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The Influence of Alcohol Outlet Density and Advertising on Youth Drinking in Urban Tanzania

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Abstract

Despite the detrimental effects of alcohol on adolescent health, high rates of alcohol use are reported among Tanzanian youth. We conducted systematic community mapping and participatory group activities with 177 adolescents in Dar es Salaam to explore how alcohol outlet density and advertising may contribute to adolescent drinking in urban Tanzania. Findings revealed a high density of alcohol-selling outlets and outdoor advertisements. The abundance of alcohol-related cues, including their close proximity to places where youth congregate, may facilitate and increase adolescent alcohol use in Tanzania. Participants recommended several changes to the alcohol environment to reduce adolescent drinking. Structural interventions that reduce adolescents' access and exposure to alcohol are needed in Tanzania.

Keywords

Adolescent; alcohol; advertising; outlet density; structural factors; environmental factors

INTRODUCTION

Alcohol use during adolescence can have long-term detrimental health, social, economic and developmental effects on youth (1, 2) and society (3). Research shows that youth who start drinking alcohol before the age of 15 are six times more likely to develop alcohol dependency problems than those who start drinking after the age of 21 (4). Adolescents who

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drink alcohol are also more likely to experience social problems, abuse other drugs, perpetrate or experience violence, perform poorly in school, and engage in reckless behavior (3, 5). Alcohol use in adolescence is associated with risky sexual behaviors and increased risk for sexually transmitted diseases (1). Furthermore, alcohol use during adolescence can lead to changes in brain development and disrupt normal growth and development (5).

According to the World Health Organization (WHO), the alcohol-attributable burden of disease is on the rise in Africa (6). This is coupled with high levels of reported alcohol use among adolescents. The WHO estimates that 41.6% of African adolescents aged 15–19 have ever consumed alcohol, 29.3% have done so in the last year and 6.3% engage in monthly binge drinking (3). However, alcohol use patterns vary widely among adolescents across Africa. Global School-based Student Health Surveys from nine African countries found prevalence of alcohol use among adolescents aged 13–15 ranging from 3.2% in Senegal to 61.6% in the Seychelles (7). Adolescent alcohol consumption rates also vary within countries; this is the case in Tanzania, the country where the study described here was conducted. In a study of two northern Tanzania regions (Mwanza and Kilimanjaro), the prevalence of ever use among secondary school students aged 15 and older ranged from 12.9% among girls in Mwanza to 63.9% among boys in Kilimanjaro, with 0.4% to 10.5% respectively consuming alcohol in the past 30 days (8). In contrast, prevalence of alcohol use in the past 30 days among students aged 13–15 in Dar es Salaam (coastal Tanzania) was 5.6% (7).

Differences in alcohol availability and advertising may contribute to the regional variations in adolescent alcohol use (3). Research shows that high alcohol outlet density within communities is associated with increased alcohol consumption and alcohol-related harms (9, 10). Adolescents who live in areas with greater alcohol density have greater access to alcohol (11) and higher rates of alcohol use (12–14) than adolescents in areas with fewer alcohol-selling outlets. Research from several countries also shows that greater exposure to alcohol advertising may facilitate early initiation of alcohol use, and increase current alcohol use and intentions for future use among adolescents (15–17). There is also evidence of a dose-response relationship, with greater alcohol consumption or likelihood of drinking tied to greater exposure to advertisements (15). Although the effect of the alcohol environment on adolescent drinking has not been previously assessed in Tanzania, research from northern Tanzania shows that most youth (64%) have easy access to alcohol and are exposed to high levels of alcohol advertising in their communities (8). Findings from the region also indicate that advertisements are one of the main reasons why youth reportedly start drinking alcohol (18).

Given that influencing alcohol outlet density and advertising are beyond the control of consumers, the WHO recommends the use of structural interventions to reduce alcohol uptake and use (3). Instead of focusing on individual behaviors and consumption patterns, structural interventions alter the context in which alcohol use occurs. They address the social, economic, political and environmental factors that shape individual, community and societal alcohol-related behaviors and work together to address the increased vulnerability of some groups to negative alcohol-related outcomes (19, 20). However, most of the research underpinning WHO recommendations has been conducted in high-income countries with

strong alcohol monitoring and regulation. Differences in the alcohol use context (including sociocultural patterns around alcohol use) and regulation of alcohol sales and advertising make it difficult to generalize findings from higher-income countries to the Tanzanian context.

In contrast to most other parts of the world where beer, spirits and wine make up the majority of consumed alcohol, in Tanzania, 87% of total alcohol consumption involves “other” forms of alcohol (including traditional beverages brewed from grains like corn) (3). Traditional (home/locally brewed) alcohol plays an important role in social, cultural and nutritional life in Tanzania (21–23). Tanzania is currently without a comprehensive written national alcohol policy (3). However there exist several national regulations including the 1968 Intoxicating Liquors Act which is intended to govern the production, licensing, sales, and consumption of alcohol in Tanzania (24). Tanzania currently has no “legally binding regulations on alcohol advertising” (3). The country has a minimum legal alcohol drinking/purchasing age of 18 years, however little data are available on its enforcement. There is a need to better understand how the alcohol environment in Tanzania contributes to adolescents’ alcohol consumption.

The goal of the current study was to assess the effects of alcohol outlet density and outdoor advertising on adolescent alcohol use in an urban Tanzanian environment, using a combination of systematic community mapping by the research team and participatory group activities with adolescents. We also explored changes that could be made to the alcohol environment to reduce adolescent alcohol use.

METHODS

Study design

The data reported here come from a two-year study examining the structural and environmental context of adolescent alcohol use and alcohol-related risky sexual behavior in urban Tanzania. The study involved several methodologies including: key informant interviews; systematic mapping of alcohol outlets and advertising; four-weeks of participatory activities with adolescents; and in-depth interviews with adolescents and adults. The overall methodological approach for the study has been described in detail elsewhere (25), as have other findings from the study (26).

Here we specifically report the methods and findings of the systematic mapping of alcohol outlet density and advertising, and two participatory activities with adolescents that pertain to the effects of alcohol outlet density and advertisements on adolescent alcohol use. The data reported here were collected from August to October 2016. The study was approved by [IRBs blinded for review process].

