Health Promotion International, 2025, **40**, daaf002
https://doi.org/10.1093/heapro/daaf002
Article

Article

Alcohol marketing as a commercial determinant of health: daily diary insights from young women in Kampala

Monica H. Swahn[1,*], Charles Natuhamya[2], Rachel Culbreth[3], Jane Palmier[4], Rogers Kasirye[2], Emeka W. Dumbili[5]

[1]Department of Health Promotion and Physical Education, Wellstar College of Health and Human Services, Kennesaw State University, Prillaman Hall, Room 4103, 520 Parliament Garden Way, Kennesaw, GA 30144, United States
[2]Uganda Youth Development Link, Sir Apollo Kaggwa Road, Bifro House, P.O. Box 12659, Kampala, Uganda
[3]American College of Medical Toxicology, 10645 N. Tatum Boulevard, Phoenix, AZ 85028, United States
[4]Wellstar College of Health and Human Services, Kennesaw State University, 520 Parliament Garden Way NW, Kennesaw, GA 30144, United States
[5]School of Sociology, College of Social Sciences and Law, University College Dublin, Belfield, Dublin 4, Ireland

[*]Corresponding author. Monica H. Swahn, Department of Health Promotion and Physical Education, Wellstar College of Health and Human Services, Prillaman Hall, Room 4103, 520 Parliament Garden Way, Kennesaw, GA 30144, USA. E-mail: mswahn@kennesaw.edu

Abstract

Alcohol marketing, as a commercial determinant of health, presents an emerging threat to global health and is of particular importance in low-resource settings. This study is composed of data from 'The Onward Project On Wellbeing and Adversity' (TOPOWA) project, a multi-component prospective cohort study examining the mechanistic pathways of adverse mental health conditions among women aged 18 to 24 years living in the Kampala slums in Uganda. The cohort consists of 300 women recruited in 2023 from three study sites (i.e., Banda, Bwaise, and Makindye). In this study, we deployed an underutilized tool, daily diaries, for assessing the exposure to alcohol marketing and an alcohol-promoting environment among young women living in the urban slums of Kampala, Uganda to spur new research and action. At baseline, participants completed a 5-day daily diary and an interviewer-administered survey. Findings show that alcohol-related neighborhood features were most frequently reported, including bars (Mean = 3.88 days), people drinking alcohol (Mean = 3.75), alcohol selling points (Mean = 3.45) and alcohol ads on TV (Mean = 2.51). Women who were exposed to bars (PR = 1.31) and alcohol ads on billboards (PR = 1.14) in a day were more likely to report alcohol use. Similarly, those exposed to alcohol ads on billboards (PR = 1.76) and bars (PR = 2.02) every day were more likely to report alcohol use. Higher cumulative exposure to different alcohol-related features was associated with a greater likelihood of alcohol use, particularly in the group with the highest exposure level. These findings underscore a need to develop alcohol counter-marketing strategies and harm reduction approaches. Daily diaries proved to be a feasible strategy in capturing real-time exposure data, which could in turn support prevention measures and the evaluation of intervention strategies.

Keywords: commercial determinants of health; alcohol marketing; alcohol environment; daily diary; alcohol use; Kampala; Uganda

Contribution to Health Promotion

- Highlighting the widespread and often unregulated nature of alcohol marketing in low-income countries.
- Utilizing daily diaries to show that young women exposed to alcohol marketing were more likely to report alcohol use, both in the past month and year.
- Examining alcohol marketing exposure through daily diaries to identify its association with alcohol use among young women in Kampala's slums, showing that cumulative exposure is linked to higher consumption.
- Emphasizing the feasibility and utility of daily diaries in studying exposure to commercial determinants of health.
- Focusing health promotion efforts on counter-marketing and expanding daily diary use as a tool for prevention research and for the evaluation of interventions.

BACKGROUND

Alcohol is considered a commercial determinant of health due to the way it is produced, distributed, marketed, and consumed, which are all driven by commercial interests that significantly impact public health (Mialon 2020; Gilmore et al. 2023; Petticrew *et al.* 2023). It is well known that alcohol marketing often aggressively targets vulnerable populations, particularly young people and women, in regions of

the world where restrictions and enforcement of marketing are limited (Sargent and Babor 2020; McCarthy et al. 2023; Pitt et al. 2024). As such, alcohol marketing has emerged as a critical commercial determinant of health, significantly influencing patterns of alcohol consumption and related harm, particularly among vulnerable populations in low-resource settings (Mutumba and Schulenberg 2019). Although there is increasing global awareness of the negative health impacts associated with alcohol use, efforts to reduce the harm caused by this widely consumed substance have seen limited success (Jernigan and Trangenstein 2020).

Alcohol consumption is linked to about 5% of global deaths and similarly contributes to 5% of the global disease burden (World Health Organization [WHO] 2024). Younger people are disproportionately affected by alcohol use. The highest proportion of alcohol-attributable deaths—13%—is among those aged 20–39 years (WHO 2024). The harmful effects of alcohol are well-established, affecting a wide range of populations and contributing to both communicable and noncommunicable diseases, as well as violence and injuries (Lopez et al. 2006; Rehm et al. 2009). Among young people, the acute risks associated with alcohol use—such as unintentional injuries from road traffic accidents, falls, drowning, and various forms of violence—are particularly concerning (Lopez et al. 2006; Rehm et al. 2009; WHO 2024). Frequent and heavy drinking are major factors that exacerbate these dangers (Hingson et al. 2017; Kuntsche et al. 2017; Hasselgård-Rowe et al. 2022; van Roozendaal et al. 2023).

Alcohol marketing plays a pivotal role as a commercial determinant of health by promoting and normalizing alcohol consumption, particularly among youth (Jernigan et al. 2017; Dumbili 2024; Pitt et al. 2024) and women (McCarty et al. 2023). Research underscores the significant impact that alcohol marketing has on the drinking behaviors of young people (Gordon et al. 2010; de Bruijn *et al.* 2012; Ross et al. 2014; WHO 2018; Sargent and Babor 2020). A wealth of evidence now exists, particularly from North America and Europe, which indicates that alcohol marketing plays a crucial role in shaping youth intentions to consume alcohol (Fleming et al. 2004; Fisher et al. 2007; Morgenstern et al. 2011). Greater exposure to alcohol advertisements is linked to increased alcohol consumption among young people (de Bruijn *et al.* 2012; Naimi et al. 2016; Morojele et al. 2018). Additionally, both awareness of and receptivity to alcohol ads are associated with more frequent drinking and the transition to various drinking behaviors (Gordon et al. 2010; Tanski et al. 2010).

However, the scarcity of alcohol marketing research in low- and middle-income countries is troubling, especially in regions like sub-Saharan Africa, where marketing practices have become increasingly aggressive and predatory (Jernigan et al. 2006; Jernigan 2010; Obot 2013; van Beemen 2019; Madden et al. 2024; Swahn et al. 2024). In these contexts, it is also important to note that the alcohol industry often self-regulates (Morojele et al. 2021), a practice that has proven highly ineffective in protecting youth from marketing exposure and reducing alcohol-related harm (Esser and Jernigan 2018), especially since much of the alcohol marketing materials contain high violations of alcohol marketing codes (Noel et al. 2017; Swahn et al. 2024).

Considering that restricting alcohol marketing is regarded by the WHO as a 'best buy' for the prevention of noncommunicable diseases and public health—a cost-effective strategy with significant health benefits (WHO 2021), the lack of research and policy attention in this area is especially troubling. Previous research indicates relatively high levels of alcohol use and related harm among youth in Uganda (Swahn et al. 2018, 2020; Kumar et al. 2020), but research on alcohol marketing in this setting (Swahn et al. 2022a, 2022b, 2024; Madden et al. 2024) and the broader region (de Bruijin et al. 2014; Morojele et al. 2018; Odeigah et al. 2023; Dumbili 2024) is just emerging.

