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Spatial Dimensions of Research on Alcohol and Sexual Risk: A Case Example from a Mumbai Study

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Abstract

Alcohol's role in unprotected sex is an important issue in the spread of HIV. Research on alcohol use in many countries has found complex relationships between individual characteristics, places where people drink, and consumption patterns. Data on drinking and leisure time activities and locations from in-person surveys with 1,239 young men aged 18–29 living in low-income communities in Mumbai, India, were analyzed. For every pair of men, an index of association measured the degree of similarity in their reported activities in specific communities. Multidimensional scaling of the similarity matrix revealed men who engaged in similar activities in the same communities. Hierarchical grouping classified men based on their activity dimensions. The ten groups of men, distinguished by their activities in particular communities, also differed in alcohol consumption, number of non-spousal sex partners, and level of unprotected sex. Understanding where activities take place is important in designing venue-based interventions to reduce health risk behaviors leading to the spread of HIV/AIDS.

Keywords

Drinking places; Alcohol; Young men; Mumbai; Sexual risk

Introduction

The role of alcohol as a factor in sexual risk behavior that contributes to the spread of HIV is an important research question. It has fostered the growth of a significant body of research on

alcohol and human sexuality in general over the last three decades [1]. There is ample evidence that alcohol consumption is linked to sexual risk behaviors, including engaging in unprotected sex, in the U.S [2–4], and in other countries [5]. In a population-based study in Andhra Pradesh, India, consuming alcohol before sex was one factor associated with HIV among men in a population-based study in Andhra Pradesh, India [6]. Nevertheless, other studies have found that drinking before sex did not have an effect on condom use [7].

Because the scope of research on alcohol and sexual risk behavior—especially as they affect the transmission of HIV/AIDS—is so wide, the study of many different groups in different communities around the world using different research methods may explain apparent contradictions in the evidence. Event or diary data have been used to establish the relationship between alcohol use and risky sex because these data link alcohol consumption and sexual behavior temporally, but even studies using these methods have come to different conclusions about whether or not alcohol use before sex leads to risky sex [7,8].

Research testing different theories of the possible link between alcohol use and sexual risk also provides some explanation for differences in results [9]. Disinhibition theory considers alcohol a general disinhibitor, with consumption removing normal behavioral constraints and consistently contributing to a range of risky behaviors. Alcohol myopia theory suggests that alcohol consumption reduces cognitive capacity and limits a person's ability to process the full range of cues in the environment. This myopia—focus on a few salient environmental cues—may make a person more or less likely to engage in risky behavior depending on the environment. From this perspective, alcohol consumption would not consistently lead to risky behavior. The social and spatial contextual settings of alcohol consumption thus become a key issue in explaining the conditions under which alcohol might or might not lead to unprotected sex.

The importance of explicitly recognizing the places where the behaviors relevant to the transmission of HIV occur has been acknowledged for more than a decade. HIV infection occurs because individuals are socially and sexually engaged with each other in specific places. As Auerbach et al. note, “the central problem in AIDS epidemiology, from the perspective of the social and behavior sciences, is to describe the connections between individual acts and social settings that lead to the spread of infection” [11, pp. 65–66]. At the same time, there has been renewed interest in the links between health and place, facilitated by the growing use of geographic information systems and spatial analysis in health and epidemiology [12–14]. In response, research in a variety of countries has uncovered complex relationships between alcohol use and place.

Distinct patterns of drinking outlet utilization associated with age, gender, and ethnic subgroups and differentially linked to acute drinking problems were found in a study of 25,000 drinkers in communities in California and South Carolina [15]. Reasons for drinking and drinking setting together influenced consumption in a study sample of more than 8,000 students at 18 universities. In this multisite study, students drank for different reasons in different contexts [16]. A comparative multilevel analysis of contextual drinking in American and Canadian adults concluded that interactions between locations and individual demographic variables may differ in different societies [17]. Local patterns of alcohol use in six villages of West Bengal, India, revealed that drinking was an integral part of the cultural landscape [18]. Palm wine (tadi), distilled country liquor (chullu), and Indian-made “foreign liquor” were used in particular segments of society and settings. For example, chullu was served with snacks in video parlours to encourage group drinking among the young male patrons.

A number of spatial ecological studies have explored the connections between alcohol availability and alcohol use. Higher densities of off-campus alcohol outlets allowing on-

premise drinking were strongly related to drinking outcomes in college students even when individual predictors of college drinking were controlled [19]. The structure of drinking opportunities may also affect rates of sexually transmitted disease. Declines in gonorrhea rates from 1988 to 1996 were steeper in Los Angeles neighborhoods where more alcohol outlets closed following a period of social unrest in 1992 [20].

