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Research Paper

The prevalence and characteristics of unrecorded alcohol consumption: a secondary analysis of cross-sectional surveys in 11 countries in sub-Saharan Africa

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ABSTRACT

Objective: Empirical evidence on unrecorded alcohol (alcohol produced, distributed and sold outside government oversight) remains limited in sub-Saharan Africa, despite its contribution to total alcohol consumption in many low- and middle-income countries. We estimated the prevalence and main types of unrecorded alcohol consumption; investigated sociodemographic characteristics of its use; and examined differences in drinking patterns between consumers of recorded and unrecorded alcohol across 11 sub-Saharan African countries.

Methods: We conducted a cross-sectional analysis of nationally representative data from WHO's STEPwise surveys collected between 2014 and 2022 in Benin, Botswana, Burkina Faso, Cabo Verde, Eswatini, Ethiopia, Liberia, Malawi, Sao Tome and Principe, Uganda, and Zambia. The sample included 48,230 adults aged 18–69 years. Weighted descriptive analyses were conducted at the country level, and hierarchical logistic and linear regression models examined sociodemographic correlates of unrecorded alcohol use and associations with drinking patterns.

Findings: More than a quarter (27.6%) of respondents consumed alcohol in the past week, and 51.3% of these consumed unrecorded alcohol, with marked differences across countries. Consumption was dominated by homebrewed products, although the relative contribution of spirits and beer or wine varied across settings. Among people who drink alcohol, unrecorded alcohol use was more common among men, older adults, those with lower educational attainment, and those not employed, and was associated with frequent drinking and higher average daily intake.

Conclusion: Unrecorded alcohol accounts for a large and heterogenous component of alcohol consumption in several sub-Saharan African countries. Surveillance systems and alcohol policies should explicitly account for unrecorded alcohol when assessing population exposure and designing health interventions.

Introduction

Unrecorded alcohol refers to alcohol that is produced, distributed, or sold outside formal systems of regulation and taxation (World Health Organization, 2021). This category includes home-brewed or informally produced alcohol, counterfeit alcohol, surrogate alcohol not intended for consumption, and cross-border purchased or smuggled alcohol (World Health Organization, 2021).

The World Health Organization (WHO) estimates that more than one fifth of all alcohol consumed globally is unrecorded (World Health Organization, 2024a). Because these products fall outside formal licensing, taxation, and marketing controls, an important share of

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alcohol production, distribution and consumption remains beyond the reach of policies designed to influence upstream drivers of alcohol acceptability, availability, and affordability (World Health Organization, 2021). Unrecorded alcohol accounts for 37.9% of total alcohol consumption in low-income countries, compared with 6.5% in high-income countries (World Health Organization, 2024a). The WHO African region reports the second-highest levels globally, with unrecorded alcohol estimated to represent around 35.5% of all alcohol consumed (World Health Organization, 2024a). In this region, high affordability and availability (compounded by poverty and unemployment) are largely attributed to weaker governance, limited regulatory enforcement, social acceptability and the strong cultural embedding of informal production and consumption (World Health Organization, 2021).

Any alcohol consumption poses a major public health concern (Babor et al., 2022; Burton et al., 2017), but unrecorded alcohol may pose additional risks. Some informally produced beverages contain toxic contaminants and adulterants, including methanol and heavy metals, increasing the risk of acute toxicity, methanol poisoning, blindness, alcohol psychoses, and other severe harms (Arnold & Morgan, 2015; Karayel et al., 2010; Leitz et al., 2009; Makhubele, 2013; Neufeld et al., 2016; Rehm et al., 2014). Production may also occur under unsanitary conditions, including the use of unsafe water, contaminated environments, pest infestation, and lack of protective equipment (Rwakahangi et al., 2025).

Unrecorded alcohol is typically cheaper than taxed products and is therefore associated with heavier drinking patterns (Haworth & Simpson, 2004; Lachenmeier et al., 2007; Rehm et al., 2014; World Health Organization, 2021). Production and consumption patterns are also shaped by geography and socioeconomic context. Homemade and artisanal alcohol is often produced and consumed in rural and peri-urban settings, and levels of urbanisation may influence the share of unrecorded alcohol within national markets (Kanteres et al., 2009; Radaev, 2016; Rehm et al., 2014).

Recorded alcohol consumption can be measured with relative reliability using production data, sales records, taxation data, and corporate disclosures (Gmel & Rehm, 2004; Poznyak et al., 2014; World Health Organization, 2024a). In contrast, unrecorded alcohol consumption is more difficult to quantify. Direct methods, such as population surveys and indirect approaches based on modelling alcohol-attributable harm have been proposed, but routine surveillance systems remain limited (Razvodovsky, 2010; Rehm et al., 2016; Rehm & Poznyak, 2015). Survey-based approaches rely on consumers recognising and correctly identifying the alcohol they consume as unrecorded alcohol, which may be particularly challenging for counterfeit or adulterated products sold through formal or semi-formal commercial markets. Unrecorded alcohol is often poorly labelled, of unknown strength, and in some cases deliberately designed to mimic legitimate products, making it difficult for consumers to identify (World Health Organization, 2021). As a result, global estimates rely heavily on statistical modelling and are sensitive to data availability, measurement choices, and underlying assumptions (Probst et al., 2019). These limitations are particularly pronounced in low- and middle-income countries (LMICs), where population health surveys and comprehensive health information systems may be limited (Gmel & Rehm, 2004; Rehm & Poznyak, 2015).