Uganda, which holds the position of 7th highest alcohol consumption in Africa (WHO 2018), exemplifies the significant impact of alcohol marketing as a commercial determinant of health. Alcohol consumption in Uganda is both widespread and socially normalized (Ssebunnya et al. 2020). Among youth residing in the slums of Kampala—a group particularly vulnerable to risks such as HIV (Swahn et al. 2016, 2019), violence (Swahn et al. 2012, 2018; Culbreth et al. 2018), child maltreatment (Swahn et al. 2017; Culbreth et al. 2021), and sexual exploitation (Swahn et al. 2016; Perry et al. 2020; Self-Brown et al. 2021)—nearly one-third reported consuming alcohol in the past year (Swahn et al. 2020).

To advance research, there is a strong need for new strategies and simple techniques to be developed to monitor alcohol marketing exposure both at the community level but also at the individual level. Alcohol marketing, which can be considered a modifiable factor and is often referred to as the best buy for alcohol prevention by the WHO (2021), needs to be prioritized in research. It has already been pointed out that East Africa needs a research agenda (Swahn et al. 2023) to guide new efforts and to consolidate what is known and what should be prioritized within the context of scarce resources. Even so, it is clear that capacity for alcohol prevention and research varies across East Africa (Swahn et al. 2022c) with many organizations focused on alcohol prevention primarily relying on volunteers and with limited budgets and also operating in a setting where regional and national infrastructure is fragmented (Raderalazasoa et al. 2024). In this context, a focus on alcohol marketing has not yet been prioritized but is key for making progress and for addressing alcohol use and harm.

Alcohol marketing can also be contextualized within the larger framework of the alcohol environment and other environmental stressors that may adversely impact health, which is also very important for understanding neighborhood characteristics and the social drivers and commercial determinants of health (Mutumba and Schulenberg 2019). More specifically, new geospatial methods and tools have been developed to link place to mental health (Kirchner et al. 2016; Swahn et al. 2022a). As an example, tools like the NIfETy method of environmental assessments have laid the groundwork for assessing neighborhood-level indicators, including violence, alcohol, and drug exposures, in urban areas (Furr-Holden et al. 2008, 2010, 2015; Brown et al. 2014). Research supports the validity of such tools for evaluating neighborhood characteristics (Nesoff et al. 2020), though few studies have focused specifically on slums (Lilford et al. 2019). In the USA, studies have shown that these neighborhood characteristics and exposures matter and that, as an example, women in alcohol-dense neighborhoods are about twice as likely to report depression (Campbell et al. 2009; Slutske et al. 2019; Theall et al. 2019). Women are a vulnerable group targeted by gender-specific alcohol marketing tactics and subjected to various forms of inequality and inequity (McCarthy et al.

2023). In SSA, women's alcohol use has traditionally been less prevalent due to cultural norms. The alcohol industry is aware of this and has been targeting women with diverse alcohol marketing strategies and practices such as new product development in the form of 'women-friendly' drinks (Dumbili and Nelson 2023). The industry also uses women to market its brands, exposing them to alcogenic environments and other harm like sexual harassment, physical and verbal abuse (in outlets where they promote alcohol brands), and associated mental health challenges (Hill and Friel 2020; Dumbili and Nelson 2023; McCarthy et al. 2023). While similar research is rare in sub-Saharan Africa, we have sought to build on this research in other settings and to leverage innovative research methodologies to increase their use and utility in low-resource settings.

Daily diaries have been extensively used in various research studies on mental health, well-being, and health behaviors, including alcohol research, to capture real-time data, examine daily variations, understand contextual influences, and reduce recall bias (Sliwinski 2008). The daily diaries have been particularly effective in studies assessing factors such as drinking to cope (Todd et al. 2003; Armeli et al. 2008), the social context and alcohol expectancies (Rhew *et al.*, 2021), and alcohol and tobacco co-use (Piasecki et al. 2011). While daily diaries have been more commonly employed to study alcohol consumption patterns—focusing on the frequency, context, and quantity of drinking (Wray et al. 2014)—they have also been used to document interactions with environments where alcohol is sold or consumed, such as bars or social gatherings where marketing might be present (Armeli et al. 2008).

However, the use of daily diaries to specifically study exposure to alcohol marketing is less common, though potentially valuable. For example, Collins and colleagues (2016) used daily diaries to examine exposure to alcohol advertising and subsequent alcohol use among adolescents, while Labhart and colleagues (2017) explored the effects of alcohol advertising and pricing. While the use of the daily diary has been primarily used to study alcohol consumption, their potential to explore alcohol marketing exposure remains an underutilized area of research, particularly in low-resource settings.

To address the significant gap in understanding alcohol marketing and exposure to the broader alcohol environment in Uganda, particularly among young women living in poverty in Kampala's slums, where previous research indicates that alcohol marketing is quite aggressive (Swahn et al. 2022a, 2022b, 2024; Madden et al. 2024), the current study integrates the use of daily diaries alongside a survey. As outlined earlier, daily diaries allow for the near real-time capture of participants' exposure to alcohol marketing and the alcohol environment, potentially providing detailed insights into how these factors influence or may be linked to behavior on a day-to-day basis. By understanding the self-reported perceived alcohol environment, we can better understand and contextualize alcohol use and other potentially related factors. This approach aims to provide novel insights into the prevalence of alcohol marketing and the alcohol environment among young women in a low-resource setting. The research question for this analysis, is whether exposure to alcohol marketing, or an alcohol environment is associated with alcohol use among an understudied population of young women living in the slums of Kampala? The overarching goal of this research is to develop simple research tools to be deployed in settings where alcohol marketing needs to be monitored more effectively and to inform prevention strategies for mitigating the harmful effects of alcohol.

METHODS

Study participants

Between July 2023 and November 2023, we enrolled 300 young women aged 18 to 24 years to participate in a prospective observational cohort study across three sites in Kampala (i.e., Banda, Bwaise, and Makindye) to examine the social determinants of health and mechanistic pathways of adverse mental health (The Onward Project On Wellbeing and Adversity [TOPOWA] study). The study methodology has been described previously (Swahn et al. 2024). Briefly, the study target population for the TOPOWA cohort study were those who self-reported as female, those 18–24 years of age, those living within a radius of 2 km from the Uganda Youth Development Link (UYDEL) vocational training centers and those who had attained a minimum of primary five education level. Those who presented with self-reported pregnancy, significant intellectual disability, severe mental health condition, or substance use requiring hospitalization were excluded from recruitment into the cohort study.

Among the 495 young women screened, 137 were not eligible for participation and 58 did not appear during the study enrollment. As such, among those eligible, the participation rate was 83%. A total of 150 participants were enrolled in each cohort group, that is, a community comparison cohort and an intervention cohort receiving vocational training and psychosocial support, matched by level of education, average monthly income, and the number of children, and to be followed up for 27 months (during 10 assessments). The intervention and community cohorts were not randomized due to ethical concerns and also because this is an observational study of an existing intervention. The intervention was delivered after the baseline assessment and before the first follow-up assessment. However, for the present analysis, the two groups were analyzed concurrently and limited to the baseline data.

As part of the baseline assessment for the TOPOWA cohort study, participants were asked to complete a research assistant-administered survey containing a broad range of measures pertaining to demographic and psychosocial characteristics and life experiences in addition to other study components. The study was conducted in accordance with the ethical declaration of Helsinki. It was approved by the Kennesaw State University, Makerere University School of Health Sciences (MaKSHS) Research and Ethics Committee (MAKSHSREC-2023-532), and the Uganda National Council of Science and Technology, UNCST (HS2959ES). All participants provided written informed consent following the approved study protocol, after receiving comprehensive information about the study's aims, procedures, potential risks, and benefits by thoroughly trained and CITI-certified research assistants. Consent forms were provided in both English and Luganda (local language). Study participants were also given ample opportunities to ask questions and clarify any concerns before agreeing to participate. Participants also received renumeration for participating in the baseline survey, daily diary completion, and the other data collection protocol components. Depending on the number of project components the participants chose to complete, they could receive up to 142 000 Uganda shillings (equivalent to 39 US dollars) and

included 25 000 Uganda shillings for completing the survey (equivalent to 7 US dollars) and 25 000 Uganda shillings for completing the daily diary and returning it (equivalent to 7 US dollars).