A social ecological model of alcohol outlets and alcohol outcomes views drinkers as agents who circulate in the environment and select specific places to drink [10]. These places provide contexts for drinking and compete with each other as drinking sites. Drinkers come into contact with each other at these places and influence each other's behavior. The patterns of utilization of drinking places are shaped by individual travel and activity patterns, social networks, and factors governing the operation of drinking places.

Our research is related to this theoretical approach and addresses three main questions. First, where do young men drink and engage in leisure activities? This includes both the type of setting (bar, restaurant, or other type of place) and the geographic location of the setting. Second, are there groups of men who drink and engage in leisure time activities in the same types of places in the same communities? Third, do different groups of men report different group levels of alcohol consumption and sexual risk behavior? Understanding where activities of interest take place, which is related to why and with whom drinking occurs, is important for advancing theory and for designing venue-based interventions to reduce health risk behaviors, including those leading to the spread of HIV-AIDS.

Methods

The research was designed and implemented through a collaboration between the Institute for Community Research, a research institute based in the eastern United States, and the International Institute for Population Sciences, an independent governmental institution of higher education, or deemed university, in Mumbai, India. Although prevalence is relatively low, India has a high number of people with HIV. The National Family Health Survey of 2005–2006 (NFHS-3) found that prevalence was higher in urban areas than rural areas and was higher among men than women [21]. Mumbai is the largest city in Maharashtra state where the state's HIV prevalence rate is higher than in the country as a whole.

The study was conducted in three low-income communities on the outskirts of the Mumbai metropolitan region (Fig. 1). The communities were selected because of differences in size and alcohol and sex risk opportunities. For example, one of the communities included a cluster of brothels, and another included a major intersection with numerous alcohol outlets. The boundaries of the study sites were defined based on natural features, elements in the built environment including major roads, and local knowledge. Residences in these communities are temporary, permanent, or semi-permanent structures no more than two levels in height, the limit in areas officially designated as slum. Homes are built at high density on narrow lanes. Each community included local temples and shops, outdoor markets, central gathering places, and locations where alcohol could be purchased and consumed. All were located near a major industrial zone which offers employment to area residents and has contributed to the communities' growth through migration, primarily from northern and eastern states.

The survey sampling plan defined lanes along which houses were located and then grouped lanes into clusters with approximately 150 households each. A total of 66 clusters were identified. For the survey, 40 clusters were randomly selected and mapped to verify that the random selection provided reasonable coverage of areas in the study community. A random selection could by chance result in the sampling of only certain parts of a study area. The initial random sample of clusters left one part of the study area uncovered, and a replacement cluster

was selected. The unique cluster identifier was included as part of the data collected for the survey so that respondents could be located to the cluster level based on residence.

The study design included open-ended interviews and social mapping with community gatekeepers and local experts, in-depth qualitative interviews with 84 married and unmarried drinking men exploring their drinking behavior and recent sexual experiences including with non-spousal partners. The design also included in-person surveys with 1,239 young men aged 18–29. About 18% of these were men were non-30 day drinkers, most of whom had never drunk alcohol. The study sample represents the general population of young men, not high-risk individuals.

The survey instrument had 21 sections covering demographics, alcohol exposure, expectancies, and use, and sexual relationships, behavior, and health. In the section on leisure time activities, men were asked whether they engaged in eight leisure time activities with friends: drinking, roaming, drinking in bars, playing cards, gambling, watching blue films, visiting commercial sex workers, and meeting women and girls. Drinking with friends and drinking in bars with friends along with visiting commercial sex workers and meeting women and girls are of interest in understanding connections between alcohol and sexual risk. Playing cards and gambling [22] and watching blue films [23] have also been linked to alcohol use and extra-marital and pre-marital sex in the Indian context. Men who participated in an activity were asked to describe the type and location of the setting where they usually engaged in the activity in sufficient detail to locate the place on a map.

In the section on alcohol use, men were asked whether they had ever consumed five types of alcohol (foreign liquor, country liquor, tadi madi, wine, and beer). “Country liquor” refers to hard liquor that is produced in Indian slum communities and shipped to other localities, often in inner tubes of large truck tires. It is distributed to local dealers who fill small bottles and distribute them to individual customers or to private sites within the community where it is sold unlicensed. Tadi madi is date wine and many communities have centers where this product is served and consumed. For each type of liquor, men were asked to describe how much they drank at one time, the type of setting, and the location of the setting where they last drank the particular type of liquor.

