchange and Google Scholar. The search terms included 'cigarette', 'smoking', 'tobacco', 'nicotine', 'prevalence' and 'Sub-Saharan Africa'. Prevalence data on smoking was extracted separately for adolescents (10–17) and adults (18+). Prevalence of lifetime, past 12- and 6-month smoking was included. Weighted pooled prevalence was calculated using MetaXL, while meta-regression analysis was conducted with Stata version 17. For the estimation of pooled prevalence, we employed a DerSimonian–Laird estimation method. The risk of bias tool was utilised to assess the quality of the studies.

Key Findings: We included 195 papers. Overall, between 2018 and 2023, the weighted lifetime smoking prevalence was 8.8% (95% confidence interval [CI] 5.1, 13.4%), with a past-year prevalence of 10.8% (CI 4.0%, 19.9%), and daily smoking was 3.5% (CI 0.0%, 9.5%) in SSA. Among adolescents, the lifetime prevalence was 4.5% (CI 2.0%, 8.0%), with a past-year prevalence of 4.1% (CI 0.0%, 13.4%) and daily smoking was 4.7% (CI 1.0%, 10.6%). Among adults, the lifetime prevalence of smoking was 12.7% (CI 6.6%, 20.4%), 12.1% (CI 2.6%, 26.2%) in the past year and daily smoking was 3.3% (CI 0.0%, 9.8%).

Implications: These findings highlight the importance of maintaining consistent monitoring and ensuring timely follow-up in implementing smoking prevention measures and regulations in SSA countries.

KEYWORDS
population, prevalence, Sub-Saharan Africa, tobacco smoking

1 | INTRODUCTION

In 2019, over 1.1 billion people smoked tobacco, resulting in 8 million fatalities and a loss of 200 million disability-adjusted life years [1,2]. Notably, over 80% of tobacco consumers reside in low- and middle-income nations [3].

Smoking prevalence data mainly come from developed countries that conduct regular population surveys [4]. In 2019, past-year smoking prevalence was 15.5% in Europe and Asia, 17.6% in high-income countries like the United States, Australia and Canada, 7.6% in Latin America and the Caribbean [1]. In Sub-Saharan Africa (SSA), annual smoking prevalence was 2.9% in 2019 [1]. However, this is likely an underestimate due to the lack of available data in several SSA countries.

Among adolescents (12–17 years), the annual prevalence of smoking in low-and-middle-income countries was 14.0%, ranging from 5.0% in Mozambique to 31.5% in Wallis and Futuna in the Global School-based Student Health Survey (GSHS 2013–2022) [5]. Regionally, adolescent past-year smoking rates were 10.1% in Africa, 14% in Southeast Asia, 15.6% in the Americas and 23.9% in the Western Pacific in the GSHS 2013–2022 [5].

In 2019, global adult smoking prevalence was 19.6%, with males having higher odds of smoking than females [6,7]. The male-to-female risk gap is relatively small in Western countries [8] but it is significantly wider in Asia and SSA [9–11].

While global smoking rates have declined over the past decades, this decrease has been slower in less developed nations, where research data are limited [12]. In SSA, adolescent lifetime smoking prevalence was 23.5% in 2018, but no updated figures for adults have been reported in the past 5 years [13]. Geographically, SSA is a diverse region with low- to high-income countries; 22 are politically fragile or in conflict, and 13 small states have limited resources [14]. Evidence suggests that smoking rates may be rising in low-income communities [15], as the smoking epidemic shifts towards these regions [12].

Despite the World Health Organization (WHO) Framework Convention on Tobacco Control's [16] goal to reduce global tobacco use by 30% by 2025 [17], projections suggest the health and economic impact of the tobacco epidemic will continue to rise [16]. In SSA, home to two-thirds of the world's poorest population [18], population-level prevalence data are critical. While high-income countries have enforced government-led smoking regulations [19], low-income nations, including those in SSA, face significant challenges. Regular and reliable data are vital to shaping health policies and implementing evidence-based tobacco control measures in SSA [7].

This study aimed to estimate the general population level prevalence and frequency of smoking in SSA, including data from adolescent (10–17) and adult (18+) studies.

2 | METHODS

2.1 | Protocol and registration

The protocol was registered (CRD42021271813). The reporting of this study adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [20] (Table S1, Supporting Information).

2.2 | Search strategy

Database search was conducted in PubMed, Embase, CINAHL and PsycINFO, employing MeSH Terms, Emtree and the APA Thesaurus of Psychological Index Terms, respectively. Data were searched in additional resources including the African Journal Online, Google Scholar and the Global Burden Disease's Global Health Data Exchange data source.

The initial and updated search was carried out in July 2022 and October 2023, respectively. The search included studies published since January 2018 to ensure the inclusion of the most current articles from the past 5 years (2018–2023) (Tables S3–S5), and the lifetime prevalence of smoking was reported at 23.5% only among adolescents in 2018 in SSA [13].

This review was part of a broader review on the prevalence of substance use in Sub-Saharan Africa [21,22], therefore, we used search terms for the databases, including 'substance use disorder', 'substance-related disorders', 'substance use', 'cigarette', 'smoking', 'tobacco', 'nicotine', and 'prevalence', and 'Sub-Saharan Africa' (see Table S3). Studies that examined cigarette smoking, tobacco, or nicotine use were included in this current review. However, e-cigarette (and its variations) was not examined.

2.3 | Eligibility

We included peer-reviewed observational studies published in any language that met the criteria outlined below.

2.3.1 | Study design

Cohort studies and cross-sectional surveys were included.

2.3.2 | Population

The study followed the Population, Exposure, Comparison and Outcome framework [23] (Table S2). We included general population-level participants. We excluded studies among clinical populations, high-risk groups (e.g., street youth or minorities) and individuals using other substances due to the potential higher smoking status. We categorised participants into adolescents (≤17 years) and adults (≥18 years).

2.3.3 | Outcome

The prevalence of smoking (i.e., cigarette smoking, tobacco or nicotine use) was captured by: 'past 6-months' (within the last 6 months), 'past 12 months' and 'lifetime use' (at any point in the participant's life).

The prevalence of daily smoking was defined as smoking at least once a day. There were not enough frequency data in available published reports on smoking, weekly and less than a week of smoking to include these outcomes.

2.4 | Screening

We initially retained studies featuring broad keywords related to substance use within their titles and abstracts, subjecting them to full-text screening to assess whether they provided data on the prevalence of smoking. Duplicate articles were removed. Initially, one reviewer (Habte Belete) conducted a screening of the title and abstract. Subsequently, two reviewers (Habte Belete and DC) screened the full texts. Reviewer consensus reached 92% agreement. The remainder was decided by joint agreement (Tesfa Mekonen and Janni Leung).

2.5 | Risk of bias assessment

The risk of bias assessment was performed using a modified version of the Joanna Briggs Institute critical appraisal tool [24] and the risk of bias tool for prevalence studies [25]. This modified risk of bias assessment tool was used by previous meta-analyses of prevalence studies [26]. The tool has 10 items for assessing bias in population-based prevalence studies and employs a binary scoring system (yes/no) for each item (Table S6).