In this context, the WHO STEPwise approach to noncommunicable disease risk factor surveillance (STEPS) provides an opportunity to measure unrecorded alcohol consumption directly through harmonised, population-based surveys (World Health Organization, 2024b). Although survey coverage and frequency vary across countries, and self-reported data may under-capture sensitive behaviours such as hazardous or binge drinking or illicit alcohol use (Gmel & Rehm, 2004; Rehm & Poznyak, 2015), STEPS remains one of the few standardised sources for examining patterns of unrecorded alcohol use across LMICs.

Reducing the public health impact of illicit or informally produced alcohol is identified as a priority in the Framework for implementing the Global Action Plan 2022–30 in the WHO African Region (World Health Organization. Regional Office for Africa, 2023). Achieving this goal requires better evidence on who consumes unrecorded alcohol, what types of beverages are consumed, and how patterns differ across countries and population groups. However, comparable population-based data across countries in sub-Saharan Africa remain limited.

This study provides comparative, survey-based evidence on the prevalence, sources, and correlates of unrecorded alcohol consumption across 11 countries in sub-Saharan Africa. Specifically, it aims to characterise the prevalence and main sources of unrecorded alcohol consumption; investigate the sociodemographic characteristics of people who report unrecorded alcohol use; and examine differences in drinking patterns between people reporting past-week alcohol use who do and do not report unrecorded alcohol consumption.

Methods

Data source and sample

We used data from WHO STEPS surveys undertaken between 2014 and 2022 in 11 sub-Saharan African countries. Although this represents 22.4% of sub-Saharan countries, these were the only countries undertaking a STEPS survey including questions on unrecorded alcohol consumption and able to provide data for our analysis.

STEPS surveys use standardised protocols to collect nationally representative data on adults aged 18–69 years (methodological details published elsewhere) (Riley et al., 2016; World Health Organization, 2024b). Table 1 summarises the included surveys (see **Supplementary Material Table 1** for the prevalence of alcohol use). We restricted the sample to respondents aged 18–69 years with complete information on key sociodemographic and alcohol use variables, resulting in a final sample of 48 230 respondents. Item-level missingness ranged from 0.1% to 7.3%.

Variables and measurement

Outcome variables

Alcohol use was measured using self-reported alcohol consumption over the past seven days. Respondents reported the number of standard drinks consumed on each day of the previous week, aided by a showcard depicting standard drink sizes (see **Supplementary Material Table 2**). Drinks were summed across the week and converted to total grams of pure alcohol (1 drink = 10 g) as well as calculating the average grams of pure alcohol per day. Any non-zero consumption was classified as past seven-day use, referred to as a person who drank alcohol in the past week.

Unrecorded alcohol use was captured through five specific questions, with country-specific adaptations to the showcard used where appropriate, on home-brewed spirits, e.g. moonshine, homebrewed beer and wine, e.g. beer, palm, or fruit wine, alcohol brought over the border or from another country (cross-border alcohol), surrogate products (alcohol not intended for drinking) e.g. alcohol-based medicines or perfumes, and other untaxed sources, see **Supplementary Material Tables 2–3** for examples. Consumption from each source was converted to grams of pure alcohol (1 drink = 10 g). Respondents were asked specifically about their intake from each source during the past seven days.

Frequency of alcohol consumption was measured over the past 12 months and responses were classified as high frequency ($\geq$5 drinking days per week) or low/medium frequency ($<$5 drinking days per week). Heavy episodic drinking was defined as consuming $\geq$6 standard drinks on a single occasion in the past 30 days and recorded as a binary variable (yes/no).

Exploratory variables

Sociodemographic variables included age, sex, education, and employment status. Age was grouped into three categories: 18–29 years,

Table 1
An overview of the surveys included in this study.

Country	Sub-region	Income level[a]	Year	Response rate	Analytical n	% missing
Benin	Western	L	2015	98.6	5 120	0.1
Botswana	Southern	UM	2014	64.0	3 896	0.2
Burkina Faso	Western	L	2021	85.6	3 648	1.3
Cabo Verde	Western	LM	2020	63.5	4 558	0.1
Eswatini	Southern	LM	2014	76.0	3 022	7.3
Ethiopia	Eastern	L	2015	95.5	9 243	0.1
Liberia	Western	L	2022	94.0	4 010	1.4
Malawi	Southern	L	2017	[b]	4 081	2.5
Sao Tome & Principe	Central	LM	2019	91.0	2 393	1.0
Uganda	Eastern	L	2014	99.0	3 966	0.5
Zambia	Southern	LM	2017	74.3	4 293	0.2

L: low-income; LM: lower-middle income; UM: upper-middle income.
[a] Corresponds to the year of the survey.
[b] Data regarding non-respondents was lost, so no response rate could be calculated.

30–44 years, and 45–69 years. Education was categorised into four levels: no formal schooling; primary school or less; secondary school/high school completed; or university degree or higher. Employment status was classified as employed, unemployed, or other, e.g. student, retired, homemaker.

Statistical analysis

All analyses, including data extraction and cleaning were conducted in Stata v17, applying survey weights to produce population-representative estimates. We began with descriptive statistics to characterise alcohol use. This included estimating the population prevalence of any past seven-day alcohol use and of past seven-day unrecorded alcohol use, both overall and stratified by sex. Among people reporting any past seven-day alcohol use, we calculated the proportion who reported consuming any unrecorded alcohol. For this subgroup, we also calculated the share of total reported unrecorded alcohol volume. When the reported unrecorded volume exceeded the reported total consumption, values were proportionally scaled to maintain internal consistency. To describe the composition of unrecorded alcohol, we estimated the share of total unrecorded volume attributable to each source, e.g. homebrewed, cross-border, surrogate, other.