Measures

Daily diary

The daily diaries consisted of small paper booklets completed by participants using a traditional 'paper/pencil' approach. The daily diary had been pilot tested twice with young women from the three study sites. Following the pilot tests of the daily diaries, the content was streamlined and modified, and we also expanded the training session with participants to facilitate the completion of the information requested in the daily diaries. The daily diaries were used to collect self-reported sleep disturbance and daily neighborhood exposure data during the baseline assessment. Participants received prior training on how to complete the brief 5-day daily diary booklet. The questions were presented in English and the native language, Luganda. Of the 29 daily neighborhood exposure features whose information was collected in this study, we only selected those related to alcohol marketing and the alcohol environment. These included eight different measures of potential exposure: bars, alcohol ads on billboards, alcohol posters, alcohol-branded bars and restaurants, alcohol promotion of events, alcohol selling points, people drinking alcohol, and alcohol ads on TV. We summed up the number of days a woman was exposed to a particular neighborhood feature to obtain the cumulative number of days of exposure across the 5 days of measurement. We also created a variable to assess the cumulative responses across the different alcohol marketing/exposure types across the 5 days. This was further categorized into quartiles: lower, low, high, and higher.

Past year alcohol use

The Alcohol Use Disorders Identification Test (AUDIT) (WHO 2001), a 10-item screening tool developed by the WHO was used to assess past year alcohol use. The questions assessed alcohol consumption in the past year, for example, 'How often do you have a drink containing alcohol?' The total score ranged from 0 to 40, with higher scores indicating higher severity of alcohol use. Alcohol use was categorized as low risk (0–7), hazardous (8–15), harmful (16–19), and dependence (20–40) (John et al. 2023). The scale's internal consistency was high (Cronbach's α = 0.90).

Past month alcohol use

This was assessed using a survey question: 'During the past 30 days, how many days did you drink one or more drinks of an alcoholic beverage?' Responses were used to generate a binary categorical variable coded as 0 (abstainer, didn't drink, nonresponse), 1 (had a drink). This was used to test the mean difference in exposure days among current users and nonusers.

Demographic characteristics

A survey was used to collect information that included age, education level, housing status, and parental living status, among others. In this study, we only included demographic characteristics relevant to the study objective to describe the cohort characteristics.

Statistical analysis

Participants' demographic characteristics and the prevalence of alcohol use were presented using frequencies and percentages. Neighborhood exposures were presented using summary statistics (mean and standard error). The difference in the mean number of days exposed to the neighborhood determinants of alcohol use across study sites was assessed using the analysis of variance (ANOVA) test (Kao and Green 2008), and the same was assessed by alcohol use using the *t*-test (Mishra et al. 2019) assuming the data were normally distributed based on the central limit theorem (Kwak and Kim 2017).

Modified Poisson regression models, useful for estimating relative risk by combining a log Poisson regression model with robust variance estimation (Yelland et al. 2011) were fit since alcohol use was a common outcome (prevalence > 10%) (Tamhane et al. 2016) in these data. The outcome variable in the models was past year alcohol use, which was included as a binary variable (nonuser vs user). Daily alcohol-related neighborhood exposures were included as independent variables and measured as a cumulative number of days of exposure in one model and everyday exposure in another.

The cumulative number of exposures in 5 days was used to predict the probability of past year alcohol use using margins (Miller 2021), and, in its categorical form, the cumulative number of exposures in 5 days was tested by chi-square to assess its association with past year alcohol use. All statistical assumptions were assessed and verified.

Statistical analyses were conducted using Stata 15 (StataCorp, TX, USA) and the level of statistical significance was set a priori at $P < 0.05$ for all hypothesis tests.

RESULTS

Cohort characteristics

Of the 300 young women enrolled in the study, more than half of the women had attained at least some secondary education (66.0%) and had given birth (62.0%). Most women had both of their parents alive (65.0%). The details of these results are indicated in Table 1.

Prevalence of alcohol use

Overall, 68 (22.7%) and 83 (27.7%) of all women had used alcohol in the past month and past year, respectively, during the baseline assessment. Following past year alcohol use, 84% of the women were at low risk of an alcohol use disorder, and alcohol use behavior of 10% and 2% of the women was described as hazardous and harmful, respectively. In comparison, 4% of the women were alcohol dependent.

Description of alcohol-related daily neighborhood exposure

The mean number of days that women were exposed to alcohol-related neighborhood characteristics is presented in Table 2. The most common exposures were bars (Mean, $M = 3.88$; Standard error, SE = 0.08), followed by people drinking alcohol ($M = 3.75$; SE = 0.09) and alcohol selling points ($M = 3.45$; SE = 0.10) followed by alcohol ads on TV ($M = 2.51$, SE = 0.12). Results from the ANOVA test indicate a significant difference in the mean number of days that women saw bars, alcohol ads on billboards, and people drinking alcohol across the three study sites.

Overall, women who used alcohol reported more exposure days compared to their counterparts, both in the past year and past month (Table 3). There was a significant difference in the mean number of days that women were exposed to bars, alcohol ads on billboards, alcohol posters, alcohol-branded bars and restaurants, alcohol selling points, and people drinking alcohol between past year alcohol users and nonusers. The most prevalent alcohol-related daily neighborhood features among past year alcohol users were bars (M = 4.33, SE = 0.12), people drinking alcohol in the community (M = 4.10, SE = 0.15), and alcohol selling points (M = 4.06, SE = 0.14). In addition, there was a significant difference in the mean number of exposure days to bars and alcohol selling points between past month alcohol users and nonusers. Alcohol users in the past month were more exposed to bars (M = 4.32, SE = 0.12) and alcohol selling points (M = 3.91, SE = 0.16) compared to nondrinkers. Also, the cumulative number of exposures was significantly higher among past year drinkers.

Table 1. Participants' demographic characteristics during the baseline assessment of the TOPOWA cohort study (N = 300)

Characteristic	Category	*n* (%)
Education level	Primary or lower	102 (34.0)
	Some secondary	174 (58.0)
	Secondary or higher	24 (8.0)
Age	18–20	144 (48.0)
	21–24	156 (52.0)
Has given birth	No	114 (38.0)
	Yes	186 (62.0)
Household size	≤4	169 (56.3)
	>4	131 (43.7)
Parents living status	Both parents alive	195 (65.0)
	One parent alive	91 (30.3)
	No parents alive	14 (4.7)
Lives with parents	No	176 (58.7)
	Yes	110 (36.7)
	Has no parent	14 (4.7)
Lives with her children	No	34 (11.3)
	Yes	152 (50.7)
	Has no child	114 (38.0)
Household generations	One	45 (15.0)
	Two	154 (51.3)
	Three or more	101 (33.7)

Alcohol-related daily neighborhood exposure features associated with recent alcohol use

The first model (M1) indicates that a day's exposure to bars (PR = 1.31; 95% CI = 1.06, 1.61) and alcohol advertisements on billboards (PR = 1.14; 95% CI = 1.02, 1.27) was positively associated with reporting past year alcohol use (Table 4). Results of the second model (M2) indicate the effect of everyday exposure (all 5 days) status on alcohol use. Everyday exposure to alcohol ads on billboards (PR = 1.76; 95% CI = 1.09, 2.83) and bars (PR = 2.02; 95% CI = 1.37, 2.99) was positively associated with reporting past year alcohol use.