2.6 | Analysis

Weighted prevalence (with the population size in a given country or state) was performed using MetaXL version 5.3 [27]. Stata version 17 (StataCorp, College Station, Texas, USA) was used for meta-regression analysis [28]. The I^2 statistic (DerSimonian–Laid approach) was employed to evaluate the heterogeneity of prevalence estimates, and the high values of I^2 statistics indicated that the variability among studies is predominantly attributable to heterogeneity rather than chance [29]. For pooled prevalence estimation, the DerSimonian–Lairdestimation method was used.

We utilised the United Nations sub-region classification for SSA to examine regional disparities, focusing on the central, eastern, western and southern SSA [30]. The United Nations gross domestic product income classifications (low income, lower middle income, upper middle income and high income) were entered as a moderator in the meta-regression. Gender differences were analysed using pooled relative risks (RRs) to compare prevalence between males and females. Publication bias was assessed through the Eggers test [31].

Confidence intervals were calculated by using the DerSimonian–Laid estimation method [32]. The prevalence of individual articles was checked against the total pooled prevalence. Articles with non-overlapping confidence intervals with the confidence interval of the pooled effect were classified as outliers. A sensitivity analysis was conducted to check how much the pooled effect size changes if the outliers are omitted from the meta-analysis.

3 | RESULTS

3.1 | Search results

After title and abstract screening from 10,310 unique records, 340 studies were included for full-text screening. We retained 195 articles for inclusion, with a total of 1,304,723 participants (Figure 1).

3.2 | Study characteristics

Most studies ($n = 184$) were cross-sectional surveys, with fewer being longitudinal ($n = 11$). Articles were included from 35 SSA countries and a notable portion ($n = 67$) was conducted nationwide. Many of the studies were community-based ($n = 123$) and others were school-based ($n = 71$). Sample sizes ranged from 124 participants in a South African study to 493,032 participants in a multinational study. Response rates varied widely, ranging from 14.7% in Nigeria to 100% in South Africa, Uganda, Benin and Ethiopia.

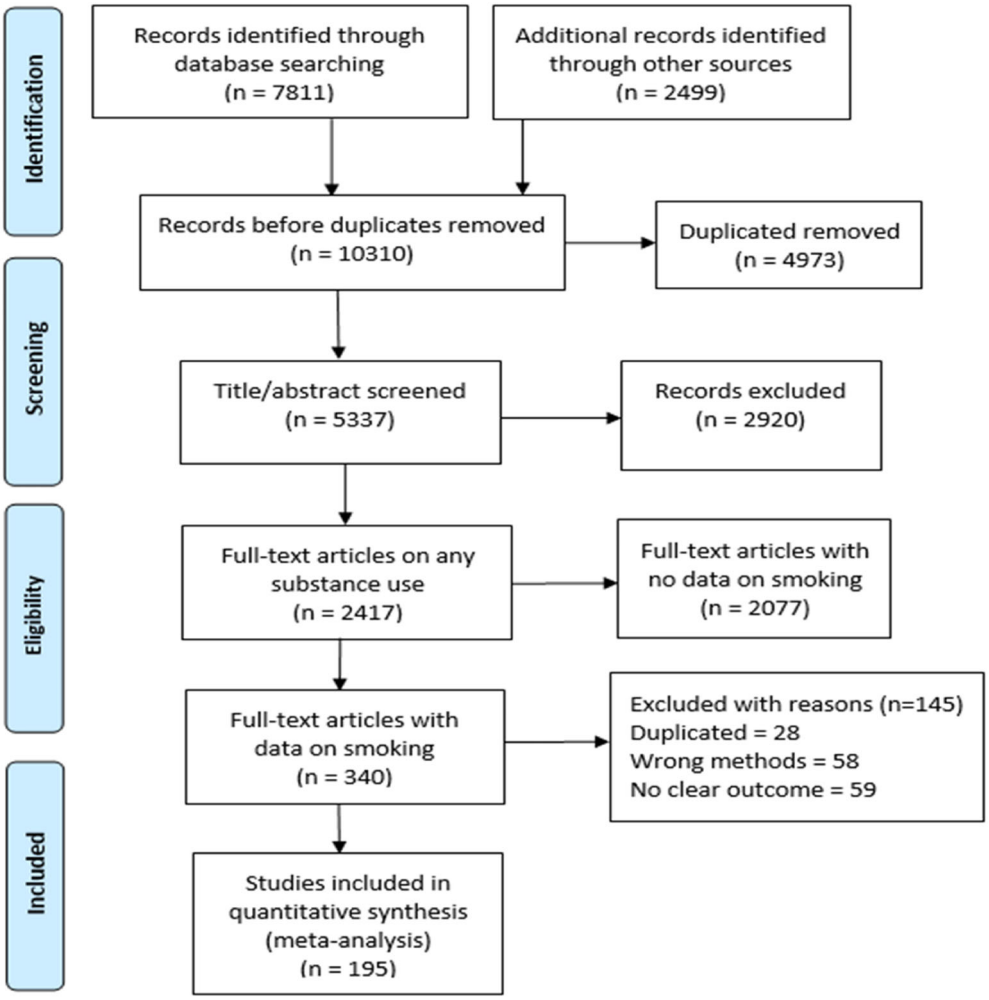

FIGURE 1 Preferred reporting items for systematic reviews and meta-analyses flow chart.

Lifetime, 12- and 6-month rates of general population-level smoking are reported in Table S8, while daily smoking prevalence is shown in Table S9. No data were available for adolescent smoking in eastern and central SSA for the past 12 months, as well as for adult smoking prevalence in western SSA over the same period.

3.3 | Overall smoking prevalence

Overall, among the total participants, the lifetime smoking prevalence in SSA was 8.8% (95% confidence interval [CI] 5.1%, 13.4%), with a past-year prevalence of 10.8% (CI 4.0%, 19.9%) and 5.8% (95% CI 0.2%, 15.9%) in the last 6 months (Table 1).

For adolescents, the pooled lifetime smoking prevalence in SSA was 4.5% (95% CI 2.0%, 8.0%), with a past-year prevalence of 4.1% (CI 0.0%, 13.4%) and 7.6% (CI 2.9%, 14.0%) in the past 6 months (Table 2). These estimates indicate that there was likely a data gap, as the estimates for the lifetime smoking prevalence were lower than the estimate for the past 6 months.

For adults, the lifetime prevalence of smoking was 12.7% (95% CI 6.6%, 20.4%), 12.1% (95% CI 2.6%, 26.2%) in the past year and 6.3% (95% CI 0.0%, 16.3%) in the last 6 months (Table 2). The study found a high degree of heterogeneity (I^2 >99%), evident in both the meta-regression and subgroup analyses (Figures S3–S8). This is further supported by the wide confidence intervals, ranging from 0.0% to 100.0% for each study and the pooled prevalence estimates (Tables S13 and S14). Sensitivity analysis results indicated that there was a difference in the prevalence before and after removing outliers, with overlapping confidence intervals (Figures S9–S12).