We then examined how sociodemographic characteristics (sex, age, education, and employment status) were associated with i) any unrecorded alcohol consumption, and ii) consumption of alcohol from specific unrecorded sources. These associations were estimated using hierarchical logistic regression models, with all sociodemographic variables entered simultaneously to provide fully adjusted estimates. Each model included a random intercept for country to account for unobserved between-country heterogeneity.

Finally, among people reporting alcohol consumption in the past week, we explored whether unrecorded alcohol consumption was associated with drinking patterns using hierarchical logistic regression models, with country-level random intercepts, to examine high frequency drinking (≥5 drinking days per week) and heavy episodic drinking (≥6 standard drinks on a single occasion in the past 30 days), adjusting for age and sex. Average daily quantity of alcohol consumed (grams per day) was modelled using a hierarchical linear regression after log-transforming grams per day.

Results

Past seven-day alcohol use

The population-weighted prevalence of past seven-day alcohol use among the whole population (including people who report no alcohol use) was 27.6% (95% confidence interval [CI]: 26.8% to 28.5%) and 15.7% (95% CI: 15.0%, 16.4%) for unrecorded alcohol use. Sao Tome and Principe had the highest population prevalence of both past seven-day recorded and unrecorded alcohol use: 64.6% (95% CI: 62.3%, 66.8%) reported any alcohol use and 21.8% (95% CI: 20.0%, 23.8%) reported any unrecorded use (Fig. 1). The prevalence of any alcohol use in Sao Tome and Principe was 1.8 times higher than in Ethiopia, which had the second highest prevalence (36.3%, 95% CI: 34.9%, 37.8%). Eswatini had the lowest prevalence of both alcohol use (11.8%, 95% CI: 10.3%, 13.5%) and unrecorded alcohol use (2.8%, 95% CI: 2.0%, 3.7%). Population prevalence of any recorded or unrecorded alcohol use was consistently higher among men than women (**Supplementary Material Figure 2**).

Past seven-day unrecorded alcohol use among people reporting alcohol use in the past seven-days

When looking only at respondents who reported any alcohol use in the past seven days, the population-weighted prevalence of past seven-day unrecorded alcohol use was 51.3% (95% CI: 49.4%, 53.1%), ranging from 14.8% (95% CI: 10.5%, 20.5%) in Eswatini to 65.1% in Burkina Faso (95% CI: 60.0%, 69.8%) (Fig. 2). Although Burkina Faso ranks fourth in the overall prevalence of past seven-day alcohol use and third in overall past seven-day unrecorded alcohol use among the whole population, it reports the highest prevalence of unrecorded alcohol use among people who report alcohol in the past seven-days. In Malawi, despite only 14.6% (95% CI: 12.5%, 17.1%) of respondents reporting any alcohol use in the past seven-days, almost two-thirds (65.0%, 95% CI: 56.1%, 72.9%) of those respondents report unrecorded alcohol use. Uganda also recorded a high proportion of unrecorded alcohol use (61.5%, 95% CI: 57.0%, 65.8%) amongst people who reported alcohol use in the past seven-days. Data split by sex are shown in **Supplementary Material Figure 3**.

The proportion of total alcohol consumption accounted for by unrecorded alcohol

Across the 11 countries, an estimated 36.0% (95% CI: 33.7%, 38.3%) of total alcohol consumed was unrecorded alcohol (Fig. 3). The proportion of total consumption that was unrecorded varied across countries. It was highest in Malawi, where 42.7% (95% CI: 34.0%, 51.3%) of all reported consumption was unrecorded alcohol, and then Ethiopia (39.5%; 95% CI: 36.1%, 42.9%), Uganda (39.2%, 95% CI: 33.5%, 44.9%), Burkina Faso (35.5%; 95% CI: 31.2%, 39.8%), and Benin (35.0%, 95% CI: 30.6%, 39.4%). Data split by sex are shown in **Supplementary Material Figure 4**.

Sources of unrecorded alcohol

Unrecorded consumption was largely made up of homebrewed products, although the balance between spirits versus beer and wine varied by country (Fig. 4). In Benin (71.8%), Malawi (51.8%), Zambia (47.6%), and Liberia (35.6%), most of the total unrecorded alcohol