Past year alcohol use by the cumulative number of exposures

In Figure 1, it is indicated that the proportion of drinkers was significantly higher (P = 0.026) in higher quartiles of the cumulative number of exposures, ranging from 16.9% in the lower quartile to 39.8% in the higher quartile. Also, Figure 2 shows that higher cumulative exposure to different alcohol-related features was associated with a greater likelihood of alcohol use, particularly in the group with the highest exposure level.

DISCUSSION

In this study, we deployed an underutilized tool, daily diaries, for assessing the exposure to alcohol marketing and an alcohol-promoting environment among young women living in urban slums of Kampala to determine if such exposure was associated with alcohol use. Our study found that exposure to various domains of alcohol marketing and alcohol environment, as well as cumulative exposure, was significantly associated with reported alcohol use. Specifically, women who reported alcohol use exhibited higher mean exposure to bars, advertisements on billboards, alcohol posters, alcohol-branded bars and restaurants, alcohol selling points, and people drinking alcohol, compared to nondrinkers.

These findings align with previous studies that have demonstrated a strong association between alcohol marketing

Table 2. Mean (± SE) number of days exposed to alcohol-related daily neighborhood features in 5 days by study site (N = 300)

Exposure	Overall	Study site		
		A	B	C
Bars	3.88 (0.08)	**4.16 (0.12)**	**3.68 (0.15)**	**3.81 (0.14)**
Alcohol ads on billboards	1.76 (0.10)	**1.70 (0.17)**	**1.48 (0.17)**	**2.10 (0.19)**
Alcohol posters	2.11 (0.11)	2.08 (0.19)	1.97 (0.19)	2.29 (0.19)
Alcohol-branded bars and restaurants	2.40 (0.10)	2.36 (0.17)	2.53 (0.18)	2.31 (0.18)
Alcohol promotion of events	1.16 (0.09)	1.28 (0.16)	1.10 (0.15)	1.09 (0.15)
Alcohol selling points	3.45 (0.10)	3.72 (0.16)	3.37 (0.17)	3.25 (0.18)
People drinking alcohol	3.75 (0.09)	**4.14 (0.13)**	**3.59 (0.16)**	**3.51 (0.18)**
Alcohol ads on TV	2.51 (0.12)	2.49 (0.20)	2.28 (0.20)	2.76 (0.20)
Cumulative number of exposures	21.02 (0.53)	21.93 (0.87)	20.00 (0.93)	21.12 (0.95)

Bold indicates statistically significant mean differences.

Table 3. Mean (± SE) number of days exposed to alcohol-related daily neighborhood features in 5 days by past year and past month alcohol use (*N* = 300)

Exposure	Overall	Past year alcohol use		Past month alcohol use	
		No	Yes	No	Yes
Bars	3.88 (0.08)	**3.71 (0.10)**	**4.33 (0.12)**	**3.75 (0.10)**	**4.32 (0.12)**
Alcohol ads on billboards	1.76 (0.10)	**1.62 (0.12)**	**2.12 (0.20)**	1.66 (0.12)	2.09 (0.21)
Alcohol posters	2.11 (0.11)	**1.94 (0.13)**	**2.58 (0.20)**	2.04 (0.12)	2.37 (0.23)
Alcohol-branded bars and restaurants	2.40 (0.10)	**2.26 (0.12)**	**2.76 (0.19)**	2.35 (0.12)	2.56 (0.21)
Alcohol promotion of events	1.16 (0.09)	1.12 (0.10)	1.25 (0.17)	1.16 (0.10)	1.16 (0.18)
Alcohol selling points	3.45 (0.10)	**3.21 (0.12)**	**4.06 (0.14)**	**3.31 (0.12)**	**3.91 (0.16)**
People drinking alcohol	3.75 (0.09)	**3.61 (0.11)**	**4.10 (0.15)**	3.67 (0.11)	4.01 (0.17)
Alcohol ads on TV	2.51 (0.12)	2.52 (0.14)	2.48 (0.22)	2.58 (0.13)	2.26 (0.24)
Cumulative nr exposures	21.02 (0.53)	**20.00 (0.63)**	**23.67 (0.93)**	20.53 (0.62)	22.69 (1.00)

Bold indicates statistically significant mean differences.

Table 4. Modified Poisson regression model assessing the association between alcohol-related neighborhood exposure and past year alcohol use (*N* = 300)

Exposure	Past year alcohol use, PR (95% CI)	
	M1	M2
Bars	1.31 (1.06, 1.61)*	2.02 (1.37, 2.99)***
Alcohol ads on billboards	1.14 (1.02, 1.27)*	1.76 (1.09, 2.83)*
Alcohol-branded bars and restaurants	1.07 (0.96, 1.19)	0.98 (0.62, 1.54)
Alcohol promotion of events	0.94 (0.83, 1.07)	0.87 (0.36, 2.07)
Alcohol ads on TV	0.93 (0.85, 1.03)	0.68 (0.44, 1.06)

***$P < 0.001$,
*$P < 0.05$. M1 = exposure variables were measured as the number of days exposed in 5 days (count). M2 = exposure variables were measured as everyday exposure status (binary).

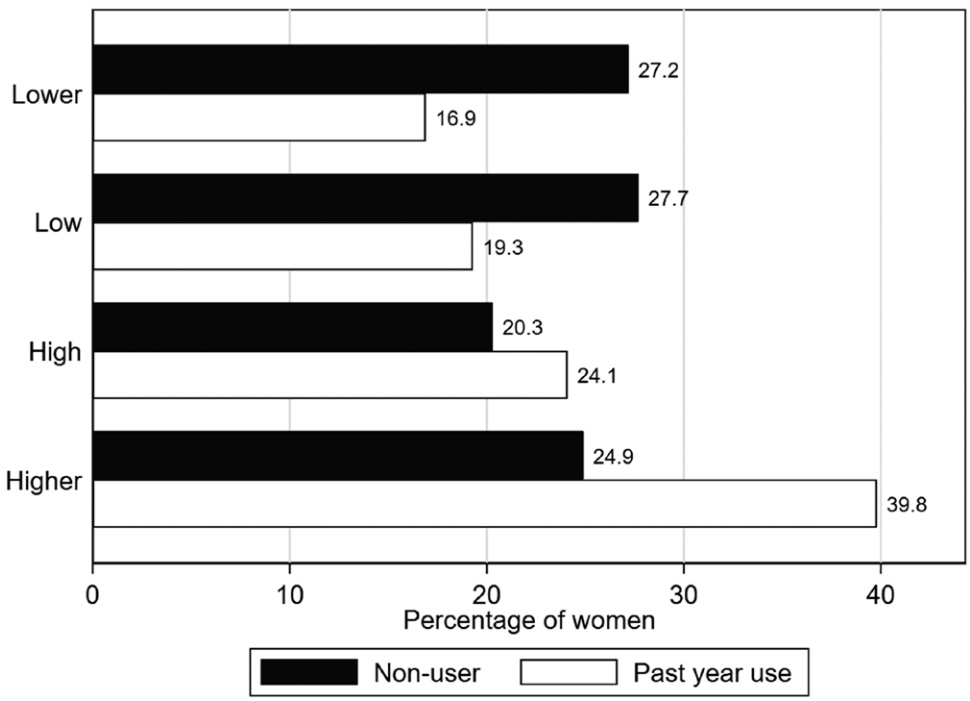

Figure 1. Quartiles of the cumulative number of exposure days by past year alcohol use.