After excluding 11 outliers, the weighted lifetime prevalence of smoking among adolescents was 4.0% (95% CI 2.0%–7.0%), and the confidence intervals overlapped with the original prevalence, 4.5% (CI 2.0%, 8.0%). The

TABLE 1 Overall prevalence and gender differences in smoking by region in Sub-Saharan Africa.

	Overall prevalence		Gender differences, male to female	
Region	**No. of studies**	**Prevalence (95% CI)**	**No. of studies**	**RR (95% CI)**
Lifetime prevalence	143	8.8 (5.1, 13.4)	38	4.9 (3.8, 6.4)
Southern SSA	26	36.1 (21.2, 52.4)	9	3.3 (2.2, 4.9)
Western SSA	50	5.2 (1.7, 10.2)	12	3.8 (2.2, 6.6)
Eastern SSA	64	5.7 (3.0, 9.1)	16	6.5 (3.9, 10.8)
Central SSA	2	6.9 (4.5, 9.8)	1	7.0 (6.7, 7.3)
12 months prevalence	9	10.8 (4.0, 19.9)	–	–
Southern SSA	3	16.9 (0.0, 71.1)	–	–
Western SSA	1	11.1 (9.8, 12.5)	–	–
Eastern SSA	5	8.2 (5.2, 11.8)	3	3.0 (1.6, 5.6)
Central SSA	–	–	–	–
6 months prevalence	126	5.8 (0.2, 15.9)	48	4.0 (3.1, 5.2)
Southern SSA	26	20.2 (14.4, 26.6)	13	3.9 (2.7, 5.4)
Eastern SSA	56	6.0 (4.1, 8.3)	21	4.5 (3.1, 6.8)
Western SSA	40	8.1 (1.5, 18.5)	12	3.0 (1.9, 4.6)
Central SSA	1	6.1 (5.3, 7.0)	–	–

Abbreviations: –, no data is available; CI, confidence interval; RR, relative risk; SSA, Sub-Saharan Africa.

prevalence of smoking in the past 6 months for adolescents was 3.0% (CI 1.0%, 7.0%) after excluding three outliers.

For adults, the weighted lifetime prevalence of smoking was 9.0% (95% CI 6.0%, 13.0%) after excluding nine outliers, and for the past 6 months, it was 5.0% (CI 0.0%, 15.0%) after excluding six outliers, but the confidence intervals overlapped. All findings in the abstract and tables/figures presented in this paper are derived from the original data unless stated otherwise.

The Eggers' test [31] indicated a significant small study effect in the lifetime and 6-month prevalence of smoking among adults. However, after excluding these outliers, the Eggers' test indicated no small study effects ($t = -0.54$; $p = 0.595$) in the lifetime prevalence of smoking among adults.

The heatmap shows smoking varies in various SSA countries, the results of which are further described in the regional differences section below (Figure 2; S3–S8).

3.4 | Prevalence of daily smoking

The overall prevalence of daily smoking among participants was 3.5% (CI 0.0%, 9.5%) (Table S10). For adolescents, it was 4.7% (CI 1.0%, 10.6%) and for adults, it was 8.2% (CI 4.9%, 13.8%) (Table S11).

3.5 | Regional differences in overall prevalence

Lifetime smoking prevalence varied by region: 36.1% in southern SSA, 6.9% in central SSA, 5.7% in eastern SSA and 5.2% in western SSA (Table 1). Over the past 12 months, smoking prevalence was 16.9% in southern SSA, 11.1% in western SSA and 8.2% in eastern SSA. For the past 6 months, smoking prevalence was 20.2% in southern SSA, 8.1% in western SSA, 6.1% in central SSA and 6.0% in eastern SSA (Table 1).

At the country level, the overall lifetime prevalence of smoking was 37.0% in South Africa, and a 6-month prevalence of 20.3% (15.3%, 25.8%). Namibia had a lifetime prevalence of 28.9% (0.0%, 69.4%) with no available data for 12 months. In Rwanda, lifetime prevalence was 19.8% (18.0%, 21.6%) and 6-month prevalence was 8.6% (7.4%, 9.9%) (Table S13).

The highest overall daily smoking prevalence was reported in South Africa (24.5%), followed by Seychelles (14.8%) and Kenya (11.8%) (Table S10).

3.6 | Regional differences among adolescents

Adolescent smoking prevalence varies by region and country in SSA (Table S14). Lifetime smoking prevalence

TABLE 2 Prevalence and gender differences in smoking by region among adults and adolescents in Sub-Saharan Africa.

	Prevalence in adolescents		Gender differences in adolescents, male to female		Prevalence in adults		Gender difference in adults, male to female	
Region	No. of studies	Prevalence (95% CI)	No. of studies	RR (95% CI)	No. of studies	Prevalence (95% CI)	No. of studies	RR (95% CI)
Lifetime prevalence	67	4.5 (2.0, 8.0)	13	2.7 (2.0, 3.6)	76	12.7 (6.6, 20.4)	25	6.0 (4.4, 8.2)
Southern SSA	6	19.8 (9.1, 33.1)	2	2.1 (1.8, 2.6)	20	37.1 (21.1, 54.6)	7	3.5 (2.2, 5.6)
Western SSA	32	4.0 (0.6, 4.0)	6	2.6 (1.5, 4.8)	18	6.1 (0.2, 17.1)	6	5.0 (2.1, 11.6)
Eastern SSA	27	4.6 (1.6, 8.8)	5	2.9 (2.4, 3.6)	37	6.3 (2.9, 10.7)	11	7.9 (4.4, 14.2)
Central SSA	1	9.1 (7.8, 10.5)	–	–	1	7.0 (6.7, 7.3)	1	42.4 (34.6, 52.2)
12 months prevalence	3	4.1 (0.0, 13.4)	–	–	6	12.1 (2.6, 26.2)	3	3.0 (1.6, 5.6)
Southern SSA	2	3.0 (0.0, 16.1)	–	–	1	59.2 (55.7, 62.5)	–	–
Western SSA	1	11.1 (9.8, 12.5)	–	–	–	–	–	–
Eastern SSA	–	–	–	–	5	8.2 (5.2, 11.8)	3	3.0 (1.6, 5.6)
Central SSA	–	–	–	–	–	–	–	–
6 months prevalence	58	7.6 (2.9, 14.0)	17	1.8 (1.5, 2.1)	68	6.3 (0.0, 16.3)	31	6.0 (4.4, 8.1)
Southern SSA	8	22.9 (8.8, 40.7)	3	1.8 (1.5, 2.7)	18	19.5 (13.7, 25.9)	10	4.9 (3.1, 7.8)
Eastern SSA	24	4.7 (2.5, 7.5)	7	1.8 (1.4, 2.3)	32	7.2 (4.4, 10.6)	14	7.3 (4.4, 12.1)
Western SSA	25	8.3 (0.0, 22.6)	7	1.8 (1.3, 2.5)	15	8.8 (4.4, 23.6)	5	5.2 (1.8, 14.6)
Central SSA	–	–	–	–	1	6.1 (5.3, 6.9)	–	–

Abbreviations: –, no data is available; CI, confidence interval; RR, relative risk; SSA, Sub-Saharan Africa.

is highest in southern SSA at 19.8%, followed by central SSA at 9.1%, eastern SSA at 4.6%, and western SSA at 4.0%. Over the past 12 months, smoking rates were 11.1% in western SSA and 3.0% in southern SSA. In the last 6 months, southern SSA had the highest prevalence at 22.9%, followed by western SSA at 8.3% and eastern SSA at 4.7% (Table S14).