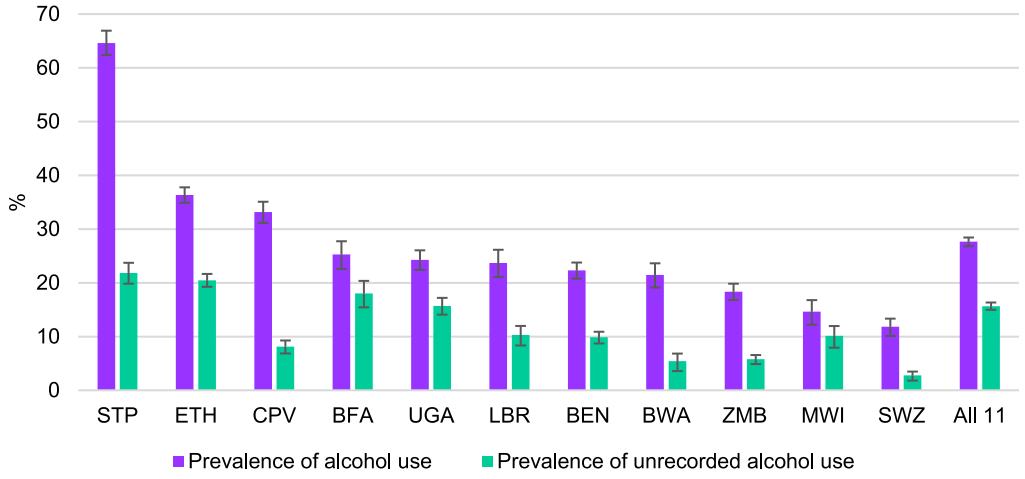

Fig. 1. Prevalence of past seven-day alcohol and unrecorded alcohol use in the past seven-days among the whole population, by country.
All 11: all countries included in the analysis; BEN: Benin; BFA: Burkina Faso; BWA: Botswana; CPV: Cabo Verde; ETH: Ethiopia; LBR: Liberia; MWI: Malawi; STP: Sao Tome and Principe; SWZ: Eswatini; UGA: Uganda; ZMB: Zambia

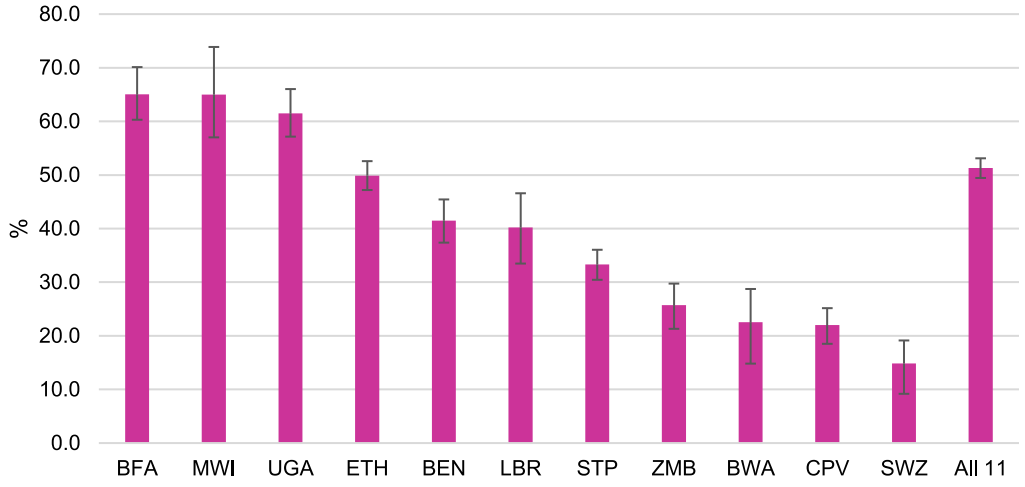

Fig. 2. Prevalence of past seven-day unrecorded alcohol use among respondents reporting the use of any alcohol in the past seven-days, by country.
All 11: all countries included in the analysis; BFA: Burkina Faso; BWA: Botswana; CPV: Cabo Verde; ETH: Ethiopia; LBR: Liberia; MWI: Malawi; STP: Sao Tome and Principe; SWZ: Eswatini; UGA: Uganda; ZMB: Zambia

consumed was homebrewed spirits, whereas in Eswatini (68.0%), Sao Tome and Principe (62.8%), and Botswana (43.7%) it was homebrewed beer and wine. Cross-border alcohol was a notable source in Liberia (32.1%) and Zambia (12.7%). Other untaxed products accounted for a low proportion of overall unrecorded alcohol consumption in all countries except Cabo Verde (61.9%), with surrogate alcohol (e.g. industrial or non-beverage alcohol) use generally uncommon (<3% in all countries).

Sociodemographic characteristics associated with unrecorded alcohol use

Among people reporting alcohol use in the past seven days, men, older adults (30–44 and 45–69 years), adults with fewer years of education, and those without employment had elevated odds of reporting unrecorded alcohol use compared with females, younger adults (18–29 years), adults with more years of education, and employed adults (Table 2).

Across specific unrecorded alcohol sources, sociodemographic patterns varied. Men had higher odds of consuming homebrewed spirits, cross-border alcohol, and other taxed products, but were less likely than women to report homebrewed beer and wine; there was no clear difference for surrogate alcohol. Adults with no formal schooling had higher odds of consuming homebrewed spirits and other untaxed alcohol, and lower odds of consuming cross-border alcohol, there was no consistent pattern for homebrewed beer and wine and surrogate alcohol. Unemployed adults were less likely to report homebrewed spirits.

Drinking patterns associated with unrecorded alcohol use

There was no evidence of an association between unrecorded alcohol use and heavy episodic drinking after adjustment for age and sex (OR=1.06, 95% CI=0.96, 1.16, $p = 0.237$). Those who reported consuming unrecorded alcohol had a significantly higher odds of drinking on five or more days per week compared with those who consumed only recorded alcohol (OR=1.73, 95% CI=1.51, 1.98, $p < 0.001$). Finally, unrecorded alcohol use was associated with an average daily intake that was 1.30 g higher (95% CI = 0.96, 1.67, $p < 0.001$).