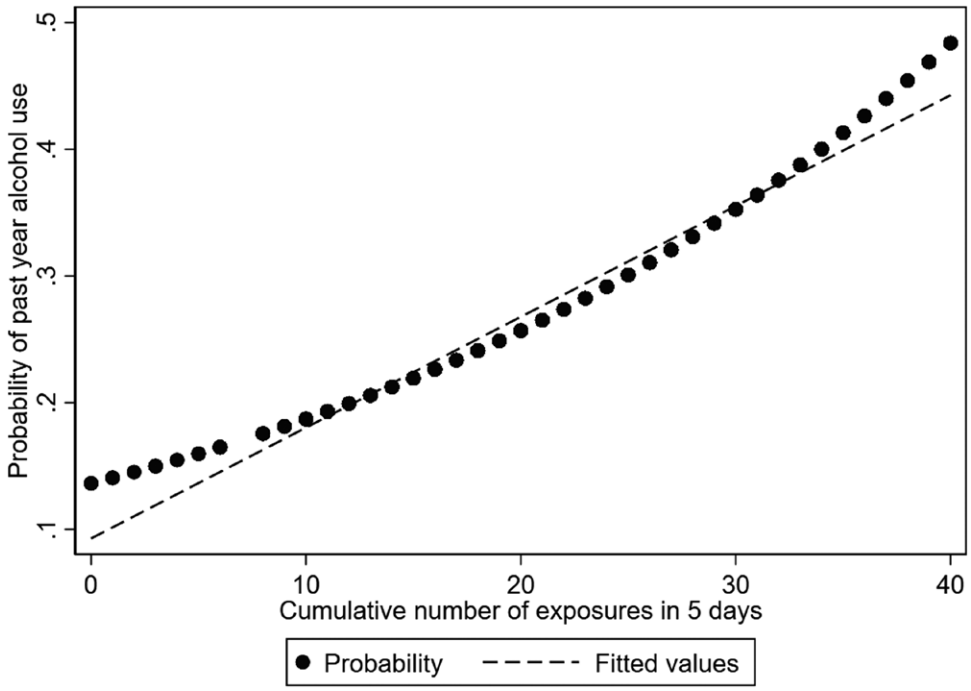

Figure 2. Probability of past year alcohol use by the cumulative number of exposures.

exposure and alcohol consumption, particularly in vulnerable populations such as women and youth and those living in urban slums (Esser and Jernigan 2018; Swahn et al. 2020). Our analysis also indicated that increasing cumulative exposure across different types of alcohol marketing and alcohol environment significantly increased the probability of reporting alcohol use in the past year. This suggests that the cumulative effect of exposure to multiple forms of alcohol marketing reinforces the likelihood of alcohol consumption, consistent with the theory of cumulative risk exposure (Naimi et al. 2016), but can also of course be the result of a bidirectional relationship such that those who are drinkers are more perceptive to these cues and characteristics and may also seek them out (Hollett *et al.*, 2024).

In this study, the use of daily diaries proved to be a helpful, straightforward, low-cost, and easy-to-use tool for participants, many of which had relatively low levels of literacy. The daily diary, which we had pilot tested twice and enhanced prior to this data collection, offered a method that reduced recall bias and provided real-time data on marketing exposures. The simplicity of the daily diary makes it an accessible approach that can be replicated across various and different commercial determinants of health, including tobacco use, sugary beverages, and other harmful products (Shiffman et al. 2008), and should be considered for use in low-resource settings to accelerate this line of research and to triangulate findings from different research tools and approaches.

Furthermore, while alcohol billboards were not the most common type of alcohol marketing exposure reported, they still present a significant concern. Recent analyses of alcohol billboard content in Uganda revealed that a significant proportion of these advertisements violated agreed-upon alcohol marketing standards, with a violation rate of 85% and where some ads contained up to seven specific violations (Swahn et al. 2024). Such aggressive marketing tactics in these settings exacerbate the already limited access to prevention and treatment services, contributing to the well-documented link between alcohol marketing and underage drinking (Sargent and Babor 2020). Our previous research over the last decade underscores this connection, highlighting the association between alcohol marketing and alcohol use among youth in Kampala (Swahn et al. 2013, 2018, 2022c).

Additionally, the WHO identifies restrictions on alcohol marketing as a 'best buy' intervention due to their cost-effectiveness and potential for reducing noncommunicable diseases (WHO 2021). However, the relatively limited attention to research and policy in this area remains a significant concern. This issue is further complicated by ongoing debates within the field, as empirical evidence on the effectiveness of these restrictions has produced mixed results (Manthey et al. 2024), which some say reflect the need for improved evaluation methods that can accurately assess the impact of marketing restrictions (Casswell 2024). Addressing these challenges necessitates the development of more robust tools and strategies for understanding the dynamics of alcohol marketing exposure and its effects on public health.

Limitations

There are several limitations that should be noted when interpreting the findings from this study. First, the analyses of the baseline data of this cohort study represent cross-sectional analyses and cannot be inferred to indicate causation or temporal associations between exposure to alcohol marketing and environment characteristics and alcohol use. Second, the study was designed to measure a range of factors, and as such, relatively few measures were devoted to assessing alcohol and alcohol marketing exposures specifically. Third, our daily diary lasted for only 5 days, which contrasts with the longer windows of data collection and exposure used in previous research. Our primary objective was to capture daily exposure

rather than long-term patterns. As such, we cannot address or provide details on longer exposures and whether the exposure data we collected were typical of the participants' usual activity space or behavior. That said, we will conduct additional daily diaries in this prospective cohort and will be able to determine the stability or changes in alcohol marketing exposure when those data become available. Additionally, since this is a prospective cohort study, we will also be able to measure changes in alcohol consumption patterns over the study period. Fourth, we also did not quantify the number of exposures to each type of marketing; for instance, participants were asked if they had seen an alcohol billboard that day but not how many billboards they had encountered. This is a significant limitation for those seeking or wanting to quantify each type of marketing type and can easily be addressed in future research where this may be the key outcome of interest. Fifth, to assess the past month alcohol use, we combined abstainers and nonusers in the past month with nonresponses. Though the nonresponses were minimal, this might have led to misclassification of some alcohol users as nonusers and also created a heterogeneous group. Finally, the women participants in this community-based cohort study were recruited from three areas composed of informal settlements or slums and as such, their exposures may not be representative of other population groups and other settings (Madden et al. 2024). We also speculate, based on our previous research, that the overall level of alcohol marketing exposure is likely not fluctuating substantially over time in this urban setting, although that is something we plan to empirically assess. Despite these limitations, our findings indicate relatively high levels of alcohol marketing exposure among these women, although we have no clear reference of what may be considered high in this setting, or for young women in general, which is why research is urgently needed to provide better context. Moreover, this approach presents an innovative and simple strategy for capturing the real-world complexity of the daily exposure to alcohol marketing and an alcohol-promoting environment that can be used across different settings.

CONCLUSION

Our study demonstrates that young women see several different types of alcohol marketing strategies daily in their communities. This is not surprising given previous research outlining concerns about alcohol marketing in this setting (Obot 2013; Madden et al. 2024). More specifically, a recent study (Madden et al. 2024) explored alcohol marketing strategies in the urban slums in Kampala, Uganda, focusing on the type, content, and placement of ads. The findings revealed that most ads were nonpermanent, such as paper posters, making them easy targets for community intervention (Madden et al. 2024). Additionally, a significant portion of the ads represented products sold by international companies like Diageo and AB InBev, despite their promotion of national pride (Madden et al. 2024). This dominance of foreign corporations (that often focus on profit maximization and wealth extraction; Gilmore et al. 2023) in local markets underscores the need for targeted policies to mitigate their aggressive and predatory influence in low-resource settings and adversely impact youth and women (McCarthy et al. 2023; Pitt et al. 2024). Also, it raises important and urgent questions about health equity and what populations bear the brunt of the exposure to commercial determinants of health.

In terms of future research, we encourage other researchers to explore the use of the daily diaries as a tool for better understanding and capturing alcohol marketing exposure and the alcohol environment. While our approach was relatively simple, it can be expanded with more in-depth measures, including quantifying the specific number of exposures and types and other relevant variables. As part of the prospective TOPOWA cohort study, we plan to further examine exposure to alcohol marketing through daily diaries as well as self-report survey measures. Although alcohol marketing exposure is not a primary measure or outcome in this study, this research presents an opportunity to investigate alcohol marketing and the alcohol environment as commercial determinant of health, including its impact on mental health specifically. This is particularly important when considering the commercial determinants of health from an equity issue in low-resource settings and how women and youth are more vulnerable (Ghebreyesus 2023; McCarthy et al. 2023; Pitt et al. 2024). Meanwhile, our findings also indicate the need for prevention programs and policy development to reduce exposure to alcohol marketing and alcohol-promoting environment as well as zoning for alcohol outlet density, as these are evidence-based strategies that will reduce alcohol use and related harm.