Study setting

The study was conducted in Dar es Salaam, the most populous and diverse city in Tanzania, with a population of 4.3 million people (27). With an area of 1,393 km², Dar es Salaam is the most densely populated part of Tanzania (3,133 persons/km²) (28). It is a rapidly growing city, that experienced a 75 percent population increase from 2002–2012. Dar es

Salaam has a relatively young population, with more than 50% being under the age of 25 years. The city is divided into three districts (Ilala, Temeke and Kinondoni) each with varying sociodemographic compositions, neighborhood characteristics and population densities (Table 1) (27, 29).

Site selection

Study sites were selected from all three districts of Dar es Salaam to represent a diversity of sociodemographic and environmental contexts (Table 1). A preliminary list of neighborhoods was compiled based on the following criteria: i) had at least one public secondary school; and ii) had at least one youth center or vocational training center that serves out-of-school youth.

Within each neighborhood, a list of potential study sites (schools and youth centers) was compiled. Eligibility criteria for study sites included: i) was either a public secondary school or youth center serving out-of-school youth; ii) served youth aged 15–19; iii) would allow the research team to meet with groups of 10–15 youth on-site weekly for a month; iv) had a private space where the research team could meet with youth. The study coordinator reached out to and visited each potential site to explain the study, confirm that sites met eligibility criteria and to obtain necessary permissions. The final study sites represent a purposive convenience sample and are in neighborhoods where we were able to obtain approval from both a secondary school (and the district education officer) and a youth center.

Procedures

Mapping of alcohol availability—Prior to data collection, the research assistants (2 female and 2 male Tanzanians in their mid-20s to early 30s) went through four weeks of intensive training with extensive practice of the various study methodologies. The research assistants practiced mapping the areas surrounding the research team's offices while being observed by a trainer. After each practice session, there was a team debriefing, where the trainers pointed out things in the environment that the researchers overlooked and discussed ways to be more observant during subsequent mapping.

Once data collection began, the research assistants spent four consecutive weeks in each neighborhood, with data collected in two neighborhoods simultaneously. In co-ed pairs, research assistants physically mapped and counted all alcohol-selling outlets within a 0.25-mile (0.40km) radius of each study site. Studies from high-income countries usually assess alcohol outlet density by geocoding alcohol vendors based on lists of licensed alcohol sellers (30), however, the presence of several unlicensed alcohol vendors in Dar es Salaam necessitated a physical tally of all alcohol vendors within the study areas.

Each pair was provided with a printed Google map with main roads and landmarks clearly identified, along with a checklist package to document observations. The checklist package included: a cover page with mapping instructions; space to tally all alcohol outlets and outdoor alcohol advertisements encountered; space to document general observations about the alcohol environment; and types of alcohol sold, prices and product placement within specific alcohol selling venues. The teams were reminded that the printed maps may not

depict all roadways within each area, and were instructed to walk through, explore and note all undocumented paths while mapping each area. This enabled the teams to explore pedestrian walkways and alleyways which were not marked on the maps but often housed alcohol vendors.

The teams marked on their maps and tallied every venue they encountered which sold alcohol. They also tallied all visible outdoor alcohol signage and advertisements they encountered. If it was unclear if alcohol was sold (e.g. some shops with no visible alcohol or advertisements), the teams approached the seller and requested alcohol (usually *viroba*, cheap, plastic sachets of hard liquor; the most commonly sold form of alcohol in Tanzania during data collection). If the seller offered the teams the requested or a different type of alcohol, they tallied the venue as an alcohol-selling outlet. The Tanzanian government had recently begun to enforce the collection of value-added tax from vendors. Therefore, the teams tried to be inconspicuous with their documentations so as not to rouse the suspicion of vendors.

Due to safety concerns, we refrained from using special GPS devices or personal mobile phones to mark the location of alcohol-selling outlets, and all mapping was conducted during the day. The daytime conduct of the mapping may have led to an underestimate of alcohol sellers, because the government had recently banned alcohol sales before 4pm on weekdays in on-premise drinking outlets. However, the teams tallied all obvious alcohol selling outlets (e.g. bars) regardless of whether or not they were open at the time of mapping and made note of places where it was unclear if alcohol was sold (e.g. restaurants). When they encountered multi-use high-rise buildings, the teams went inside the buildings and counted the number of alcohol sellers and alcohol signs within the buildings (such buildings housed casinos, hotels and supermarkets that sold alcohol).

Participatory activities

Participants and recruitment: Adolescent boys and girls were recruited from each study site to participate in a series of qualitative activities using purposive sampling. At each study site, school or center administrators were asked to identify at least 12 boys and 12 girls, aged 15–19 years, of diverse economic and family backgrounds (and for students, of diverse academic performance) who would be able to meet with the research team once a week for four consecutive weeks. Research assistants explained study goals, procedures and the voluntary nature of participation to the recruited youth in detail before obtaining informed consent from those who wished to participate. A total of 177 adolescent boys and girls were enrolled across all eight study sites.

The research assistants conducted a series of participatory activities with groups of adolescents in each of the eight study sites once a week for four consecutive weeks. Each meeting lasted approximately 90 minutes, involved several participatory activities (25) and were conducted in private rooms in each site. Each group was run by two research assistants; one facilitated the groups while the other took notes of all discussions. The qualitative findings in this paper were derived from the two participatory activities below.

Brainstorming and ranking on changing the alcohol environment: During week 3 of the participatory activities, in same-sex groups of 6–12, adolescents in each site discussed possible changes that could be made to the alcohol environment in Dar es Salaam to reduce adolescent drinking. First, the research assistants (of the same sex as the participants) asked what it means to change the alcohol environment, and elicited responses from the whole group. Research assistants provided clarifications to the participants with possible examples when necessary. Once the research assistants ascertained that participants understood what alcohol environment meant, they asked participants why changing the environment might reduce youth drinking and elicited a few responses.

Next, the youth were divided into smaller groups (3–4 per group), given paper and pens, and asked to brainstorm and list ways to change the alcohol environment to reduce adolescent drinking. Once participants were done brainstorming, they came back together in the larger group to share, discuss and rank their ideas. Each small group took turns reading out loud and discussing their lists with the whole group while the facilitator wrote their responses on the blackboard. Finally, each participant voted on the three ideas from the compiled list that they thought would be most effective for reducing adolescent drinking. This activity was conducted with all 177 participants and took approximately 25 minutes to complete.