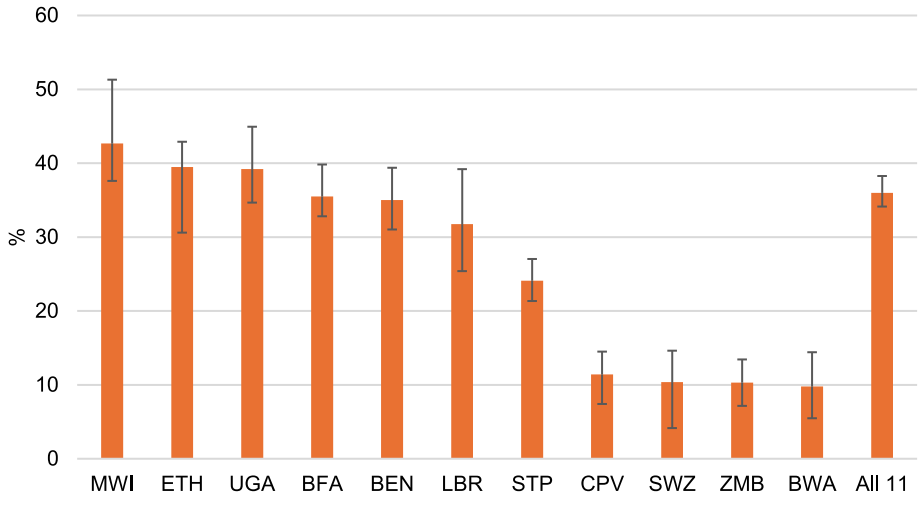

Fig. 3. Proportion of total alcohol consumption accounted for by unrecorded alcohol use in the past seven days, by sex and country.
All 11: all countries included in the analysis; BEN: Benin; BFA: Burkina Faso; BWA: Botswana; CPV: Cabo Verde; ETH: Ethiopia; LBR: Liberia; MWI: Malawi; STP: Sao Tome and Principe; SWZ: Eswatini; UGA: Uganda; ZMB: Zambia

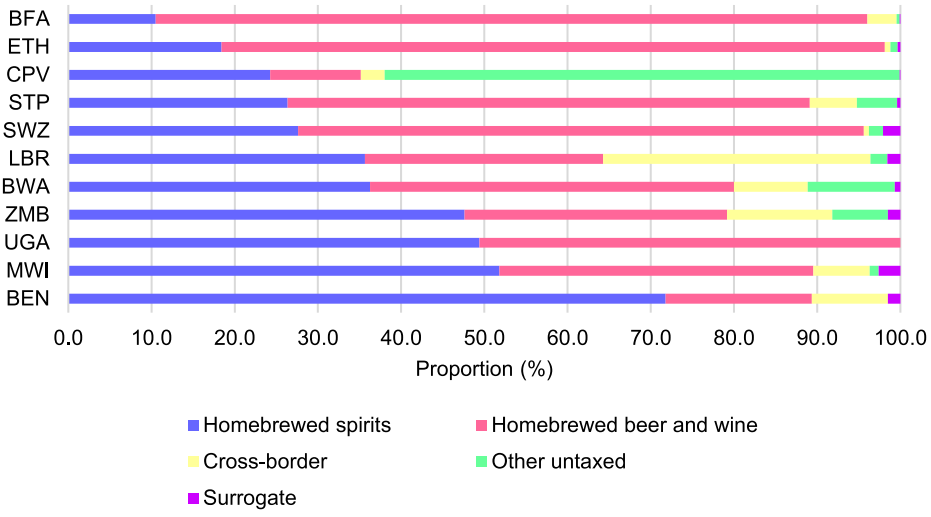

Fig. 4. Sources of unrecorded alcohol consumption (past seven-days).
BEN: Benin; BFA: Burkina Faso; BWA: Botswana; CPV: Cabo Verde; ETH: Ethiopia; LBR: Liberia; MWI: Malawi; STP: Sao Tome and Principe; SWZ: Eswatini; UGA: Uganda; ZMB: Zambia. Benin did not include a "other untaxed" category; Uganda did not include a "cross-border", "other untaxed", or "surrogate" category; in Botswana, homebrewed wine and beer refers to wine only.

Discussion

This multi-country analysis shows that unrecorded alcohol constitutes a substantial share of alcohol exposure across several sub-Saharan African countries, providing empirical evidence on its prevalence, composition, and correlates using harmonised survey data. The study found a high prevalence (51.3%) of unrecorded alcohol among respondents reporting past seven-day alcohol consumption, indicating its importance in several African contexts. The prevalence observed here is higher than the 12.1% reported among people who reported alcohol use in the past seven-days in a pooled analysis of 33 European countries (Manthey et al., 2023) and the 35.1% observed in nine former Soviet Union countries (Probst et al., 2021). The findings reinforce the importance of accounting for unrecorded alcohol when describing alcohol production, distribution, and consumption in the sub-Saharan African region.

The share of total alcohol consumption accounted for by unrecorded alcohol in many study countries highlights its relevance for understanding population-level alcohol exposure. In six of the 11 countries, unrecorded products made up more than one-third of all reported alcohol consumed, comparable to the 35.5% regional estimate. The volume of unrecorded alcohol consumed is relevant to public health because many alcohol-attributable harms are driven by cumulative population exposure over time (Rehm et al., 2017, 2021), meaning incomplete measurement of unrecorded alcohol can lead to underestimation of exposure (World Health Organization 2024a).

Alcoholic products described as homebrewed within the STEPS survey instrument encompass a wide range of beverages with different production processes, ethanol concentrations, distribution modes, and consumption patterns (**Supplementary Material Table 3**). These broad survey categories therefore mask substantial variation both within and between countries. For example, products grouped as homebrewed beer

Table 2
Hierarchical logistic regression analysis on using unrecorded alcohol in the past seven days among people reporting any alcohol use in the past seven days.