For this study, we analyzed data from the leisure activities and alcohol use sections. To facilitate collection of the spatial data, 49 specific places where alcohol was consumed were identified during the formative work prior to the survey. These places were given 3-digit place codes. As new activity and drinking places were identified through the survey, the list of coded places grew to 477 places where men reported usually drinking with friends.

To apply the ecological perspective, we investigated whether or not it was possible to define communities of men based on where they engaged in the same activities, rather than where they lived, and to see whether or not these groups exhibited different patterns of alcohol use and sex risk. Preliminary analysis of sex risk across the three communities of residence showed little difference between the communities in average number of non-wife partners over the last year, the average number of times men had unprotected sex with non-wife partners over the last year, and condom use risk, although men living in Community C had unprotected sex with non-wife partners less frequently than men living in the other two communities. For this reason, we did not conduct an analysis based on communities of residence.

To explore the associations between men, activities, and places, locations were generalized to the neighborhood or community level rather than to a specific establishment. For activities like roaming or meeting women and girls, it is difficult to identify a specific point where the activity occurs. In the case of drinking at home, there would be no matches between respondents unless they resided in the same community. Mapping locations at the community centroid also reduces

the risk of identifying an individual or a place. Data aggregation is one strategy used to protect privacy and confidentiality of spatial data on individuals [24].

An Index of Association was used to calculate a measure of similarity in the activity-community locations for every pair of men in the survey [25]. The index was calculated based on 9 activities, the eight leisure activities including usual drinking with friends and drinking with friends in bars and last drinking any of five types of liquor regardless of when that occurred, to capture a wide range of drinking locations. The number of times that both men engaged in the same activity in the same community is multiplied by 2. Then, this numerator is divided by the total number of activities of each man summed together. The index value ranges from 0 if there are no activities-in-community in common to 1 if both men engage in the same activities in the same communities.

Once we obtained the similarity measures, we used multidimensional scaling and cluster analysis to group men who engaged in the same leisure activities including drinking with friends in the same communities. One group of 99 men who did not engage in any of the leisure time activities and did not report drinking any of the five types of liquor was easily identified. A matrix of 1,140 by 1,140 similarity measures for the remaining men was analyzed using multidimensional scaling [26]. The scaling analysis “mapped” men into a two-dimensional space based on the matrix of similarities. The two-dimensional solution was used to model the distribution of activity-community places in the landscape. The coordinates on both dimensions were recorded for each man. Agglomerative hierarchical clustering was used to identify groups of men based on their coordinate locations in the two-dimensional scaled space [27]. Initially, each man was in his own group. Groups were merged until the proportion of variance accounted for by the clusters fell below 90%. At this point, there were 9 clusters of men. To investigate whether or not these groups of men could be distinguished by their alcohol use and sexual behavior, discriminant analysis was used to find combinations of variables that revealed differences among groups [28]. Logistic regression can also be used, but the results are generally similar. Discriminant analysis is preferred unless explanatory variables are not multivariate normal, for example, if many dummy variables are used [29].

Results

In the survey, drinking with friends was the most frequently reported leisure time activity with 751 of the 1,239 men reporting that they drank with friends. Other activities were reported with less frequency: roaming ($N = 681$), drinking in bars ($N = 319$), playing cards ($N = 164$), watching blue films ($N = 98$), gambling ($N = 51$), visiting commercial sex workers ($N = 41$), and meeting women and girls ($N = 16$). A wide range of settings where young men reported usually drinking with friends was identified (Table 1). *Daru Ka Addas* are establishments where people, often women, sell country liquor, and some men reported drinking at these locations. Of the 477 places, 15 (3%) had been identified in the formative work prior to the survey; 226 of the 751 men (30%) who reported drinking with friends identified one of these places.

Large numbers of young men also reported that they drank in settings that were not alcohol outlets. Almost half of the young men who said they drank with friends mentioned the respondent's home or home of a respondent's friend as the location where they usually drank with friends. About 5% of the men reported drinking at locations outdoors and the rest reported drinking at other indoor locations. Men who drank with friends were mapped to the centroids of the communities where their drinking place was located. In all, 111 of the 751 men who reported a place where they usually drank with friends (about 16%) described places outside of the three study communities. Some of these places were very remote from Mumbai itself and included native villages of the young men in Andhra Pradesh, Bihar, Maharashtra, Orissa, Uttar Pradesh, and West Bengal. Even within the Mumbai region, men reported drinking

outside of the study communities (Fig. 2). This represents a wider geographical distribution of regular drinking places than those identified in the formative work conducted before the survey. In key informant interviews and in-depth interviews with some residents, only one key informant mentioned the home as a setting where young men drank and all of the other places were located in or adjacent to a study community.