Photovoice activity: A subset of 40 students from the four participating schools (10 per site) were selected to participate in an additional photovoice activity during weeks 3 and 4 of the participatory activities. Participants were students who: i) indicated they would be able to meet with the research team for an additional day in weeks 3 and 4; ii) had not been selected for in-depth interviews. Selected participants attended two photovoice sessions, which were facilitated by co-ed pairs of research assistants.

During the week 3 session, participants were trained on using disposable cameras and safety concerns to keep in mind when taking pictures in the field, and discussed the meanings behind pictures. Participants were divided into small (mostly co-ed) groups of 2–3 youth, and each group was provided with a disposable camera to use for one week. Participants were asked to take pictures of places within their communities where youth get or drink alcohol, or things in the environment that make youth drink alcohol. The session lasted approximately 45 minutes.

Participants met with the research assistants for the second photovoice group session in week 4, after the cameras had been collected and the pictures developed. Each small group of participants was asked to pick their three favorite pictures and explain in writing why they had taken the selected pictures and what lessons could be learned from the pictures about how to reduce adolescent alcohol use. Next, participants came back together in the larger group and verbally described their favorite pictures and discussed their significance with the whole group. The session lasted approximately 90 minutes.

Data analysis

Data from the systematic community mapping included marked up maps of the study areas, filled out checklists with tallies of vendors and advertisements, and ethnographic observations of the study areas. Data from the participatory activities included fieldnotes,

transcripts, lists from the brainstorming activity, photographs, and written descriptions of the photographs. All data were translated from Swahili to English by the bilingual Tanzanian research assistants.

We analyzed the tallies of alcohol outlets in terms of variations across study sites based on overall numbers and by types of outlets. We conducted thematic analysis on the transcripts and fieldnotes from the ethnographic observations. First all transcripts were read by the first author and a preliminary list of codes was developed. The principal investigator then reviewed the preliminary codes and made revisions. Next, the research assistants independently read through a set of transcripts and placed study participants' responses into coding matrices containing the different codes. Discrepancies were resolved by discussion until consensus was reached. The matrices were revised to minimize overlap of codes and to cluster related codes together into emergent categories. Once the matrices were finalized, two research assistants independently coded all remaining transcripts. Fieldnotes were analyzed for common themes and used to triangulate the findings from the participatory activities. All the data were then assessed together for overarching themes, which are presented below. Quotes and photographs from participants were selected to illustrate the main findings. The quotes included below have been edited for clarity and combine both written and verbal responses given by participants.

RESULTS

The high density of alcohol-selling venues in study areas makes alcohol readily available to youth

The mapping exercise revealed a high density of alcohol-selling outlets around most of the study sites, with the number of alcohol sellers within a 0.25-mile radius of the study schools and youth centers ranging from 9 to 126 (Table 1). The density of alcohol vendors varied by neighborhood context, with Ilala and Temeke (the sites closest to the city center) having the fewest alcohol sellers, and Bunju (the peri-urban) and Tandale (the low-income site) having the highest densities. The low number of alcohol vendors in Ilala was due in part to the topography of the areas mapped, with a marsh and part of the bay included in the mapping areas for the two sites. In all neighborhoods except Tandale, there were more alcohol vendors around the youth centers than the schools. Although there were a lot of alcohol vendors around the Temeke youth center site, most shops and kiosks did not openly display or advertise alcohol, but provided it to patrons upon request. The different neighborhoods also varied in the types of outlets available, with unregulated local brew sellers being most common in Bunju. Unlike the other neighborhoods, Bunju also had a higher number of on-premise drinking locations than off-premise vendors. Almost all of the outlets sold *viroba* which were banned in Tanzania in January 2017 (31).

Although the systematic mapping was limited to the areas around the eight study sites, participants' photographs and responses during the participatory activities provided information on the alcohol environment in other neighborhoods in Dar es Salaam. The youth participants' responses during the various participatory activities corroborated the research team's findings from the community mapping of high alcohol outlet density within and around the study sites. While the mere presence of a large number of alcohol vendors does

not guarantee that youth will consume alcohol, findings from the participatory activities included youth perceptions that the alcohol environment in Dar es Salaam influences adolescents' drinking behaviors. Many adolescents described how constantly seeing alcohol as they go about their daily activities reminds them of the availability of alcohol and their easy access to it.

Most of the residential areas are surrounded by a lot of bars, so when the students are coming from the school, they see many people drinking and can be influenced. [Bunju, In-school girls]

Most of the youth do drink because access to alcohol is high. They see it everywhere and are tempted to drink alcohol. [Temeke, Out-of-school boys]

As noted in the above quotes, the heavy presence of alcohol-selling outlets and widespread alcohol use serves as a form of temptation for youth and may signal the social acceptance of drinking to youth.

Several participants viewed the number of alcohol outlets in their communities as problematic. They offered many suggestions on ways to alter the alcohol environment that would reduce alcohol availability and hence adolescent alcohol use. A key recommendation was to limit the number of alcohol sellers within a given area.

You wake up and you go to school and you pass the bar and see people drinking. That makes you feel tempted to drink. If they reduce the number of places where alcohol is available where people live, it makes it harder for people to drink and they see it less on their way to school. [Temeke, In-school boys]

For example, after every three streets there has to be one bar contrary to the current situation where [there] are a lot of bars everywhere in the streets [Tandale, In-school boys]

Participants suggested that by reducing the number of alcohol sellers within their communities, youth would be less likely to drink. Specifically, the youth recommended that alcohol not be sold near schools and in residential areas as their presence in such settings increased the temptation to drink.

In addition, some participants articulated as being particularly problematic the issue of traditional alcohol, which is commonly brewed and sold in households within the community. This led some youth to recommend that alcohol manufacturing and sales be forbidden within homes.

The parents who sell alcohol at home that leads for youth to be influenced, they could find for them a special place that they could be able to do their business because others do not sell alcohol by their wish but because of their low income and life hardship that they face is the reason that makes them do such things. Special place should be set aside instead of selling local brew at home [Bunju, Out-of-school girls]

This was particularly the case in Bunju where availability of local brew alcohol was greatest. Most local brew is unregulated in Tanzania, with much of it being produced and sold in homes as a source of income-generation particularly in poorer communities.