Type of unrecorded (n)	Category (reference)		Multivariate model		
			OR	P value	95% CI
All unrecorded alcohol (10 435)	Sex (female)	Male	1.15	0.001	1.06 to 1.26
	Age (18–29)	30–44	1.15	0.007	1.04 to 1.28
		45–69	1.24	<0.001	1.11 to 1.39
	Education (university or higher)	Secondary school	1.26	0.015	1.05 to 1.52
		Primary school	1.76	<0.001	1.47 to 2.12
		No formal schooling	2.36	<0.001	1.99 to 2.81
	Employment (employed)	Unemployed	1.42	<0.001	1.21 to 1.68
		Other	1.49	<0.001	1.33 to 1.67
Homebrewed spirits (4 605)	Sex (female)	Male	1.83	<0.001	1.59 to 2.10
	Age (18–29)	30–44	1.15	0.108	0.97 to 1.35
		45–69	1.17	0.082	0.98 to 1.39
	Education (university or higher)	Secondary school	1.08	0.665	0.77to 1.52
		Primary school	1.30	0.118	0.94 to 1.80
		No formal schooling	1.76	<0.001	1.29 to 2.40
	Employment (employed)	Unemployed	0.75	0.038	0.57 to 0.98
		Other	0.84	0.049	0.70 to 1.00
Homebrewed beer and wine (4 605)	Sex (female)	Male	0.82	0.022	0.70 to 0.97
	Age (18–29)	30–44	0.86	0.133	0.70 to 1.05
		45–69	0.73	0.003	0.59 to 0.89
	Education (university or higher)	Secondary school	1.00	0.983	0.67 to 1.47
		Primary school	0.87	0.481	0.60 to 1.28
		No formal schooling	0.84	0.338	0.58 to 1.20
	Employment (employed)	Unemployed	1.28	0.096	0.96 to 1.72
		Other	1.01	0.949	0.82 to 1.23
Cross-border (4 099)	Sex (female)	Male	1.29	0.030	1.03 to 1.63
	Age (18–29)	30–44	1.09	0.525	0.83 to 1.42
		45–69	0.91	0.521	0.68 to 1.21
	Education (university or higher)	Secondary school	0.51	0.003	0.33 to 0.80
		Primary school	0.44	<0.001	0.28 to 0.67
		No formal schooling	0.32	<0.001	0.21 to 0.48
	Employment (employed)	Unemployed	0.69	0.075	0.46 to 1.04
		Other	0.71	0.034	0.52 to 0.97
Surrogate (4 099)	Sex (female)	Male	1.08	0.735	0.68 to 1.73
	Age (18–29)	30–44	0.70	0.167	0.43 to 1.16
		45–69	0.49	0.015	0.28 to 0.87
	Education (university or higher)	Secondary school	0.62	0.307	0.25 to 1.55
		Primary school	0.73	0.483	0.30 to 1.77
		No formal schooling	0.58	0.206	0.25 to 1.35
	Employment (employed)	Unemployed	1.30	0.472	0.64 to 2.65
		Other	0.66	0.193	0.35 to 1.23
Other untaxed alcohol (3 649)	Sex (female)	Male	2.82	<0.001	2.02 to 3.94
	Age (18–29)	30–44	1.30	0.165	0.90 to 1.87
		45–69	0.97	0.899	0.65 to 1.45
	Education (university or higher)	Secondary school	1.29	0.482	0.64 to 2.59
		Primary school	2.53	0.008	1.27 to 5.03
		No formal schooling	2.72	0.006	1.33 to 5.56
	Employment (employed)	Unemployed	0.98	0.915	0.61 to 1.55
		Other	0.84	0.416	0.55 to 1.28

Multivariate model adjusting for all covariates simultaneously.

and wine may differ considerably in ethanol strength, serving size, ingredients, and manufacturing techniques. This may affect interpretability and comparability of prevalence estimates across countries and with studies using different classifications of unrecorded alcohol. In several countries, unrecorded alcohol consisted primarily of distilled spirits, whereas in others, it largely comprised fermented beers or wines. Importantly, the term homebrewed does not necessarily imply production for personal or household consumption. In many settings, homebrewed alcohol is produced by small-scale or informal producers, sold through local outlets, bars, and markets.

Cross-border and other untaxed alcohol contributed meaningfully to unrecorded consumption in a few countries. This variation partly reflects survey classification limitations. For example, in Liberia the cross-border category explicitly included named products, such as Kalao, Pastie, Solebra, and Star beer, as examples of alcohol obtained from neighbouring countries.

Unrecorded alcohol use was not evenly distributed across populations, raising equity concerns. Among people who reported alcohol use in the past seven days, higher odds of unrecorded alcohol use were observed among men, older adults, those with lower educational attainment, and those not in employment, although patterns varied by product type. While these findings suggest social differences in access to alcohol products, this study does not allow conclusions about causality or inequity in alcohol-related harm. These associations are likely shaped by differences in availability, affordability, and proximity to production or supply routes, rather than individual preferences alone (Kipchumba et al., 2022; World Health Organization, 2021).

Unrecorded alcohol use was associated with more frequent drinking and higher average daily alcohol intake, but not with heavy episodic drinking after adjustment for age and sex. This suggests that, within survey limitations, unrecorded alcohol may contribute more to sustained alcohol exposure rather than episodic high-intensity drinking. Although alcohol-related harms were not examined, these patterns help explain how unrecorded alcohol contributes to overall consumption profiles and risk.