There was no one-to-one relationship between activity patterns and community of residence (Table 2). Three of the groups had only members who lived in the same community. The seven remaining groups drew men from all three study communities and the group characteristics differed. Men from the same study community did not always engage in the same activities in the same places. Group 1 included 99 men who did not drink with friends, engaged in no other leisure time activities, and reported no consumption of any of the five types of alcohol. Group 4 included men who drank with friends and engaged in many leisure time activities.

To illustrate spatial differences, maps for three of the groups—Groups 4, 8, and 9—are presented here (Fig. 3). These groups were selected because of the contrasts in their characteristics. Graduated symbols representing the number of people engaging in activities in various communities were used. Because the groups have different numbers of men, the counts are normalized as a percent of the total. Group 4 included some men from each of the three study communities. These men engaged in a wide array of leisure time and drinking activities at places mostly in one of the three study communities where there is a major intersection and a high concentration of bars, restaurants, hotels, and other venues (Fig. 3a). Group 8, a group of older, mostly married men who all lived in Community C, engaged in relatively few activities, primarily drinking in their own homes with friends and roaming both in the community of residence and in an adjacent commercial area (Fig. 3b). Group 9 included men from each of the three study communities. Unlike men in Group 4 and Group 8, men in Group 9 conducted less than half of their activities in the three communities of residence. For this group, there was a single focal point of activity in a place to the west of the three study communities (Fig. 3c).

The groups of men, in addition to having distinct spatial activity patterns, could be differentiated in other ways. In relation to alcohol's role in the spread of HIV, the concern in this research is whether or not groups of men who pursue the same activities in the same communities can also be distinguished based on their alcohol consumption and sexual risk behavior. Descriptive measures (Table 2) reveal differences among the men with respect to alcohol and sex risk. Groups 2, 4, 6, 9, and 10 had higher than average number of leisure activities, which included drinking with friends and drinking in bars, accompanied by higher than average number of times of unprotected sex, except for Group 6. Groups 4, 6, and 8 had higher than average alcohol consumption. In Group 4, this was accompanied by higher than average number of times of unprotected sex with a non-wife partner.

To explore these differences further, a stepwise discriminant analysis was performed to investigate whether some combination of 9 variables distinguished men in the 10 groups: age at which the individual moved to Mumbai (0 for Mumbai natives), an index of television/movie exposure, number of drinks in the last month, an index of alcohol self efficacy, marital status, number of non-wife sex partners in the last 12 months, number of times unprotected sex with a non-wife partner, ever having had unprotected sex, and an index of condom use risk. Four discriminant functions were obtained based on the four variables that entered. In order, these were the index of alcohol efficacy, the number of drinks in the last month, the age at which the individual moved to Mumbai, and the index of television/movie exposure (Table 3). Living in Mumbai for a fewer number of years was inversely correlated with alcohol self efficacy, number of drinks in the last month, and television/movie exposure. The first three functions were statistically significant in their ability to discriminate groups of men who engaged in the

same activities in the same communities. The classification analysis correctly predicted the group membership for 21.5% of the men.

Discussion

Young men in the study communities drank at a wide range of places. The importance of residences as drinking places is clear. Residential settings also accounted for a high proportion of drinking episodes in a study of young men and women university students in New Zealand [30]. The difficulties of measuring alcohol consumption in the home setting have been noted [31]. Because the home was a drinking setting for many of the men, drinking places were concentrated in the three study communities. Nevertheless, 15% of drinking places were located outside of the three study communities. From 13–28% of men in each of the three communities reported a usual drinking place with friends located outside of the community of residence.

In the large sample of young men, it was possible to group men based on who engaged in the same leisure time activities including drinking in the same community locations. The groups differed on a number of dimensions related to alcohol consumption and unprotected sex based on descriptive statistics. Thus, the relationship between alcohol use and sexual risk may not be the same for all groups in all places. This suggests a possible explanation for the sometimes contradictory evidence on alcohol use and risky sexual practices. In this study, sexual risk behavior contributing to the spread of HIV did not significantly discriminate the groups. Given the large number of groups and the fact that the activity-in-community patterns of groups members were not identical but overlapping, it is noteworthy that some variables related to alcohol use significantly discriminated the groups and that these variables correctly classified men by group in almost a quarter of cases.