Author contributions

M.H.S. secured funding, guided the study, conceptualized, and drafted the manuscript. C.N. conducted the statistical analyses and drafted the manuscript. R.C. and J.P. reviewed and interpreted the analyses and drafted the manuscript. R.K. oversaw project implementation, including data collection and interpreted the findings. E.D. contributed the conceptualization of the manuscript and revised the draft. All authors contributed to the final draft and approved its submission.

Conflict of interest

The authors have no conflicts of interest to disclose. The material has not been published in whole or in part elsewhere. The paper is not currently being considered for publication elsewhere. All authors have been personally and actively involved in substantive work leading to the report and will hold themselves jointly and individually responsible for its content. All relevant ethical safeguards have been met in relation to patient or subject protection. The research has complied with the World Medical Association Declaration of Helsinki.

Funding

Research reported in this publication was supported by the National Institute of Mental Health, of the National Institutes of Health under award number R01MH128930 to Dr Swahn. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Institutional review board

Ethical approvals were obtained from Kennesaw State University, the Makerere University School of Health Sciences Research Ethics Committee (MAKSHSREC-2023-532, dated

02 June 2023) and the Uganda National Council of Science and Technology (registration number HS2959ES).

Informed consent

Informed consent was obtained from all subjects involved in the study.

Data availability

The data presented in this study are available on request from the corresponding author.

References

Armeli S, Todd M, Conner TS et al. Drinking to cope: a daily process examination of positive and negative affect and drinking behavior. *J Clin Psychol* 2008;**64**:1163–73. https://doi.org/10.1002/jclp.20509

Brown QL, Milam AJ, Smart MJ et al. Objective and perceived neighborhood characteristics and tobacco use among young adults. *Drug Alcohol Depend* 2014;**134**:370–5. https://doi.org/10.1016/j.drugalcdep.2013.11.005

Campbell CA, Hahn RA, Elder R et al.; Task Force on Community Preventive Services. The effectiveness of limiting alcohol outlet density as a means of reducing excessive alcohol consumption and alcohol-related harms. *Am J Prev Med* 2009;**37**:556–69. https://doi.org/10.1016/j.amepre.2009.09.028

Casswell S. Misleading conclusion from limited research approach: comment on Manthey *et al*. 'Restricting alcohol marketing to reduce alcohol consumption: a systematic review of the empirical evidence for one of the "best buys"'. *Addiction (Abingdon, England)* 2024;**119**:1139–40. https://doi.org/10.1111/add.16453

Collins RL, Martino SC, Kovalchik SA et al. Alcohol advertising exposure among middle school–age youth: an assessment across all media and venues. *J Stud Alcohol Drugs* 2016;**77**:384–92. https://doi.org/10.15288/jsad.2016.77.384

Culbreth R, Masyn KE, Swahn MH et al. The interrelationships of child maltreatment, alcohol use, and suicidal ideation among youth living in the slums of Kampala, Uganda. *Child Abuse Neglect* 2021;**112**:104904. https://doi.org/10.1016/j.chiabu.2020.104904

Culbreth R, Swahn MH, Ndetei D et al. Suicidal ideation among youth living in the slums of Kampala, Uganda. *Int J Environ Res Public Health* 2018;**15**:pii: E298. https://doi.org/10.3390/ijerph15020298

de Bruijin A, Ferreira-Borges C, Engels R et al. Monitoring outdoor alcohol advertising in developing countries: findings of a pilot study in five African countries. *Afr J Drug Alcohol Stud* 2014;**13**:13–29.

de Bruijn A, Tanghe J, Beccaria F et al. Report on the impact of European alcohol marketing exposure on youth alcohol expectancies and youth drinking. *Alcohol Measures Public Health Res Alliance (AMPHORA)* 2012;**4**:1–36. https://www.drugsandalcohol.ie/19722/

Dumbili EW. Alcohol industry-sponsored music festivals, alcohol marketing and drinking practices among young Nigerians: implications for policy. *Int J Drug Policy* 2024;**127**:104384. https://doi.org/10.1016/j.drugpo.2024.104384

Dumbili EW and Nelson EUE. Sexualized alcohol marketing, precarious work and gendered sexual risks: explorations of women beer promoters in Benin City, Nigeria. *Drugs* 2023;**30**:573–82. https://doi.org/10.1080/09687637.2022.2100742

Esser MB and Jernigan DH. Policy approaches for regulating alcohol marketing in a global context: a public health perspective. *Annu Rev Public Health* 2018;**39**:385–401. https://doi.org/10.1146/annurev-publhealth-040617-014711

Fisher LB, Miles IW, Austin SB et al. Predictors of initiation of alcohol use among US adolescents: findings from a prospective cohort study. *Arch Pediatrics Adolescent Med* 2007;**161**:959–66. https://doi.org/10.1001/archpedi.161.10.959

Fleming K, Thorson E and Atkin CK. Alcohol advertising exposure and perceptions: links with alcohol expectancies and intentions to drink or drinking in underaged youth and young adults. *J Health Commun* 2004;**9**:3–29. https://doi.org/10.1080/10810730490271665

Furr-Holden CDM, Campbell KDM, Milam AJ et al. Metric properties of the Neighborhood Inventory for Environmental Typology (NIfETy): an environmental assessment tool for measuring indicators of violence, alcohol, tobacco, and other drug exposures. *Eval Rev* 2010;**34**:159–84. https://doi.org/10.1177/0193841X10368493

Furr-Holden CDM, Lee MH, Milam AJ et al. Neighborhood environment and marijuana use in urban young adults. *Prevent Sci* 2015;**16**:268–78. https://doi.org/10.1007/s11121-014-0497-8

Furr-Holden CDM, Smart MJ, Pokorni JL et al. The NIfETy method for environmental assessment of neighborhood-level indicators of violence, alcohol, and other drug exposure. *Prevent Sci* 2008;**9**:245–55. https://doi.org/10.1007/s11121-008-0107-8

Ghebreyesus TA. Achieving health for all requires action on the economic and commercial determinants of health. *Lancet (London, England)* 2023;**401**:1137–9. https://doi.org/10.1016/S0140-6736(23)00574-3

Gilmore AB, Fabbri A, Baum F et al. Defining and conceptualising the commercial determinants of health. *Lancet (London, England)* 2023;**401**:1194–213. https://doi.org/10.1016/S0140-6736(23)00013-2

Gordon R, MacKintosh AM and Moodie C. The impact of alcohol marketing on youth drinking behaviour: a two-stage cohort study. *Alcohol Alcohol* 2010;**45**:470–80. https://doi.org/10.1093/alcalc/agq047

Hasselgård-Rowe J, Senchyna A, Broers B et al. Heterogeneity of definitions and measurements of binge drinking in research on adolescents and young adults. *Drug Alcohol Depend* 2022;**241**:109650. https://doi.org/10.1016/j.drugalcdep.2022.109650

Hill SE and Friel S. 'As long as it comes off as a cigarette ad, not a civil rights message': gender, inequality and the commercial determinants of health. *Int J Environ Res Public Health* 2020;**17**:7902. https://doi.org/10.3390/ijerph17217902

Hingson R, Zha W and Smyth D. Magnitude and trends in heavy episodic drinking, alcohol-impaired driving, and alcohol-related mortality and overdose hospitalizations among emerging adults of college ages 18-24 in the United States, 1998-2014. *J Stud Alcohol Drugs* 2017;**78**:540–8. https://doi.org/10.15288/jsad.2017.78.540

Hollett RC, Fairclough J, Butt J and Mills B. .Exposure to preference-matched alcohol advertisements from national sports broadcasts increases short-term alcohol consumption inclinations in risky drinkers. *Health Promot J Austr* 2024;**36**:1. https://doi.org/10.1002/hpja.894. Epub ahead of print. PMID: 38951019.