These findings highlight persistent challenges in monitoring and surveillance of unrecorded alcohol in sub-Saharan Africa. While recorded alcohol can be tracked through sales, production, and taxation data,

unrecorded alcohol requires more comprehensive approaches to distinguish sub-categories relevant for policy design. STEPS surveys inform global estimates but also provide complementary individual-level data, enabling cross-country comparison through a harmonised methodology. However, inconsistencies in terminology and broad categorisation limit surveys' ability to capture the full diversity of unrecorded alcoholic products and markets.

These findings have several implications for alcohol control policy in sub-Saharan Africa. Because some alcohol consumption occurs outside formal regulatory and taxation systems, effective policy responses should address both recorded and unrecorded alcohol, including improved regulatory and monitoring frameworks recognising informal production and distribution of harmful products. At the same time, policy responses should consider the economic and social roles that small-scale alcohol production plays in some communities, particularly for household income generation. Strengthening surveillance and generating more detailed evidence on unrecorded alcohol markets will be essential for designing context-appropriate policy responses.

Strengths and limitations

This study draws on population-based survey data collected using a harmonised methodology across multiple countries (Riley et al., 2016; World Health Organization, 2024b), providing the first multi-country overview of unrecorded alcohol consumption in sub-Saharan Africa. However, several limitations should be considered.

Self-reported survey data are known to underestimate alcohol consumption compared with sales-based estimates, and underreporting may be greater for unrecorded alcohol due to stigma or illegality. Also, the study sample is not representative of the entire Sub-Saharan African population. Certain groups – including people who drink heavily, individuals with no formal education, and those living in hard-to-reach areas may be underrepresented. While sampling procedures may contribute to this underrepresentation, social desirability bias, recall bias, and non-response may affect the representativeness of survey responses.

Further limitations relate to measurement and comparability. Surveys were conducted in different years, and classification of unrecorded alcohol types lacked specificity, limiting cross-country comparability and product-level interpretation. Variations in sources of unrecorded alcohol consumption may also not be fully captured by survey items. For example, individuals who bring alcohol from another country may not recognise that such products are classified as cross-border alcohol and not report them, leading to potential underestimation.

The STEPS methodology assumes that one standard drink contains 10 g of pure alcohol and applies standardised showcards to estimate intake across beverage types. However, the ethanol concentration, serving size, and chemical composition of unrecorded alcohol products may vary substantially within and across countries, particularly for homebrewed products. As a result, standard drink assumptions may not fully capture variation in actual ethanol exposure or the presence of toxic contaminants such as methanol. More precise estimation would require detailed product-level compositional and volume data, which were beyond the scope of this study.

Conclusions

Unrecorded alcohol is structurally embedded in alcohol markets in several sub-Saharan African settings and represents a substantial component of population alcohol exposure. Analyses or policies that overlook it risk underestimating alcohol exposure and harms. At the same time, the scale, composition, and patterns of unrecorded alcohol consumption vary across and within countries, highlighting the limitations of treating it as a single, homogeneous category.

Whilst unrecorded alcohol, by definition, is difficult to estimate accurately improving how unrecorded alcohol is defined and measured, particularly for sub-Saharan and other African countries, would strengthen the interpretability and comparability of survey-based evidence, support more accurate assessments of alcohol exposure and magnify important inequalities in exposure and harm. Without such improvements, epidemiological analyses and policy responses may rely on incomplete data.

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CRediT authorship contribution statement

Robyn Burton: Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Formal analysis, Data curation, Conceptualization. **Abdul Cadri:** Writing – review & editing, Writing – original draft. **Juan E. Tello:** Writing – review & editing, Writing – original draft. **Crawford Moodie:** Writing – review & editing. **Isabelle Uny:** Writing – review & editing. **Niamh Fitzgerald:** Writing – review & editing. **Nadine Harker:** Writing – review & editing, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.drugpo.2026.105368.

References

Arnold, J., & Morgan, B. (2015). Management of lead encephalopathy with DMSA after exposure to lead-contaminated moonshine. *Journal of Medical Toxicology, 11*(4), 464–467.

Babor, T. F., Casswell, S., Graham, K., Huckle, T., Livingston, M., Österberg, E., Rehm, J., Room, R., Rossow, I., & Sornpaisarn, B. (2022). *Alcohol: No ordinary commodity: Research and public policy*.

Burton, R., Henn, C., Lavoie, D., O'Connor, R., Perkins, C., Sweeney, K., Greaves, F., Ferguson, B., Beynon, C., & Belloni, A. (2017). A rapid evidence review of the effectiveness and cost-effectiveness of alcohol control policies: An English perspective. *The Lancet, 389*(10078), 1558–1580.

Gmel, G., & Rehm, J. (2004). Measuring alcohol consumption. *Contemporary Drug Problems, 31*(3), 467–540.

Haworth, A., & Simpson, R. (2004). *Moonshine markets: Issues in unrecorded alcohol beverage production and consumption*. Routledge.

Kanteres, F., Lachenmeier, D. W., & Rehm, J. (2009). Alcohol in Mayan Guatemala: Consumption, distribution, production and composition of cuxa. *Addiction (Abingdon, England), 104*(5), 752–759.

Karayel, F., Turan, A. A., Sav, A., Pakis, I., Akyildiz, E. U., & Ersoy, G. (2010). Methanol intoxication: Pathological changes of central nervous system (17 cases). *The American Journal of Forensic Medicine and Pathology, 31*(1), 34–36.

Kipchumba, H. K. H., Kiruthu, F. K. F., & Minja, D. M. D. (2022). Production, sale and distribution of unrecorded liquor in Kakamega and Uasin-Gishu Counties in Kenya. *African Journal of Alcohol and Drug Abuse, 7*(2), 45–53.