In Benin, the lifetime prevalence of smoking was 43.5%, with a 6-month prevalence of 4.6%. In South Africa, the lifetime prevalence was 21.2%, with a 6-month prevalence of 23.7%. Botswana had a lifetime prevalence of 18.2% and a 12-month prevalence of 13.0%. Zimbabwe reported a lifetime prevalence of 17.8% (Table S14). The highest daily smoking prevalence among adolescents was in Nigeria at 4.9% (Table S11).

3.7 | Regional differences among adults

Adult smoking rates also vary by region and country (Table S14). The southern SSA region had a lifetime prevalence of 37.1%, central SSA had 7.0%, eastern SSA had a 6.3% and western SSA had 6.1%. In the past 12 months, southern SSA had a prevalence of 59.2%, and eastern SSA had 8.2%. In the past 6 months, southern SSA had a 19.5%, western SSA had 8.8%, eastern SSA had 7.2% and central SSA had 6.1% (Table S14).

In South Africa, the 12-month prevalence was 59.2%, and the 6-month prevalence was 19.6%. Namibia recorded a lifetime prevalence of 28.9%, with no available data for 12-month and 6-month prevalence. In Gambia, the lifetime prevalence was 27.9%, with no available data for 12-month and 6-month prevalence. In Burkina Faso,

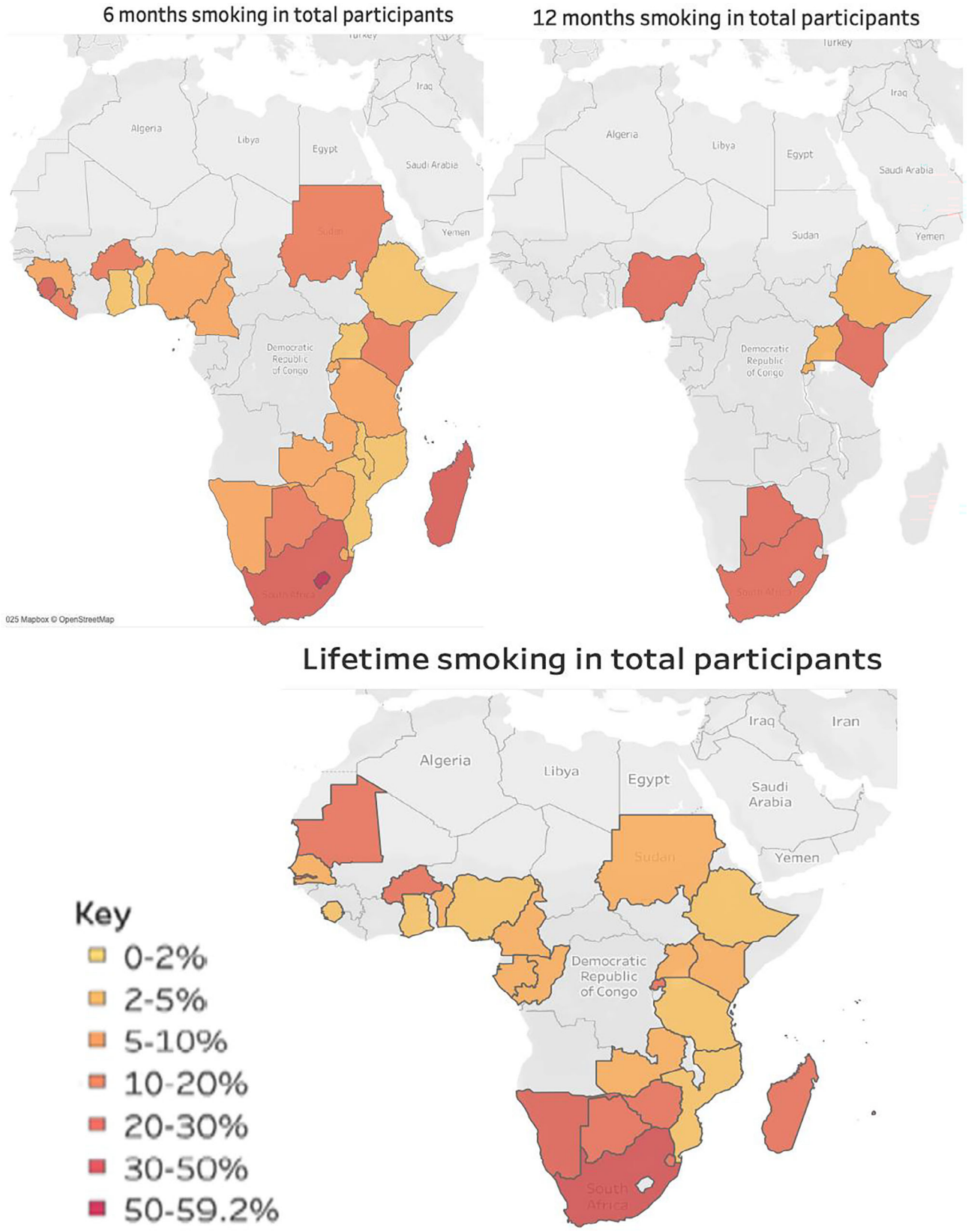

FIGURE 2 The heatmaps display disparities in smoking prevalence across Sub-Saharan African countries. Shaded areas represent nations with available pooled smoking data, while countries with no data are left unshaded.

the lifetime smoking prevalence was 19.4%, past 6-month was 10.7%, with no data for 12 months. In Rwanda, the lifetime prevalence was 19.8%, and the 12-month prevalence was 8.0%. Congo had a lifetime prevalence of 7.0%, with no available data for 12 and 6 months (Table S14).

South Africa had the highest daily smoking prevalence among adults at 24.5%, followed by Ghana at 18.8%, Seychelles at 14.8%, and Kenya at 11.8% (Table S11).

3.8 | Gender differences

Among all participants, the male-to-female RR for lifetime and 6-month smoking was 4.9 and 4.0, respectively (Table 1). In central SSA, the RR for lifetime smoking was 7.0; in eastern SSA, it was 6.5; in western SSA, it was 3.8; and in southern SSA, it was 3.3 (Table 1). Among adolescents, the lifetime and 6-month RR for smoking were 2.7 and 1.8, respectively (Table 2). Among adults, the lifetime, 12-month, and 6-month RR for smoking were 6.0, 3.0 and 6.0, respectively (Table 2).

The highest RR was 2.9 in eastern SSA in the lifetime prevalence of smoking among adolescents. The lowest RR was 1.8 in southern, eastern and western SSA (RR = 1.8) in the 6-month prevalence among adolescents (Table 2).