Jernigan D, Noel J, Landon J et al. Alcohol marketing and youth alcohol consumption: a systematic review of longitudinal studies published since 2008. *Addiction* 2017;**112**:7–20. https://doi.org/10.1111/add.13591

Jernigan D, Obot I and Jos N. Thirsting for the African market. *Afr J Drug Alcohol Stud* 2006;**5**:57–70.

Jernigan D and Trangenstein PJ. What's next for WHO's global strategy to reduce the harmful use of alcohol? *Bull World Health Organ* 2020;**98**:222–3. https://doi.org/10.2471/BLT.19.241737

Jernigan DH. The extent of global alcohol marketing and its impact on youth. *Contemp Drug Probl* 2010;**37**:57–89. https://doi.org/10.1177/009145091003700104

John U, Rumpf H-J, Hanke M et al. The alcohol use disorders identification test and mortality 20 years later. *Int J Mental Health Addict* 2023;**22**:2600–12. https://doi.org/10.1007/s11469-023-01008-y

Kao LS and Green CE. Analysis of variance: is there a difference in means and what does it mean? *J Surg Res* 2008;**144**:158–70. https://doi.org/10.1016/j.jss.2007.02.053

Kirchner TR and Shiffman S. Spatio-temporal determinants of mental health and well-being: advances in geographically-explicit ecological momentary assessment (GEMA). *Soc Psychiatry Psychiatr*

Epidemiol 2016;**51**:1211–23. https://doi.org/10.1007/s00127-016-1277-5

Kumar S, Culbreth RE, Swahn MH et al. Examining correlates of alcohol related condom-less sex among youth living in the slums of Kampala, Uganda. *AIDS Care* 2020;**32**:1246–50. https://doi.org/10.1080/09540121.2020.1762066

Kuntsche E, Kuntsche S, Thrul J et al. Binge drinking: health impact, prevalence, correlates and interventions. *Psychol Health* 2017;**32**:976–1017. https://doi.org/10.1080/08870446.2017.1325889

Kwak SG and Kim JH. Central limit theorem: the cornerstone of modern statistics. *Korean J Anesthesiol* 2017;**70**:144–56. https://doi.org/10.4097/kjae.2017.70.2.144

Labhart F, Ferris J, Winstock A et al. The country-level effects of drinking, heavy drinking and drink prices on pre-drinking: an international comparison of 25 countries. *Drug Alcohol Rev* 2017;**36**:742–50. https://doi.org/10.1111/dar.12525

Lilford R, Kyobutungi C, Ndugwa R et al. Because space matters: conceptual framework to help distinguish slum from non-slum urban areas. *BMJ Global Health* 2019;**4**:e001267. https://doi.org/10.1136/bmjgh-2018-001267

Lopez AD, Mathers CD, Ezzati M et al. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. *Lancet* 2006;**367**:1747–57. https://doi.org/10.1016/S0140-6736(06)68770-9

Madden J, Swahn HM and Kasirye R. Who is marketing alcohol in the slums of Kampala? A closer look at marketing types, content and brands. *Int J Alcohol Drug Res* 2024;**12**:S91–6. https://doi.org/10.7895/ijadr.461

Manthey J, Jacobsen B, Klinger S et al. Restricting alcohol marketing to reduce alcohol consumption: a systematic review of the empirical evidence for one of the 'best buys'. *Addiction (Abingdon, England)* 2024;**119**:799–811. https://doi.org/10.1111/add.16411

McCarthy S, Pitt H, Hennessy M et al. Women and the commercial determinants of health. *Health Promot Int* 2023;**38**:daad076. https://doi.org/10.1093/heapro/daad076

Mialon M. An overview of the commercial determinants of health. *Global Health* 2020;**16**:74. https://doi.org/10.1186/s12992-020-00607-x

Miller C. Marginal probabilities and point estimation for conditionally specified logistic regression. *Commun Stat Simul Comput* 2021;**50**:4338–63. https://doi.org/10.1080/03610918.2019.1643478

Mishra P, Singh U, Pandey CM et al. Application of student's t-test, analysis of variance, and covariance. *Ann Card Anaesth* 2019;**22**:407–11. https://doi.org/10.4103/aca.ACA_94_19

Morgenstern M, Isensee B, Sargent JD et al. Attitudes as mediators of the longitudinal association between alcohol advertising and youth drinking. *Arch Pediatrics Adolescent Med* 2011;**165**:610–6. https://doi.org/10.1001/archpediatrics.2011.12

Morojele NK, Dumbili EW, Obot IS et al. Alcohol consumption, harms and policy developments in sub-Saharan Africa: the case for stronger national and regional responses. *Drug Alcohol Rev* 2021;**40**:402–19.

Morojele NK, Lombard C, Harker Burnhams N et al. Alcohol marketing and adolescent alcohol consumption: results from the international alcohol control study (South Africa). *South Afr Med J* 2018;**108**:782–8. https://doi.org/10.7196/SAMJ.2018.v108i9.12958

Mutumba M and Schulenberg JE. Tobacco and alcohol use among youth in low and middle income countries: a multi-country analysis on the influence of structural and micro-level factors. *Subst Use Misuse* 2019;**54**:396–411. https://doi.org/10.1080/10826084.2018.1497063 Epub 2019 Jan 17. PMID: 30654696; PMCID: PMC6438732

Naimi TS, Ross CS, Siegel MB et al. Amount of televised alcohol advertising exposure and the quantity of alcohol consumed by youth. *J Stud Alcohol Drugs* 2016;**77**:723–9. https://doi.org/10.15288/jsad.2016.77.723

Nesoff ED, Milam AJ, Barajas CB et al. Expanding tools for investigating neighborhood indicators of drug use and violence: validation of the NIfETy for virtual street observation. *Prevent Sci* 2020;**21**:203–10. https://doi.org/10.1007/s11121-019-01062-w

Noel JK and Babor TF. Does industry self-regulation protect young people from exposure to alcohol marketing? A review of compliance and complaint studies. *Addict (Abingdon, England)* 2017;**112**:51–6. https://doi.org/10.1111/add.13432

Obot IS. Alcohol marketing in Africa: not an ordinary business. *Afr J Drug Alcohol Stud* 2013;**12**:63–73.

Odeigah OW, Patton R and Trangenstein P. Alcohol outlet density and marketing in Abeokuta, Nigeria. *Alcohol Alcohol* 2023;**58**:628–36. https://doi.org/10.1093/alcalc/agad058

Perry EW, Culbreth R, Swahn MH et al. Psychological distress among orphaned youth and youth reporting sexual exploitation in Kampala, Uganda. *Children Youth Services Rev* 2020;**119**:105587. https://doi.org/10.1016/j.childyouth.2020.105587

Petticrew M, Glover RE, Volmink J .et al. The Commercial Determinants of Health and Evidence Synthesis (CODES): methodological guidance for systematic reviews and other evidence syntheses. *Syst Rev* 2023;**12**:165.