Lachenmeier, D. W., Rehm, J., & Gmel, G. (2007). Surrogate alcohol: What do we know and where do we go? *Alcoholism: Clinical and Experimental Research, 31*(10), 1613–1624.

Leitz, J., Kuballa, T., Rehm, J., & Lachenmeier, D. W. (2009). Chemical analysis and risk assessment of diethyl phthalate in alcoholic beverages with special regard to unrecorded alcohol. *PLoS ONE, 4*(12), Article e8127.

Makhubele, J. (2013). Concoction of harmful substances in homemade alcoholic beverages in rural areas of Mopani District in Limpopo Province—RSA: Implications for social work practice. *Journal of Evidence-Based Social Work, 10*(5), 435–446.

Manthey, J., Braddick, F., López-Pelayo, H., Shield, K., Rehm, J., & Kilian, C. (2023). Unrecorded alcohol use in 33 European countries: Analyses of a comparative survey with 49,000 people who use alcohol. *International Journal of Drug Policy, 116*, Article 104028.

Neufeld, M., Lachenmeier, D., Hausler, T., & Rehm, J. (2016). Surrogate alcohol containing methanol, social deprivation and public health in Novosibirsk, Russia. *International Journal of Drug Policy, 37*, 107–110.

Poznyak, V., Fleischmann, A., Rekve, D., Rylett, M., Rehm, J., & Gmel, G. (2014). The World Health Organization's global monitoring system on alcohol and health. *Alcohol Research: Current Reviews, 35*(2), 244.

Probst, C., Fleischmann, A., Gmel, G., Poznyak, V., Rekve, D., Riley, L., Rylett, M., Shield, K. D., & Rehm, J. (2019). The global proportion and volume of unrecorded alcohol in 2015. *Journal of Global Health, 9*(1).

Probst, C., Manthey, J., Ferreira-Borges, C., Neufeld, M., Rakovac, I., Andreasyan, D., Sturua, L., Novik, I., Hagverdiyev, G., & Obreja, G. (2021). Cross-sectional study on the characteristics of unrecorded alcohol consumption in nine newly independent states between 2013 and 2017. *BMJ Open, 11*(12), Article e051874.

Radaev, V. (2016). Divergent drinking patterns and factors affecting homemade alcohol consumption (the case of Russia). *International Journal of Drug Policy, 34*, 88–95.

Razvodovsky, Y. E. (2010). Unrecorded alcohol consumption: Quantitative methods of estimation. *Archives of Psychiatry Research, 46*(1), 15.

Rehm, J., Gmel, G. E., Sr, Gmel, G., Hasan, O. S., Imtiaz, S., Popova, S., Probst, C., Roerecke, M., Room, R., & Samokhvalov, A. V. (2017). The relationship between different dimensions of alcohol use and the burden of disease—An update. *Addiction (Abingdon, England), 112*(6), 968–1001.

Rehm, J., Kailasapillai, S., Larsen, E., Rehm, M. X., Samokhvalov, A. V., Shield, K. D., Roerecke, M., & Lachenmeier, D. W. (2014). A systematic review of the epidemiology of unrecorded alcohol consumption and the chemical composition of unrecorded alcohol. *Addiction (Abingdon, England), 109*(6), 880–893.

Rehm, J., Larsen, E., Lewis-Laietmark, C., Gheorghe, P., Poznyak, V., Rekve, D., & Fleischmann, A. (2016). Estimation of unrecorded alcohol consumption in low-, middle-, and high-income economies for 2010. *Alcoholism: Clinical and Experimental Research, 40*(6), 1283–1289.

Rehm, J., & Poznyak, V. (2015). On monitoring unrecorded alcohol consumption. *Alcoholism and Drug Addiction, 28*(2), 79–89.

Rehm, J., Rovira, P., Llamosas-Falcón, L., & Shield, K. D. (2021). Dose–response relationships between levels of alcohol use and risks of mortality or disease, for all people, by age, sex, and specific risk factors. *Nutrients, 13*(8), 2652.

Riley, L., Guthold, R., Cowan, M., Savin, S., Bhatti, L., Armstrong, T., & Bonita, R. (2016). The World Health Organization STEPwise approach to noncommunicable disease risk-factor surveillance: Methods, challenges, and opportunities. *American Journal of Public Health, 106*(1), 74–78.

Rwakahangi, S.P., Tumwine, M., Niwagaba, K., Zyambo, C., Kakuba, C., Matagi, L., Mirembe, S., Mukupa, M., Semakula, M., & Rizzo, A. (2025). Health risks and public safety concerns of illicit alcohol in Uganda: Alcohol content, hygiene & sanitation in production and retail.

World Health Organization. (2021). *Unrecorded alcohol: What the evidence tells us*. https://iris.who.int/server/api/core/bitstreams/e874f5d1-7d23-49f4-a929-a763d4c7f780/content.

World Health Organization. (2024a). *Global status report on alcohol and health and treatment of substance use disorders*. https://iris.who.int/bitstream/handle/10665/377960/9789240096745-eng.pdf?sequence=1.

World Health Organization. (2024b). *Standard steps instrument*. https://www.who.int/publications/m/item/standard-steps-instrument.

World Health Organization. Regional Office for Africa. (2023). *Framework for implementing the global alcohol action plan, 2022–2030 in the WHO African region: Report of the secretariat*. https://iris.who.int/handle/10665/372385.