Among adults, eastern SSA had the highest RR (3.0) for the past 12-month smoking, whereas southern SSA had the lowest RR (4.9) for 6-month prevalence (Table 2). The male-to-female RR for daily smoking was not reported among adolescents, while among adults, it was 8.2 (Table S11). Regionally, western SSA had the highest RR for daily smoking (RR = 17.5) and southern SSA had the lowest (RR = 2.6) (Table S11).

3.9 | Bias and meta-regression analysis

The overall risk of bias assessment in this review was assessed as low. However, some studies presented low quality, including poor sample representation, lack of reporting for the shortest prevalence period, and missing details on measurement reliability and validity (Table S7). In the summary score, 20% of the studies ($n = 39$) scored 9–10 out of 10, while 70.8% of the studies ($n = 138$) scored 7–8, indicating that a low risk of bias existed.

The meta-regression analysis revealed no overall significant correlation between country income levels and smoking (Table S12). However, among adults, there was a significant association in upper-middle-income countries for the lifetime ($\beta = 0.18$, $p = 0.001$), 12-month ($\beta = 0.51$, $p = 0.001$) and 6-month prevalence of smoking ($\beta = 0.11$, $p = 0.001$).

4 | DISCUSSION

This systematic review and meta-analysis presents estimates of lifetime, past-year and daily smoking prevalence across 35 SSA countries, using data from 195 unique articles.

Overall, across the total SSA sample, the lifetime smoking prevalence was 8.8% and the past-year prevalence was 10.8%. The past-12-month prevalence of smoking was 4.1% and 12.2% among adolescents and adults, respectively. The prevalence of daily smoking was 3.5% in the total sample, 4.7% among adolescents and 3.3% among adults. These population-level prevalence estimation results highlight the prevalence of smoking in SSA between 2018 and 2023, supporting the notion that the high smoking prevalence is shifting towards low-income countries, such as SSA [12].

4.1 | Smoking in adults

The lifetime prevalence of smoking among adults in SSA was found to be comparable to the United States (19.0%), where population-level data are routinely monitored [33]. This indicates that smoking may be widespread and cause harm in SSA, a region facing significant challenges such as limited healthcare resources, weak implementation of tobacco control policies [34] and being home to two-thirds of the world's most impoverished population [18].

Most notably, the past 12-month prevalence of smoking among adults in SSA (12.7%) is higher than the 7.6% annual prevalence reported in Latin America and the Caribbean and the 2.9% annual prevalence reported in SSA [1]. This finding aligns with the 15.5% overall annual prevalence reported in Central Europe, Eastern Europe and Central Asia, and the 17.6% in the United States, Australia and Canada [1]. The prevalence of past 6-month smoking among SSA adults (6.3%) is lower than the 15.5% current prevalence in the United States among adults [35]. These prevalence differences might be due to the differences in the population, data collection period, and the lack of regular data collection in most SSA countries [36]. This suggests that smoking may pose a more substantial public health challenge in the SSA region compared to high-income regions.

Among adults, the prevalence of daily smoking (3.3%) in SSA is lower than the 16.5% daily smoking reported in Organisation for Economic Co-operation and Development member countries [37]. This disparity may result from variations in health system practices and limited data collection infrastructure in SSA. The lack of routine monitoring for health behaviour like smoking likely leads to underreporting, affecting the accuracy of prevalence rates and obscuring the true extent of smoking-related public health issues in the SSA region [38].

4.2 | Smoking in adolescents

We found a significantly lower lifetime prevalence of smoking among adolescents (4.5%) compared to the

23.5% prevalence reported in the 2018 review of SSA [13]. This discrepancy might be due to the small number of studies in the previous review and the exclusion of street children in this review [13].

The 12-month prevalence of smoking (4.1%) among adolescents is also lower than in the 2019 global annual prevalence of smoking (12.7%) among youths (15–24 years) [7]. This result is lower than in the previous annual report from the SSA region (5.8%) [7], but the confidence intervals were overlapping, indicating a need for more regular data collection to monitor trends accurately in the region. The prevalence of smoking in the past 6 months among adolescents (7.6%) was also lower than in many regions [7], and in the low- and middle-income countries where the overall prevalence was 14.0% [5]. This past 6-month prevalence was lower than in the GSHS 2013–2022 in Africa (10.1%) [5]. The differences may be attributed to variations in the study populations' age ranges. For example, the 2019 global prevalence estimate included both adolescents and youths, whereas our data focus solely on adolescents. Additionally, the GSHS data only includes adolescents aged 12–17 years. This highlights the need for further research and regular data monitoring in the SSA region to gain a deeper understanding of adolescent smoking behaviour and its associated health risks, particularly considering that two-thirds of the population in SSA are under 44 years of age.

The prevalence of daily smoking among adolescents (4.7%) was higher than the prevalence of regular smoking in low- and middle-income countries overall (1.2%) [39], and in the United States, 1.3% [40] in 2019, and 1.9% in 2016–2019 [41]. This prevalence difference was significant but may be due to methodological differences in how the prevalence of daily smoking was assessed. For example, daily smoking was defined as smoking at least once per day in the current review, whereas in low- and middle-income countries, it was defined as smoking 20 or more cigarettes in the past 30 days, and in the United States, as smoking 1 to 5 cigarettes per day or more [41]. Another possible reason for this discrepancy is that the daily smoking prevalence in this study is more recent (2018–2023), whereas the older data sources used in the GSHS were collected between 2003 and 2017 [39].

4.3 | Gender and smoking

The male-to-female RR in all timeframe prevalence estimates was greater among males than females (Tables S13 and S14). Among adults, the RR of daily smoking was greater among males than females (RR = 8.2 for daily smoking). This finding is in line with prior global reports indicating a higher risk of smoking among males compared to females [12], consistent with the World Health Organization's global smoking risk predictions for both genders and with the global risk prediction of smoking [42]. The RR of smoking is higher among males than females in low-income countries [43], more notable in SSA countries due to varying cultural and traditional attitudes that impose lower expectations for smoking among females [44,45]. However, the gender risk difference is reduced among adolescents when compared to adults, potentially due to a higher prevalence of smoking among female adolescents. This observation may hold significance for future research and investigations into the relationship between gender roles and smoking prevalence.

Smoking is prevalent in SSA, particularly with a high 12-month prevalence among adults. The major reasons for this higher prevalence may include the lack of comprehensive policies and national tobacco control laws and limited implementation of effective tobacco control strategies [46]. There are weak smoking prevention measures (e.g., inadequate enforcement of smoke-free regulations of the WHO Framework Convention on Tobacco Control) [47] that should be improved to reduce the burden of smoking in SSA countries [48]. There is insufficient political dedication to enforcing tobacco taxation [34], limited collaboration among stakeholders in enforcing tobacco control measures such as the enforcement of smoke-free regulations in certain SSA countries [47], and comparatively low restrictions on tobacco advertising [49]. There is a need for policy attention to curb the rise of smoking in SSA; otherwise, this finding evidences that many countries in SSA are less likely to achieve the WHO goal of a 30% reduction in tobacco use by 2025 [17].