Piasecki TM, Jahng S, Wood PK et al. The subjective effects of alcohol-tobacco co-use: an ecological momentary assessment investigation. *J Abnorm Psychol* 2011;**120**:557–71. https://doi.org/10.1037/a0023033

Pitt H, McCarthy S and Arnot G. Children, young people and the commercial determinants of health. *Health Promot Int* 2024;**39**:daad185. https://doi.org/10.1093/heapro/daad185

Raderalazasoa G, Swahn MH, Balenger A et al. Organizational structure, capacity and reach of organizations involved in alcohol prevention: an assessment of stakeholders across five countries in East Africa. *Int J Alcohol Drug Res* 2024;**12**:S79–S85. https://doi.org/10.7895/ijadr.453

Rehm J, Mathers C, Popova S et al. Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. *Lancet* 2009;**373**:2223–33. https://doi.org/10.1016/S0140-6736(09)60746-7

Rhew IC, Duckworth JC and Lee CM. The association between intended drinking contexts and alcohol expectancies in college students: a daily diary study. *Addict Behav* 2021;**120**:106967. https://doi.org/10.1016/j.addbeh.2021.106967

Ross CS, Ostroff J, Siegel MB et al. Youth alcohol brand consumption and exposure to brand advertising in magazines. *J Stud Alcohol Drugs* 2014;**75**:615–22. https://doi.org/10.15288/jsad.2014.75.615

Sargent JD and Babor TF. The relationship between exposure to alcohol marketing and underage drinking is causal. *J Stud Alcohol Drugs Suppl* 2020;**19**:113–24. https://doi.org/10.15288/jsads.2020.s19.113

Self-Brown S, Culbreth R, Wilson R et al. Individual and parental risk factors for sexual exploitation among high-risk youth in Uganda. *J Interpers Violence* 2021;**36**:NP3263–84. https://doi.org/10.1177/0886260518771685

Shiffman S, Stone AA and Hufford MR. Ecological momentary assessment. *Annu Rev Clin Psychol* 2008;**4**:1–32. https://doi.org/10.1146/annurev.clinpsy.3.022806.091415

Sliwinski MJ. Measurement-burst designs for social health research. *Social Personality Psychol Compass* 2008;**2**:245–61. https://doi.org/10.1111/j.1751-9004.2007.00043.x

Slutske WS, Deutsch AR and Piasecki TM. Neighborhood density of alcohol outlets moderates genetic and environmental influences on alcohol problems. *Addiction* 2019;**114**:815–22. https://doi.org/10.1111/add.14534

Ssebunnya J, Kituyi C, Nabanoba J et al. Social acceptance of alcohol use in Uganda. *BMC Psychiatry* 2020;**20**:52. https://doi.org/10.1186/s12888-020-2471-2

Swahn MH, Balenger A, Tumwesigye NM et al. East Africa needs an alcohol research agenda. *J Stud Alcohol Drugs* 2023;**84**:651–2. https://doi.org/10.15288/jsad.23-00079

Swahn MH, Culbreth R, Fodeman A et al. Heavy drinking and problem drinking among youth in Uganda: a structural equation model of alcohol marketing, advertisement perceptions and social norms. *Drug Alcohol Rev* 2022a;**41**:1444–56. https://doi.org/10.1111/dar.13497

Swahn MH, Culbreth R, Salazar LF et al. Prevalence of HIV and associated risks of sex work among youth in the slums of Kampala. *AIDS Res Treatment* 2016;**2016**:5360180. https://doi.org/10.1155/2016/5360180

Swahn MH, Culbreth R, Salazar LF et al. Psychosocial correlates of self-reported HIV among youth in the slums of Kampala. *BMC Public Health* 2019;**19**:1176.

Swahn MH, Culbreth R, Salazar LF et al. The prevalence and context of alcohol use, problem drinking, and alcohol-related harm among youth living in the slums of Kampala, Uganda. *Int J Environ Res Public Health* 2020;**17**:2451. https://doi.org/10.3390/ijerph17072451

Swahn M, Culbreth R, Staton C et al. Alcohol-related physical abuse of children in the slums of Kampala, Uganda. *Int J Environ Res Public Health* 2017:14101124. https://doi.org/10.3390/ijerph14101124

Swahn MH, Culbreth R, Tumwesigye NM et al. Problem drinking, alcohol-related violence, and homelessness among youth living in the slums of Kampala, Uganda. *Int J Environ Res Public Health* 2018;**15**:1061. https://doi.org/10.3390/ijerph15061061

Swahn MH, Gressard L, Palmier JB et al. Serious violence victimization and perpetration among youth living in the slums of Kampala, Uganda. *Western J Emerg Med* 2012;**13**:253–9. https://doi.org/10.5811/westjem.2012.3.11772

Swahn MH, Palmier J, Culbreth R et al. Alcohol use among young women in Kampala city: comparing self-reported survey data with presence of urinary ethyl glucuronide metabolite. *Int J Environ Res Public Health* 2024;**21**:1256. https://doi.org/10.3390/ijerph21091256

Swahn, MH, Palmier JB, Kasirye, R. Alcohol exposures, alcohol marketing, and their associations with problem drinking and drunkenness among youth living in the slums of Kampala, Uganda. *Int Scholarly Res Notices* 2013;**2013**:948675. https://doi.org/10.1155/2013/948675

Swahn MH, Palmier JB, May A et al. Features of alcohol advertisements across five urban slums in Kampala, Uganda: pilot testing a container-based approach. *BMC Public Health* 2022b;**22**:915. https://doi.org/10.1186/s12889-022-13350-2

Swahn MH, Robow Z, Balenger A et al. Preventing alcohol-related harm in East Africa: stakeholder perceptions of readiness across five countries. *Int J Environ Res Public Health* 2022c;**19**:14979. https://doi.org/10.3390/ijerph192214979

Swahn, MHM, Whitton A, Kasirye R et al. Crowdsourcing alcohol billboards in Kampala, Uganda: examining alcohol advertisement violations. *Int J Alcohol Drug Res* 2024;**12**:S97–S102. https://doi.org/10.7895/ijadr.439

Tamhane AR, Westfall AO, Burkholder GA et al. Prevalence odds ratio versus prevalence ratio: choice comes with consequences. *Stat Med* 2016;**35**:5730–5. https://doi.org/10.1002/sim.7059

Tanski SE, Dal Cin S, Stoolmiller M et al. Parental R-rated movie restriction and early-onset alcohol use. *J Stud Alcohol Drugs* 2010;**71**:452–9. https://doi.org/10.15288/jsad.2010.71.452

Theall KP, Wallace M, Felker-Kantor E et al. Neighborhood alcohol environment: differential effects on hazardous drinking and mental health by sex in persons living with HIV (PLWH). *AIDS Behav* 2019;**23**:3237–46. https://doi.org/10.1007/s10461-019-02632-3

Todd M, Armeli S, Tennen H et al. A daily diary validity test of drinking to cope measures. *J Stud Alcohol* 2003;**64**:584590. https://doi.org/10.1037/0893-164X.17.4.303

van Beemen O. *Heineken in Africa: A Multinational Unleashed*. London: Hurst, 2019.

van Roozendaal H, Verhulst S, Glazemakers I et al. Characteristics of adolescents admitted with acute alcohol intoxication: a retrospective multicentre study in Antwerp, Belgium, in the period 2015-2021. *Children (Basel, Switzerland)* 2023;**10**:1378. https://doi.org/10.3390/children10081378

World Health Organization. *The Alcohol Use Disorders Identification Test (AUDIT)*, 2001.

World Health Organization. Global status report on alcohol and health 2018. World Health Organization. 2018. https://www.who.int/publications/i/item/9789241565639 (29 August 2024, date last accessed).

World Health Organization. Saving lives, spending less: the case for investing in noncommunicable diseases. World Health Organization. 2021. https://www.who.int/publications/i/item/9789240041059 (20 October 2024, date last accessed).

World Health Organization. *Global status report on alcohol and health and treatment of substance use disorders 2024*. 2024. World Health Organization. https://www.who.int/publications/i/item/9789240096745 (20 October 2024, date last accessed).

Wray TB, Merrill JE and Monti PM. Using ecological momentary assessment (EMA) to assess situation-level predictors of alcohol use and alcohol-related consequences. *Alcohol Res* 2014;**36**:19–27.

Yelland LN, Salter AB and Ryan P. Performance of the modified Poisson regression approach for estimating relative risks from clustered prospective data. *Am J Epidemiol* 2011;**174**:984–92. https://doi.org/10.1093/aje/kwr183