The presence of alcohol advertisements within communities may influence Tanzanian adolescent alcohol use by indicating its acceptability

The mapping of the study areas also revealed a high number of outdoor alcohol advertisements, ranging from 3 to 70 advertisements per 0.25-mile radius. Such high numbers of advertisements in combination with high alcohol availability contribute to “widespread social acceptability of drinking” (32) and increase alcohol use (33, 34). Most of the advertisements were posters and signs on alcohol selling outlets, highlighting the fact that they sold alcohol and the types of alcohol available. Other advertisements included prominently placed billboards along main roads and tarps featuring specific brands of alcohol used to fence in the compounds of restaurants and bars.

The highest number of advertisements were found around two of the schools (Table 1). Interestingly, in contrast to the Temeke school site which had the highest number of outdoor advertisements, the Temeke youth center site only 1.2 miles (2 kilometers) away had the fewest outdoor advertisements. In the Temeke youth center site, even shops and kiosks that sold alcohol did not have any advertisements identifying them as alcohol sellers. As previously noted, such vendors did not openly display alcohol either. The relative absence of indicators of alcohol sales around the Temeke youth center site may indicate that alcohol is not socially acceptable to those who live in that neighborhood. The Temeke youth center stands in sharp contrast to other sites where most shops and kiosks had some form of alcohol advertisement outside.

Adolescents in the study discussed the role of advertisements in piquing their interests in alcohol and encouraging alcohol uptake and consumption. They appeared to be very sensitive to alcohol advertisements, with several groups of participants (particularly those from the Temeke school, the site with the most advertisements) taking pictures of advertisements and often mentioning the slogans for specific alcohol brands in group discussions.

[Figure 1] shows a billboard which has an advert which influences society to use alcohol. [...] it attracts and has a message which is truly influencing. For example, “Ladha ya gwiji, Imara kama simba” (“Lager has the taste of an expert, strong as a lion”). Just below it, you can see words that are missing, but they are the words that emphasize that alcohol should not be drunk by citizens that are below the age of 18 years. [Temeke, In-school co-ed group]

Many participants described how the advertisements often feature catchy slogans and pictures of youth enjoying themselves, thus enticing adolescents to try the brand of alcohol being advertised.

We see how they are advertising that beer, [...] by showing how happy the people of different sex are after drinking it. Every beer has its saying and in this one, they say “A good drink anywhere you go”. This means that anywhere you can be, you

will be happy and the people who use it are youth, so this gives other youth the desire or the wish of wanting to taste it. [Ilala, In-school boys]

This depiction of youth and other lifestyle images that youth identify with in alcohol advertisements has been shown to normalize youth drinking thus increasing perceptions of the acceptability of adolescent drinking (35–37).

Many participants also noted that several advertisements specifically stated that alcohol should not be sold to people under the age of 18 years in accordance with national minimum drinking age laws. However, the allure of the advertisements often overrode such warnings as shown by the following quote:

[Figure 2] is a fencing in the bar. When bars have adverts that say youth below 18 years cannot buy or drink alcohol, they are afraid to go there because they will not be served. [...] Sometimes the alcohol advertising posters are so attractive that they attract youth and they feel like they want to taste. [Bunju, In-school co-ed group]

While adolescents may be hesitant to consume alcohol in bars, the high density of off-premise alcohol outlets in the community provides them alternative ways to purchase and try the alcohol they see in advertisements.

Another way in which advertisements appeared to encourage alcohol consumption was through economic incentives.

[Figure 3 is a] big advertisement on a billboard, [...] located close to the gate at a secondary school. I took this picture to show how youth can be influenced by adverts to use alcohol [...] because the advert has the message that if you drink beer, you will win 100,000,000 Tsh [Tanzanian shillings; approx. 45,000 USD], so youth drink thinking they have the possibility of getting that amount. The more they drink, the more chance they have to win. [Temeke, In-school co-ed group]

In addition to monetary giveaways, alcohol advertisements also promote low-priced beverages. This was illustrated by Figure 1 above and the following quote from another participant group:

These adverts show that alcohol is available at this place [...] 3 beers for only 6000 Tsh [< 3 USD], so this convinces youth to go due to the price. If beer was 6000 [Tsh] for one beer, youth would not go. So they come here because it is cheaper. [Temeke, In-school co-ed group]

The pictures taken by several of the groups prominently displayed the price of the alcoholic beverages being advertised. This strategy may be especially important for adolescents who often have little money to spend and thus are in search of cheaper products to maximize their limited funds.

Several groups of participants recommended the restriction of alcohol advertising within the community as a way to reduce adolescent alcohol initiation and use. Suggestions included reducing the size and numbers of billboards as well as the removal of special promotion advertisements.

Reduce or to restrict advertisements on billboards and different media, which pressures alcohol use. [...] They should ban and reduce the number of billboards to reduce the influences. [For] example, there is a promotion in [a beer] advert that says when you see the number on the top of the [bottle] cap, you will win 100 million [Tsh; approx. 45,000 USD]. The more you drink the more you have a chance to win 100 million [Tsh]. Remove these types of promotions that encourage more drinking. [Ilala, In-school girls]

Although our community mapping and the photovoice pictures focused only on outdoor advertisements, participants also discussed the effect of other forms of advertisements including those aired on TV and the internet. They also discussed the effect of other marketing strategies used by alcohol companies to attract youth consumers.

Reduce the pressure of those which influence under 18 years old youth to drink alcohol. For instance [...] concerts which are influencing people to drink alcohol. Concerts are thrown by [alcohol companies] in order to promote some of their beer [...] They have a car that drives around with advertisements to tell people about the event. Youth go there for music and to watch women dance and they are offered beer for a lower price or for free to taste [Temeke, Out-of-school girls].

The above quote highlights a promotional strategy that is commonly used in Dar es Salaam to introduce new products or attract new customers for existing products. Participants noted the need to restrict such strategies, which are particularly aimed at attracting youth.

The close proximity of alcohol vendors and advertisements to places where youth spend time may facilitate adolescent drinking by increasing alcohol accessibility

Another way in which the alcohol environment in Dar es Salaam facilitates adolescent consumption is through the close proximity of several alcohol outlets and advertisements to schools, youth centers and other places where youth spend a lot of time. Our community mapping revealed alcohol sellers across the street from or next to several of the study sites. This proximity combined with the previously noted affordability of alcohol as signaled by promotional advertisements may be a key driver of youth drinking.