Without a comprehensive collaborative initiative among stakeholders to reduce smoking [47,50,51], the prevalence of smoking at the population level in SSA is likely to increase and result in significant public health consequences and economic challenges like those in South Africa [48]. These findings suggest that the prevalence of smoking at the population level is more likely to be elevated in low-income communities [15], possibly reflecting the shift of the smoking epidemic towards low-income countries [12]. This is especially crucial for nations in the SSA region, as many of these countries have limited resources for investing in robust advocacy and collaboration efforts among government and community organisations to strengthen smoking prevention [34]. Additionally, these countries have the lowest rates of national drug policies [52]. To reduce the emerging public health burden associated with smoking,

primary intervention strategies should prioritise prevention policies such as prohibiting adolescent access to tobacco products [53], like those in the WHO Framework Convention on Tobacco Control programs [16], particularly among adolescents in SSA [53,54]. This review presents the available data from 2018 to 2023 on the prevalence of smoking in SSA, which could assist in the implementation and enforcement of the WHO's effective smoke-free laws to reduce the global tobacco epidemic [55] and the enhancement of the implementation of international smoking prevention measures and strategies to curb the smoking epidemic across SSA [16,17].

Smoking control policies in Africa are currently lacking in strength [34]. There is growing evidence from the SSA indicating that the introduction of higher excise taxes can effectively deter adolescents from experimenting with smoking [56]. In addition to enforcing regulations to limit adolescent access to tobacco products, school-based interventions show great promise in curbing adolescent smoking in SSA [57]. Addressing the necessity of curbing illegal practices within the tobacco industry in low-income countries is also paramount [58]. Concerningly, there are published reports of SSA adolescents being offered free cigarettes by representatives of tobacco companies, with prevalence rates ranging from 4.7% in Côte d'Ivoire to 12.1% in South Africa [53].

One of the most notable findings was that the past 12-month prevalence of smoking among adults in SSA is higher than in Latin America and the Caribbean, and also comparable rates in Central Europe, Eastern Europe, Central Asia, the United States, Australia and Canada [1]. This suggests that the burden of smoking and related health harms in SSA may continue to increase unless appropriate measures are taken.

This finding underscores the urgent need to regulate tobacco industries and address advertising practices in low-income countries that have been banned in higher-income countries for decades [49,58]. Additionally, it is advised to strengthen the integration of smoking control measures into various stakeholders, including education, healthcare and development strategies in SSA countries [7,59–61].

This study provides the most current data on the population level of smoking in SSA, which could assist the efforts to strengthen the dedication to enforcing tobacco control implementations in many countries of the SSA [34,47]. To achieve a 30% decrease in the global smoking prevalence by 2025 [17], there is an urgent need for SSA to adopt evidence-based policies and practices known to drive down smoking prevalence [48]. There are reasons to be optimistic about change. The Tobacco Products and Electronic Delivery Systems Control Bill is currently under review in the South African Parliament, as part of the United under the Protect Our Next Initiative in this SSA region [48]. The Bill includes new regulations on all nicotine products, prohibition of smoking in enclosed public places, banning the sale of cigarettes through vending machines and displaying of tobacco products at point-of-sale, and introducing plain cigarette packaging with 'graphic health warnings'.

4.4 | Robustness of the findings

There are indicators of the high certainty of the findings. The result of the risk of bias assessment revealed that 90% of the studies ($n = 177$) scored between 7 and 10, indicating a generally low risk of bias in this review (Table S7). In addition, 34.3% of the studies ($n = 67$) included samples representing either specific provinces or regions or the entire country and were passed through several steps to include representative samples of each country, underscoring the strong policy implications of the findings for establishing priorities in SSA countries to adopt and enforce evidence-based smoking control policies and develop targeted prevention strategies.

However, a wide confidence interval observed in some estimates, such as the overall 12-month prevalence of smoking in South Africa (Table S13), suggests uncertainty about the true effect. This uncertainty may stem from various factors, including variations in sample sizes, heterogeneity across studies, inconsistent or biased findings, and the inclusion of small studies in the analysis (Table S13). The diverse cultural and attitudinal heterogeneity within the SSA population regarding smoking (I^2 >99% in the Eggers' test, as shown in both the meta-regression and subgroup analyses, Figures S3–S8), small sample sizes in certain studies (14% of studies included had fewer than 400 participants), a notable small study effect in the lifetime and 6-month smoking prevalence among adults, and the inclusion of low-quality studies (10% of studies scored 6 or below on the risk of bias assessment tool) may all contribute to the wide confidence interval. These factors raise concerns about the precision of the pooled estimates, emphasising the need for further investigation.

4.5 | Limitations related to the design and study

The systematic review and meta-analysis design is subject to several limitations that may impact the reliability and generalisability of the conclusions.

One limitation is the uneven geographic distribution of studies included in the analysis, with a high concentration

of articles from countries like Nigeria, South Africa, Ethiopia and Ghana, while countries such as Sudan, the Central African Republic and Congo have few or no studies. This imbalance creates gaps in regional representation and limits the comprehensiveness of the findings across the region.

Another limitation is related to the biases in the reporting of studies, including publication bias, where studies with significant or favourable results are more likely to be published, potentially skewing the overall conclusions. Additionally, the significant heterogeneity within SSA, encompassing diverse cultures, languages, socio-economic conditions and health systems, adds concern about the applicability of findings to the entire region. These issues underscore the importance of considering the transparency and nature of the methodological rigour while interpreting findings in this systematic review and meta-analyses.

Some articles lacked clear age distinctions between adolescents and adults, potentially affecting the interpretation of overall prevalence. As shown in Figure 2, several SSA countries had limited or no data, affecting the interpretation of overall prevalence. In this study, e-cigarettes (and its variations) were not examined as there might be a possible association between vapes and traditional smoking addiction/use in SSA that needs further investigation [62–64].

This study itself is subject to some limitations. Methodological issues, such as unclear age classifications and a lack of data on smoking frequency, may have limited the conclusions that can be drawn from the data. Inconsistencies were found in lifetime and 12-month smoking rates, with lifetime smoking being lower, an unusual trend that suggests the lack of consistent data monitoring across many SSA countries.

5 | CONCLUSIONS

The results demonstrate that the prevalence of smoking is common in SSA, with the past 12-month prevalence of smoking among adults particularly high (12.7%). However, population-level data on the prevalence and frequency of smoking in several SSA countries remain limited.

To address this gap, Saharan region nations should enhance their national smoking monitoring efforts. It is also a priority to develop innovative strategies for preventing smoking and monitoring smoking trends within the population. Furthermore, maintaining a consistent and vigilant approach to the implementation of international smoking prevention measures and regulations across Sub-Saharan countries is crucial to curbing the smoking rates. Habte Belete is supported by The University of Queensland research and training program scholarship.

AUTHOR CONTRIBUTIONS

Habte Belete, Gary Chan, Leanne Hides and Janni Leung conceived the study. Habte Belete conducted the search. Habte Belete and Dorothy C. Espinosa did the data extraction with oversight from Janni Leung, Gary Chan and Leanne Hides. Habte Belete conducted the analysis. Habte Belete drafted the manuscript and write-up with the supervision of Gary Chan, Leanne Hides and Janni Leung. Tesfa Mekonen, Jason P. Connor, Gary Chan, Leanne Hides and Janni Leung contributed to the final writing of the paper and checked important intellectual content. All authors approved the final draft of the manuscript.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge Dr Bekti Mulatiningsih (Research Outputs and Impact Specialist, The University of Queensland) for her contribution to the development of the search strategy. The authors gratefully acknowledge Ms Dorothy C. Espinosa (Honours student, The University of Queensland) for her contribution to the data screening. The authors also acknowledge the authors of the articles used in this study. Open access publishing facilitated by The University of Queensland, as part of the Wiley - The University of Queensland agreement via the Council of Australian University Librarians.

CONFLICT OF INTEREST STATEMENT

None.

ORCID

Tesfa Mekonen https://orcid.org/0000-0002-3188-0173
Gary Chan https://orcid.org/0000-0002-7569-1948
Leanne Hides https://orcid.org/0000-0002-4550-8460
Janni Leung https://orcid.org/0000-0001-5816-2959

REFERENCES

1. Reitsma MB, Kendrick PJ, Ababneh E, Abbafati C, Abbasi-Kangevari M, Abdoli A, et al. Spatial, temporal, and demographic patterns in prevalence of smoking tobacco use and attributable disease burden in 204 countries and territories, 1990–2019: a systematic analysis from the Global Burden of Disease Study 2019. Lancet. 2021;397:2337–60.
2. World Health Organization. WHO global report on trends in prevalence of tobacco use 2000–2025. 2021.
3. World Health Organization. Tobacco 2022. Available from: https://www.who.int/news-room/fact-sheets/detail/tobacco
4. Australian Bureau of Statistics. Insights into Australian smokers, 2021–22, Snapshot of smoking in Australia. 2022.

5. Wang Q, Wang H. Cannabis and tobacco use among adolescents aged 12-17 years from 16 low-and middle-income countries. J Glob Health. 2023;13:04066.
6. Murray CJ, Aravkin AY, Zheng P, Abbafati C, Abbas KM, Abbasi-Kangevari M, et al. Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the global burden of disease study 2019. Lancet. 2020;396:1223–49.
7. Reitsma MB, Flor LS, Mullany EC, Gupta V, Hay SI, Gakidou E. Spatial, temporal, and demographic patterns in prevalence of smoking tobacco use and initiation among young people in 204 countries and territories, 1990–2019. Lancet Public Health. 2021;6:e472–81.
8. Peters SA, Huxley RR, Woodward M. Do smoking habits differ between women and men in contemporary Western populations? Evidence from half a million people in the UK Biobank study. BMJ Open. 2014;4:e005663.
9. Hitchman SC, Fong GT. Gender empowerment and female-to-male smoking prevalence ratios. Bull World Health Organ. 2011;89:195–202.
10. Giovino GA, Mirza SA, Samet JM, Gupta PC, Jarvis MJ, Bhala N, et al. Tobacco use in 3 billion individuals from 16 countries: an analysis of nationally representative cross-sectional household surveys. Lancet. 2012;380:668–79.
11. Collaborators GT. Spatial, temporal, and demographic patterns in prevalence of smoking tobacco use and attributable disease burden in 204 countries and territories, 1990–2019: a systematic analysis from the Global Burden of Disease Study 2019. Lancet. 2021;397:2337–60.
12. Dai X, Gakidou E, Lopez AD. Evolution of the global smoking epidemic over the past half century: strengthening the evidence base for policy action. Tob Control. 2022;31:129–37.
13. Ogundipe O, Amoo E, Adeloye D, Olawole-Isaac A. Substance use among adolescents in sub-Saharan Africa: a systematic review and meta-analysis. S Afr J Child Health. 2018;12:s79–s84.
14. The World Bank. The World Bank in Africa 2022. Available from: https://www.worldbank.org/en/region/afr/overview
15. Casetta B, Videla AJ, Bardach A, Morello P, Soto N, Lee K, et al. Association between cigarette smoking prevalence and income level: a systematic review and meta-analysis. Nicotine Tob Res. 2017;19:1401–7.
16. World Health Organization. WHO report on the global tobacco epidemic 2019: Offer help to quit tobacco use. Geneva, Switzerland: World Health Organization; 2019.
17. World Health Organization. WHO global report on trends in prevalence of tobacco use 2000–2025: World Health Organization. 2019.
18. Schoch M, Lakner C. The number of poor people continues to rise in Sub-Saharan Africa, despite a slow decline in the poverty rate. World bank blogs. 2020.
19. Chugh A, Arora M, Jain N, Vidyasagaran A, Readshaw A, Sheikh A, et al. The global impact of tobacco control policies on smokeless tobacco use: a systematic review. Lancet Glob Health. 2023;11:e953–68.
20. Moher D, Liberati A, Tetzlaff J, Altman DG, Group P. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. PLoS Med. 2009;6:e1000097.
21. Belete H, Mekonen T, Espinosa DC, Ambaw F, Connor J, Chan G, et al. Cannabis use in sub-Saharan Africa: a systematic review and meta-analysis. Addiction. 2023;118:1201–15.
22. Belete H, Yimer TM, Dawson D, Espinosa DC, Ambaw F, Connor JP, et al. Alcohol use and alcohol use disorders in sub-Saharan Africa: a systematic review and meta-analysis. Addiction. 2024;119:1527–40.
23. Tacconelli E. Systematic reviews: CRD's guidance for undertaking reviews in health care. Lancet Infect Dis. 2010;10:226.
24. Munn Z, Moola S, Riitano D, Lisy K. The development of a critical appraisal tool for use in systematic reviews addressing questions of prevalence. Int J Health Policy Manag. 2014;3:123–8.
25. Hoy D, Brooks P, Woolf A, Blyth F, March L, Bain C, et al. Assessing risk of bias in prevalence studies: modification of an existing tool and evidence of interrater agreement. J Clin Epidemiol. 2012;65:934–9.
26. Baranyi G, Scholl C, Fazel S, Patel V, Priebe S, Mundt AP. Severe mental illness and substance use disorders in prisoners in low-income and middle-income countries: a systematic review and meta-analysis of prevalence studies. Lancet Glob Health. 2019;7:e461–71.
27. Barendregt JJ, Doi SA, Lee YY, Norman RE, Vos T. Meta-analysis of prevalence. J Epidemiol Community Health. 2013;67:974–8.
28. StataCorp L. Stata Statistical Software: Release Vol. 16. 2019.
29. Huedo-Medina TB, Sanchez-Meca J, Marin-Martinez F, Botella J. Assessing heterogeneity in meta-analysis: Q statistic or I-2 index? Psychol Methods. 2006;11:193–206.
30. United Nations. Annex II Classification of SDG regions and income groups. 2019.
31. Mavridis D, Salanti G. Exploring and accounting for publication bias in mental health: a brief overview of methods. Evid Based Ment Health. 2014;17:11–5.
32. Nyaga VN, Arbyn M, Aerts M. Metaprop: a Stata command to perform meta-analysis of binomial data. Arch Public Health. 2014;72:39.
33. Cornelius ME, Loretan CG, Wang TW, Jamal A, Homa DM. Tobacco product use among adults—United States, 2020. MMWR Morb Mortal Wkly Rep. 2022;71:397–405.
34. Egbe CO, Magati P, Wanyonyi E, Sessou L, Owusu-Dabo E, Ayo-Yusuf OA. Landscape of tobacco control in sub-Saharan Africa. Tob Control. 2022;31:153–9.
35. Jamal A, Phillips E, Gentzke AS, Homa DM, Babb SD, King BA, et al. Current cigarette smoking among adults—United States, 2016. MMWR Morb Mortal Wkly Rep. 2018;67:53–9.
36. Ng M, Freeman MK, Fleming TD, Robinson M, Dwyer-Lindgren L, Thomson B, et al. Smoking prevalence and cigarette consumption in 187 countries, 1980-2012. JAMA. 2014;311:183–92.
37. Organisation for Economic Co-operation and Development (OECD). Smoking among adults. Health at a glance 2021: OECD indicators. Paris: OECD Publishing; 2021. Available from: https://www.oecd-ilibrary.org/social-issues-migration-health/health-at-a-glance-2021_ae3016b9-en
38. Mulupi S, Ayakaka I, Tolhurst R, Kozak N, Shayo EH, Abdalla E, et al. What are the barriers to the diagnosis and management of chronic respiratory disease in sub-Saharan