This picture is showing us Vilabu (local clubs), they sell local brews plus beer. [...] Near this Kilabu (local club), there is a women's saloon, [...] There is also a chips hut next to the Kilabu. These are things that are liked by youth, the saloon and the chips, so youth go there and some of them give the excuse that they are going to the saloon or to buy chips, so the parents cannot tell where they are going because the alcohol is found at the same place. [Temeke, In-school co-ed group]

[Figure 4] shows a bar where alcohol is available. It is nearby the school and youth can go and wear casual clothes to drink. [...] it is a place where [...] other type of refreshments like music is being done at nighttime. Firstly, this picture shows how easy alcohol is available [...]. Sometimes at night they [students] fail to concentrate during their private studying because they stay at the school late at night for private studying and at the bar they play music loud, so it is so noisy they cannot concentrate [Tandale, In-school co-ed group]

As noted above, the close proximity of alcohol-selling outlets to places where adolescents spend time may have adverse effects on the youth exposed to them beyond encouraging alcohol consumption.

In addition, several of the alcohol selling outlets have activities such as live music, football game broadcasts and dancing which further attract youth to the venues.

[The] picture shows the place where people love to go drinking alcohol at the evening. [...] there are people of different age groups, who love going there to drink. [...] both well [off] people and poor go there; youth and adults are going there. Youth go there because they also show the football games. [Temeke, In-school co-ed group]

The picture shows a place that youth can get alcohol [...] Youth who go there are 15 years and above, both boys and girls [...] At that bar, there is discototo (disco for kids), so that is why even 15 years and above can go there and they can even drink. As long as they have money, they are being provided [alcohol]. [Ilala, In-school boys]

These quotes illustrate how alcohol-selling outlets attract youth by offering various social activities that engage youth from different socioeconomic backgrounds.

In addition, as mentioned in the quote directly above, adolescent alcohol use in such venues may be facilitated by a lack of enforcement of minimum drinking age laws. This point is further illustrated by the following quote:

This picture shows a bar where youth drink alcohol. [...] Youth aged 16 to 20 years old go there, both boys and girls. There are no restrictions at this place. [...] They should put a fence around the bar with a guard that will be checking the youth that are going there to confirm their age and if they are too young, they will not get in. [Tandale, In-school co-ed group]

As highlighted in the preceding quotes, vendors often sell alcohol to adolescents regardless of age. Furthermore, as noted in an earlier quote, many students knew that they could buy alcohol as long as they were in “casual clothes” and not in their school uniforms since the latter identify them as being school-aged and potentially under the legal drinking age.

Participants gave various recommendations on ways to reduce youth access to alcohol in Dar es Salaam. Several groups suggested that the government remove all alcohol vendors from residential areas and school zones and set aside specific areas for alcohol sales. Many study participants also recommended the use of economic policies including taxation to reduce adolescents’ access to alcohol. Participants believed that affordability was a key driver of adolescent alcohol use.

The government has to increase taxes to the industries that are manufacturing alcohol. That will increase the price of alcohol, therefore the youth will not afford to buy alcohol. When tax increases, youth will not afford alcohol. When a beer is sold for 5000 [Tsh; approx. 2 USD], that will make youth with 5000 [Tsh] only

drink one beer, but if it is sold for 2500 [Tsh; approx. 1 US], then they can get 2 beers, so increasing the price minimizes the drinking. [Ilala, In-school boys]

Participants' recommendations around taxation could help reduce adolescent alcohol use not only by increasing prices at the consumer end but also by increasing the costs of production, marketing and distribution, thus limiting the supply of alcohol.

Finally, many adolescents recommended better enforcement of minimum drinking age laws to prohibit alcohol use among youth under 18 years of age. Participants suggested several strategies by which the existing laws could be enforced including the use of fines for sellers who are caught selling alcohol to minors, and punishments for underage youth caught buying alcohol.

For example, there should be a big fine to those who sell to youth. If somebody is fined 150,000 Tsh [approx. 68 USD] for selling kiroba of 500 Tsh [<1 USD] to youth, they will stop and fear to sell alcohol to youth because they know if they are caught, they will be fined this huge amount of money. [Bunju, In-school boys].

To facilitate greater law enforcement, several participants also highlighted the need to put into place strategies to verify that customers are old enough to purchase alcohol. However, they also noted that this might be difficult to do since most youth do not have identification cards that could be used to verify their ages.

DISCUSSION

In our study of environmental factors contributing to adolescent alcohol use, we found that high density of alcohol selling outlets and alcohol advertisements coupled with low enforcement of minimum drinking age laws facilitate underage drinking in Dar es Salaam. Our use of several methodologies allowed us to triangulate our findings, with data from all three methods confirming high availability, accessibility and advertising of alcohol within the study areas. It also allowed us to gain insights into the alcohol environments of other parts of Dar es Salaam beyond the study sites. Our study results support the findings from northern Tanzania of high alcohol access and great exposure to alcohol advertisements (8, 18). These findings highlight the need for structural interventions that can regulate the alcohol environment to reduce alcohol-related cues and adolescents' access to alcohol in urban Tanzania.

It is worth noting that adolescents' recommendations for reducing alcohol use in Tanzania align with globally recommended structural interventions for alcohol control. Specifically, the WHO lists regulation of alcohol availability, restriction of advertising and the use of pricing policies as "best buy" interventions for controlling global alcohol use (3). These correspond to the three main categories of structural interventions-those that address availability, acceptability and accessibility (19) of alcohol. Participants' recommendations addressed all three of these areas and often highlighted the interconnectedness of the three types of interventions.

Our study results also align with findings of alcohol density research from other countries. Although we did not directly measure the effect of alcohol density on alcohol consumption,

information provided by study participants suggests that high alcohol availability in Dar es Salaam may contribute to adolescent alcohol use. Youth in our study reported being able to purchase alcohol from a variety of outlets with little enforcement of minimum drinking age laws. This could be a result of the vendors being more willing to sell alcohol to youth due to greater competition from the other vendors in the area (11, 38).

Participants recommended several approaches for reducing alcohol availability by decreasing alcohol outlet density in Dar es Salaam. This included reducing the number of alcohol-selling outlets in the community, particularly around schools and in residential areas, which could be achieved through community zoning and enforcement of existing alcohol licensing regulations as is done in high-income countries (9, 39). Existing alcohol licensing laws should be strictly enforced with sanctions for violators. Zoning regulations can also be enacted that specify minimum distances from schools, youth centers and other areas where adolescents congregate to where alcohol can be sold (40). Research has shown that decreasing alcohol outlet density is associated with decreased alcohol consumption over time among adolescents by increasing the opportunity costs of obtaining alcohol (9, 39). Decreasing alcohol density in Dar es Salaam would increase the distance youth have to travel in order to buy alcohol, and decrease competition between vendors, thus reducing adolescent alcohol purchases and use.