Africa? A qualitative study with healthcare workers, national and regional policy stakeholders in five countries. BMJ Open. 2022;12:e052105.
39. de la Torre-Luque A, Ozeylem F, Essau CA. Prevalence of addictive behaviours among adolescents from 73 low-and middle-income countries. Addict Behav Rep. 2021;14:100387.
40. Sargent JD, Gabrielli J, Budney A, Soneji S, Wills TA. Adolescent smoking experimentation as a predictor of daily cigarette smoking. Drug Alcohol Depend. 2017;175:55–9.
41. Meza R, Jimenez-Mendoza E, Levy DT. Trends in tobacco use among adolescents by grade, sex, and race, 1991-2019. JAMA Netw Open. 2020;3:e2027465.
42. World Health Organization. WHO global report on trends in prevalence of tobacco use 2000–2025. Geneva: World Health Organization; 2019.
43. Aboagye RG, Mohammed A, Duodu PA, Adnani QES, Seidu A-A, Ahinkorah BO. Sex-related inequalities in current cigarette smoking among adolescents in Africa. Subst Abuse Treat Prev Policy. 2024;19:41.
44. Egbe CO, Meyer-Weitz A, Asante KO, Petersen I. "A woman is not supposed to smoke": exploring gendered stereotypes in smoking patterns in a Nigerian setting. J Psychol. 2014;5:1–7.
45. Boua PR, Soo CC, Debpuur C, Maposa I, Nkoana S, Mohamed SF, et al. Prevalence and socio-demographic correlates of tobacco and alcohol use in four sub-Saharan African countries: a cross-sectional study of middle-aged adults. BMC Public Health. 2021;21:1126.
46. Craig L, Fong GT, Chung-Hall J, Puska P. Impact of the WHO FCTC on tobacco control: perspectives from stakeholders in 12 countries. Tob Control. 2019;28(Suppl 2):s129–s135.
47. Sanni S, Hongoro C, Ndinda C, Wisdom JP. Assessment of the multi-sectoral approach to tobacco control policies in South Africa and Togo. BMC Public Health. 2018;18(Suppl 1):962.
48. Das M. South Africa's new tobacco and e-cigarette control bill. Lancet Oncol. 2023;24:e239.
49. Peer N. Current strategies are inadequate to curb the rise of tobacco use in Africa. S Afr Med J. 2018;108:551–6.
50. Habebo TT, Takian A. Retrospective policy analysis of tobacco prevention and control in Ethiopia. Ethiop J Health Sci. 2020;30:427–38.
51. Silumbwe A, San Sebastian M, Zulu JM, Michelo C, Johansson K. The role of principled engagement in public health policymaking: the case of Zambia's prolonged efforts to develop a comprehensive tobacco control policy. Glob Health Action. 2023;16:2212959.
52. World Health Organization. Global status report on alcohol and health 2018. Geneva: World Health Organization; 2019.
53. Chandora R, Song Y, Chaussard M, Palipudi KM, Lee KA, Ramanandraibe N, et al. Youth access to cigarettes in six sub-Saharan African countries. Prev Med. 2016;91:S23–7.
54. Onaolapo OJ, Olofinnade AT, Ojo FO, Adeleye O, Falade J, Onaolapo AY. Substance use and substance use disorders in Africa: an epidemiological approach to the review of existing literature. World J Psychiatry. 2022;12:1268–86.
55. World Health Organization. WHO report on the global tobacco epidemic, 2023: protect people from tobacco smoke. 2023.
56. Dare C, Cham B, Boachie MK, Gitonga Z, D'Alessandro U, Walbeek C. Effect of price on the decision to experiment with cigarette smoking among Gambian children: a survival analysis using The Gambia 2017 Global Youth Tobacco Survey data. BMJ Open. 2022;12:e061045.
57. Saba OA, Weir C, Aceves-Martins M. Substance use prevention interventions for children and young people in Sub-Saharan Africa: a systematic review. Int J Drug Policy. 2021;94:103251.
58. Gilmore AB, Fooks G, Drope J, Bialous SA, Jackson RR. Exposing and addressing tobacco industry conduct in low-income and middle-income countries. Lancet. 2015;385:1029–43.
59. Reddy KS, Yadav A, Arora M, Nazar GP. Integrating tobacco control into health and development agendas. Tob Control. 2012;21:281–6.
60. Egbe CO, Bialous SA, Glantz S. Role of stakeholders in Nigeria's tobacco control journey after the FCTC: lessons for tobacco control advocacy in low-income and middle-income countries. Tob Control. 2019;28:386–93.
61. Pipe AL, Evans W, Papadakis S. Smoking cessation: health system challenges and opportunities. Tob Control. 2022;31:340–7.
62. Agaku IT, Egbe CO, Ayo-Yusuf OA. Geospatial spread of e-cigarette vape shops in South Africa and the relationship with tobacco product use among adults. Health Place. 2021;68:102507.
63. Erinoso O, Oyapero A, Amure M, Osoba M, Osibogun O, Wright K, et al. Electronic cigarette use among adolescents and young adults in Nigeria: prevalence, associated factors and patterns of use. PLoS One. 2021;16:e0258850.
64. Folayan MO, Alade O, Adeyemo Y, Sabbagh HJ, Oyapero A, Oziegbe EO, et al. Differences in risk indicators associated with electronic cigarette use and tobacco smoking among adolescents and young people in Nigeria. BMJ Open Respir Res. 2022;9:e001285.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Belete H, Mekonen T, Connor JP, Chan G, Hides L, Leung J. Tobacco smoking in Sub-Saharan Africa: A systematic review and meta-analysis. Drug Alcohol Rev. 2025;44(4):1079–91. https://doi.org/10.1111/dar.14040