Alcohol advertising and marketing may also play key roles in encouraging and increasing the perceived acceptability of adolescent alcohol use. Not only did our mapping reveal a high number of outdoor alcohol advertisements in the study areas (e.g. 70 within a 0.25-mile radius of a school), but the adolescents in the study also confirmed the effect that such advertisements and other marketing strategies have in encouraging their alcohol use. Our results show that alcohol advertisements have a salient effect on adolescents in Tanzania, with participants recounting the slogans and images used to advertise specific alcohol brands in great detail. Advertisers often use images that appeal to youth and normalize adolescent drinking. Although we did not quantify the effect of such advertisements on adolescents' consumption, our findings are similar to those from other studies conducted in the US and western Europe (41, 42). Youth are more likely to try or want to try alcoholic beverages advertised in ways they find appealing and with images of people who they can identify with, such as other youth (41). The high number of advertisements encountered by youth in Dar es Salaam constantly remind them of the availability of alcohol in their surroundings. This might greatly contribute to drinking and encourage early initiation of use, as high volume of advertisements encountered are bound to have an effect on drinking similar to what has been found in other countries (42).

Study participants recommended that alcohol advertisements, and particularly those featuring special promotions that encourage greater alcohol consumption, be banned near schools. In addition, our findings suggest the need for regulations similar to those found in France and Madagascar which limit the content of alcohol advertisements to factual information about the content of the beverages, and which ban advertisements normalizing and glamorizing adolescent alcohol use (39, 40). These findings support global recommendations that "the use of lifestyle images of drinkers, celebrities, sponsorships, endorsements or scenes depicting a normalized or idealized drinking context should be

prohibited” (43). The volume of alcohol advertising that youth encounter in Tanzania is likely to increase as competition among the top global alcohol producers increases in Africa. SABMiller one of the main alcohol producers in Tanzania is listed as one of Advertising Age’s top 100 global marketers (44). Our findings highlight the need for strong national efforts that regulate all forms of alcohol advertising and marketing in Tanzania to counter aggressive marketing campaigns that target adolescents and normalize drinking. The findings also highlight the need for more research on the effect of other forms of alcohol promotion on adolescents, such as through social media and promotional concerts.

Another key finding from our study was the effect of pricing and other economic factors that affect adolescents’ access to alcohol. The low cost of several types of alcoholic beverages including the now banned *viroba* (which are currently being re-packaged in small bottles for sale by the industry), local brew alcohol and reduced-cost (through special promotions) beer, made alcohol more accessible to adolescents. In addition, adolescents with lower socioeconomic status may be particularly affected by the alcohol environment in Dar es Salaam. Similar to what has been found in New Zealand and the USA, we found greater alcohol outlet density in the lower-income study communities (45, 46). This may increase the vulnerability of lower-income adolescents to alcohol use (including earlier initiation and heavier use) (10) as well as other alcohol-related problems such as violence, noise and street disturbances that often result from the clustering of on-premise alcohol outlets (47). Furthermore, youth in low-income communities in Tanzania often live in households where local brew alcohol is manufactured and sold as a source of income for the family, including for payment of school fees. This gives such youth greater access to local brew with potentially harmful high alcohol content levels but creates social challenges for its regulation (21).

In response, study participants recommended the use of pricing policies including taxation to reduce adolescent alcohol use. Research shows that harmful use of alcohol among youth can be effectively reduced by raising the price of alcohol (3). The WHO “encourages countries to review prices regularly in relation to inflation and income levels; ban or restrict sales below cost and other price promotions; and establish minimum prices for alcohol where applicable” (3). Research from other African countries also suggest that taxes may be effective in curbing alcohol advertising (40). Alcohol zoning laws are particularly needed to address the disproportional distribution of alcohol selling outlets in low-income neighborhoods, and mechanisms are needed for the regulation of sales and production of local brew alcohol. Alternative income-generation options are needed in low-income areas to help curb the production and sales of local brew. Finally, existing alcohol minimum drinking age laws should be strictly enforced as this approach has been proven effective in reducing adolescent alcohol use in other contexts (39).

The study has a few limitations. First, we used paper maps instead of GPS devices that would have allowed us to geocode the specific locations of the alcohol selling outlets we encountered. We refrained from using special GPS devices or personal mobile phones due to concerns about safety and theft while in the field. Second, given the qualitative nature of our study, we did not measure alcohol consumption among study participants and therefore cannot quantify the effect of alcohol density and advertising on adolescent drinking.

However, the study provides important insights by showing, from the perspective of adolescents, the effect that environmental alcohol cues have on adolescents' drinking or intentions to drink in Dar es Salaam. Finally, although the study sites were in diverse neighborhoods, the selected sites may not fully represent all areas of Dar es Salaam. However, through the participatory activities we were able to gather insights from participants on the alcohol environments in the areas where they lived and spent time beyond the four study neighborhoods. Despite these limitations, the combination of the mapping with the qualitative data from the adolescents provides important contextual information about the ways in which the alcohol environment in Dar es Salaam contributes to adolescent alcohol use.

Structural interventions that reduce adolescents' access to (and reminders of) alcohol within the community are needed to curb underage drinking in Dar es Salaam, and possibly other areas of Tanzania. The Tanzanian government has already started to implement structural changes to reduce alcohol use in Tanzania. This includes restricting hours of on-premises alcohol sales and banning the manufacturing, importation, sales and consumption of *viroba* (31), which was the most commonly cited form of alcohol consumed among youth in Tanzania (18). The recently implemented structural changes, coupled with other interventions recommended by the youth, such as using community zoning to restrict the number of alcohol-selling outlets per area, have the potential to reduce alcohol use among adolescents in Tanzania, thereby reducing future alcohol-related burden of disease and social harms. To enable this, Tanzania needs a comprehensive alcohol policy that addresses availability, advertising and pricing of alcoholic beverages and includes regulations that specifically pertain to reducing adolescent alcohol use. This will help create an environment that constrains adolescent alcohol use on a population level.

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REFERENCES

1. Bonomo Y, Coffey C, Wolfe R, Lynskey M, Bowes G, Patton G. Adverse outcomes of alcohol use in adolescents. *Addiction*. 2001;96(10):1485–96. [PubMed: 11571067]
2. CDC. Underage Drinking Fact Sheet Atlanta,GA: Centers for Disease Control and Prevention; 2018 [updated May 10, 2018 Available from: <https://www.cdc.gov/alcohol/fact-sheets/underage-drinking.htm>.
3. WHO. Global Status Report on Alcohol and Health. Geneva, Switzerland: World Health Organization; 2014.
4. SAMHSA. 2015 National Survey on Drug Use and Health: Detailed Tables. Rockville, MD: Substance Abuse and Mental Health Services Administration; 2016.
5. DHHS. The Surgeon General's Call to Action to Prevent and Reduce Underage Drinking. Rockville, MD: U.S. Department of Health and Human Services, Office of the Surgeon General; 2007.
6. Ferreira-Borges C, Ketsela T, D M, A A. Reduction of the Harmful Use of Alcohol: A strategy for the WHO African Region. *The African Health Monitor*. 2013:31–5.

7. Fuhr DC, Fleischmann A, Riley L, Kann L, Poznyak V. Alcohol and other psychoactive substances in Africa and the Americas: Results from the WHO Global School-based Student Health Survey. *Journal of Substance Use*. 2014;19(3):274–82.
8. Francis JM, Weiss HA, Mshana G, Baisley K, Grosskurth H, Kapiga SH. The Epidemiology of Alcohol Use and Alcohol Use Disorders among Young People in Northern Tanzania. *PLOS ONE*. 2015;10(10):e0140041. [PubMed: 26444411]
9. Campbell CA, Hahn RA, Elder R, Brewer R, Chattopadhyay S, Fielding J, et al. The effectiveness of limiting alcohol outlet density as a means of reducing excessive alcohol consumption and alcohol-related harms. *American journal of preventive medicine*. 2009;37(6):556–69. [PubMed: 19944925]
10. Mori-Gamarrá F, Moure-Rodríguez L, Sureda X, Carbia C, Roye D, Montes-Martínez A, et al. [Alcohol outlet density and alcohol consumption in Galician youth]. *Gac Sanit*. 2018.
11. Chen M-J, Gruenewald P, Remer L. Does alcohol outlet density affect youth access to alcohol? *Journal of Adolescent Health*. 2009;44(6):582–9. [PubMed: 19465323]
12. Chen MJ, Grube J, Gruenewald P. Community alcohol outlet density and underage drinking. *Addiction*. 2010;105(2):270–8. [PubMed: 20078485]
13. Treno AJ, Grube JW, Martin SE. Alcohol availability as a predictor of youth drinking and driving: a hierarchical analysis of survey and archival data. *Alcoholism: Clinical and Experimental Research*. 2003;27(5):835–40.
14. Huckle T, Huakau J, Sweetsur P, Huisman O, Casswell S. Density of alcohol outlets and teenage drinking: living in an alcogenic environment is associated with higher consumption in a metropolitan setting. *Addiction*. 2008;103(10):1614–21. [PubMed: 18821871]
15. Anderson P, de Bruijn A, Angus K, Gordon R, Hastings G. Impact of Alcohol Advertising and Media Exposure on Adolescent Alcohol Use: A Systematic Review of Longitudinal Studies. *Alcohol and Alcoholism*. 2009;44(3):229–43. [PubMed: 19144976]
16. Jernigan D, Noel J, Landon J, Thornton N, Lobstein T. Alcohol marketing and youth alcohol consumption: a systematic review of longitudinal studies published since 2008. *Addiction*. 2017;112 Suppl 1:7–20. [PubMed: 27565582]
17. Scott S, Muirhead C, Shucksmith J, Tyrrell R, Kaner E. Does Industry-Driven Alcohol Marketing Influence Adolescent Drinking Behaviour? A Systematic Review. *Alcohol Alcohol*. 2017;52(1):84–94. [PubMed: 27864186]
18. Mbata D, Mshana G, Francis J, Wamoyi J, Mongi A, Chagalucha J, et al. Alcohol Use and Drinking Norms among Young People in Northern Tanzania: Preliminary Findings from a Qualitative Study. STRIVE, National Institute for Medical Research, Mwanza Intervention Trials Unit.
19. Blankenship KM, Bray SJ, Merson MH. Structural interventions in public health. *AIDS*. 2000;14.
20. Parker RG, Easton D, Fau-Klein CH, Klein CH. Structural barriers and facilitators in HIV prevention: a review of international research. (0269–9370 (Print)).
21. Tusekwa AB, Mosha TCE, Laswai HS, Towo EE. Traditional alcoholic beverages of Tanzania: Production, quality and changes in quality attributes during storage. *International Journal of Food Sciences and Nutrition*. 2000;51(2):135–43. [PubMed: 10953757]
22. Mandishona EM, Moyo VM, Gordeuk VR, Khumalo H, Saungweme T, Gangaidzo IT, et al. A traditional beverage prevents iron deficiency in African women of child bearing age. *European Journal of Clinical Nutrition*. 1999;53(9):722–5. [PubMed: 10509769]
23. Kubo R. Production of indigenous alcoholic beverages in a rural village of Tanzania. *Journal of the Institute of Brewing*. 2014;120(2):142–8.
24. STRIVE. HIV Programming for Young People in Tanzania: Existing Structures and Alcohol Related Policies [Situational Analysis Report]. STRIVE, NIMR, MITU; 2012.
25. Authors. [details removed for peer review]. 2018a.
26. Authors. [details removed for peer review]. 2018b.
27. National Bureau of Statistics DeS, Office of Chief Government Statistician Z. Basic Demographic and Socio-Economic Profile Dar es Salaam Region. The United Republic of Tanzania: National Bureau of Statistics; 2016.
28. National Bureau of Statistics T. Socio-Economic Atlas of Tanzania - Census 2012.

29. Population C Dar es Salaam Region in Tanzania: Subdivision.
30. Kypri K, Bell ML, Hay GC, Baxter J. Alcohol outlet density and university student drinking: a national study. *Addiction*. 2008;103(7):1131–8. [PubMed: 18554346]
31. Nyato D, Mshana G, Holmes A, Fritz K. STRIVE Impact Case Study: Alcohol Policy in Tanzania. National Institute of Medical Research Mwanza, Tanzania International Center for Research on Women, Washington DC, USA London School of Hygiene and Tropical Medicine, London UK; 2017.
32. Ellickson PL. Does alcohol advertising promote adolescent drinking? Results from a longitudinal assessment. *Addiction* (Abingdon, England). 2005;100(2):235–46.
33. Sureda X, Carreno V, Espelt A, Villalbi JR, Pearce J, Franco M. Alcohol in the city: wherever and whenever. *Gaceta Sanitaria*. 2017.
34. Villalbi JR, Espelt A, Sureda X, Bosque-Prous M, Teixido-Compano E, Puigcorbe S, et al. The urban environment of alcohol: a study on the availability, promotion and visibility of its use in the neighborhoods of Barcelona. *Adicciones*. 2019;31(1):33–40. [PubMed: 29353296]
35. Chen Y-Y, Chiu Y-C, Ting T-T, Liao H-Y, Chen WJ, Chen C-Y. Television viewing and alcohol advertising with alcohol expectancies among school-aged children in Taiwan. *Drug and Alcohol Dependence*. 2016;162:219–26. [PubMed: 27032607]
36. Fleming K, Thorson E, 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(1):3–29.
37. McClure AC, Tanski SE, Li Z, Jackson K, Morgenstern M, Li Z, et al. Internet Alcohol Marketing and Underage Alcohol Use. *Pediatrics*. 2016;137(2):e20152149. [PubMed: 26738886]
38. Freisthler B, Gruenewald PJ, Treno AJ, Lee J. Evaluating alcohol access and the alcohol environment in neighborhood areas. *Alcoholism: Clinical and Experimental Research*. 2003;27(3):477–84.
39. Babor TF, Caetano R, Casswell S, Edwards G, Giesbrecht N, Graham K, et al. Alcohol no ordinary commodity : research and public policy. In: Babor T, editor. Oxford;: Oxford University Press; 2010.
40. de Bruijn A, Ferreira-Borges C, Engels R, Bhavsar M. Monitoring Outdoor Alcohol Advertising in Developing Countries: Findings of a Pilot Study in Five African Countries. *African Journal of Drug & Alcohol Studies*. 2014;13(1):13–29.
41. Collins RL, Martino SC, Kovalchik SA, D'Amico EJ, Shadel WG, Becker KM, et al. Exposure to alcohol advertising and adolescents' drinking beliefs: Role of message interpretation. *Health Psychol*. 2017;36(9):890–7. [PubMed: 28639822]
42. de Bruijn A, Tanghe J, de Leeuw R, Engels R, Anderson P, Beccaria F, et al. European longitudinal study on the relationship between adolescents' alcohol marketing exposure and alcohol use. *Addiction*. 2016;111(10):1774–83. [PubMed: 27486952]
43. Babor TF, Jernigan D, Brookes C, Brown K. Toward a public health approach to the protection of vulnerable populations from the harmful effects of alcohol marketing. *Addiction*. 2017;112 Suppl 1:125–7. [PubMed: 28070938]
44. Jernigan DH, Babor TF. The concentration of the global alcohol industry and its penetration in the African region. *Addiction*. 2015;110(4):551–60. [PubMed: 25771689]
45. Hay GC, Whigham PA, Kypri K, Langley JD. Neighbourhood deprivation and access to alcohol outlets: a national study. *Health & place*. 2009;15(4):1086–93. [PubMed: 19540790]
46. Pollack CE, Cubbin C, Ahn D, Winkleby M. Neighbourhood deprivation and alcohol consumption: does the availability of alcohol play a role? *International journal of epidemiology*. 2005;34(4):772–80. [PubMed: 15737966]
47. Livingston M, Livingston M, Chikritzhs T, Livingston M, Chikritzhs T, Room R, et al. Changing the density of alcohol outlets to reduce alcohol-related problems. *Drug and alcohol review*. 2007;26(5):557–66. [PubMed: 17701520]

Highlights

- High density of alcohol outlets in Dar es Salaam facilitates adolescent alcohol use
- Alcohol advertisements and other marketing strategies are very salient with youth
- Adolescent participants' responses corroborated community mapping findings
- Participants' proposed changes to the alcohol environment may curb youth drinking
- Participants' suggestions align with globally recommended structural interventions

Figure 1:
Picture of alcohol banner with catchy slogan

Figure 2:
Picture of attractive alcohol posters

Figure 3:
Picture of alcohol promotion billboard near secondary school entrance

Figure 4:
Picture of bar near a school

Table 1:

Tally of alcohol selling outlets and outdoor alcohol advertisements in 0.25-mile (0.40km) radius of study sites

District ^a	Ilala Population: 1,220,611 Area: 365 km ² Density: 3344/km ²		Temeke Population: 1,368,881 Area: 729km ² Density: 1879/km ²		Kinondoni Population: 1,775,049 Area: 537km ² Density 3303/km ²	
Characteristics of selected neighborhoods	Ilala: City center with government offices, high-rise buildings, and hotels. Highest socioeconomic status (SES)		Temeke: Industrial community with several factories and distribution facilities. Second highest SES		Tandale: Low-income community with informal settlements. Lowest SES	
Study sites	Ilala School	Ilala Youth Center	Temeke School	Temeke Youth Center	Tandale School ^b	Tandale Youth Center
Number of vendors in 0.25 (0.4km) radius of study sites	9	10	15	21	69	36
Type of vendor						
Off-premises						
Shop	4	1	3	13	28	13
Kiosk		1	4	4	2	4
Supermarket		1			1	
Other ^c	1				4	2
On-premises						
Bar	1	2	8	3	26	10
Grocery ^d	1				3	2
Pub				1	5	1
Local club (Kilabu)						1
Restaurant		2				1
Hotel	1	2				
Other ^c	1	1				2
Number of advertisements	4	5	70	3	<i>b</i>	14
					63	48

^a All population statistics are based on the 2012 census (27–29)

^b Missing data on advertisements

^c Other types of vendors include: Street vendor with tray of viroba, cigarettes and chewing gum; wholesale alcohol vendors, alcohol sold from a wheelbarrow outside a hut, brothel, casino, house with table outside with viroba for sale.

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A type of shop that only sells alcohol for on-premise
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