Conclusions

This study provides support for the social ecological model of alcohol settings and assortative drinking. Using spatial analysis, it is possible to identify groups of men who engage in similar activities in the same places and to distinguish these men based on alcohol consumption. As such, the research has important implications for the design of public policies, venue-based interventions and research studies. Because high amounts of drinking occur in the home, developing policies that consider drinking in private settings is important. Regulating commercial alcohol outlets will not necessarily address risky alcohol consumption and may encourage consumption in more private settings. How to deal with alcohol use in private settings is a challenging issue involving the extension of the regulatory power of the state into the private sphere.

In terms of the design of venue-based interventions, spatial analysis highlights the need to understand relationships between where people drink or engage in sexual activities and other places. Focusing interventions only on places where men are going for sex may not capture the full range of places where drinking and related activities are taking place and where men are introduced to these activities [32]. If the intervention focuses on people who patronize particular establishments, the participants may be drawn from a wide range of residential communities. If interventions focus on places where people live, their activities of interest may take place well outside the residential community. Multilevel interventions focused on residences, peers, venues, and communities may be needed.

Although the research presented here is cross-sectional by design, the importance of the amount of time a person has spent in a community underscores the importance of developing methods for exploring progression from low alcohol consumption and risk behavior to higher

consumption and riskier behavior in specific geographic contexts. Spatial research on alcohol use that helps us to investigate social influences through common activities in common settings has the potential to illuminate pathways in the progression to unhealthy behavior.

Limitations

Because the survey was a general survey, the number of high risk men was relatively low. Alcohol-related variables helped differentiate groups of men living in the three study community who engaged in activities in different places, but none of the variables associated with sexual risk behavior—including number of non-wife partners in the last year, number of times unprotected sex with non-wife partners in the last year, and an index of condom risk—contributed to the discriminant functions. Although differences across the groups in these variables were observed, they were not sufficient to contribute to a combination of variables distinguishing the groups.

The study was also limited in the spatial data available for analysis. It is difficult to develop complete data on the activity spaces of individuals in the framework of a large in-person survey. Given that data were available for only a few activity sites for each man, the degree of overlap is not always high, making it difficult to construct distinct groups. Furthermore, the data did not explicitly capture social network connections in communities. We do not know if two men who engage in the same activity in the same community actually know each other. Despite these limitations, the spatial approach makes the extent of activity occurring in private residences and in communities outside the study areas visible.

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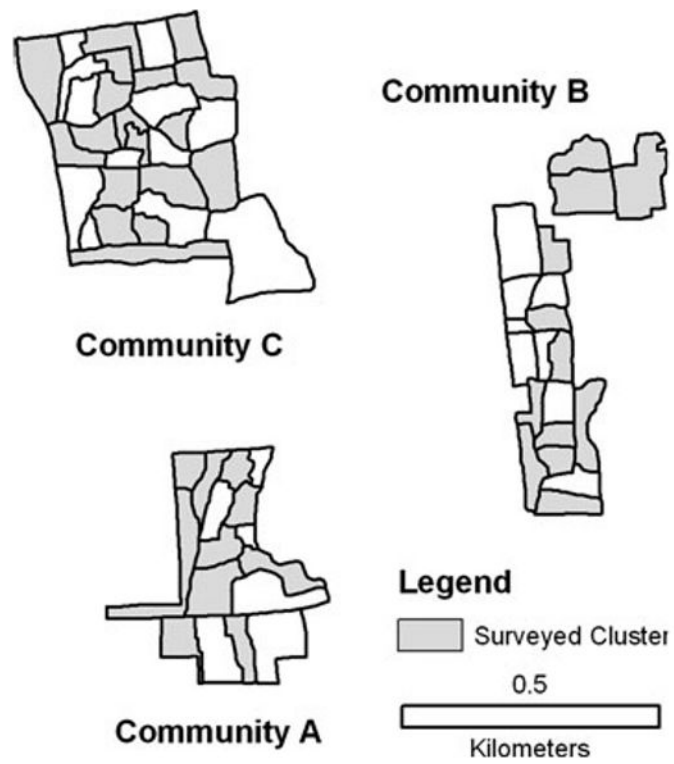


Fig. 1. The study communities, clusters, and surveyed clusters. Community B is divided by a major road

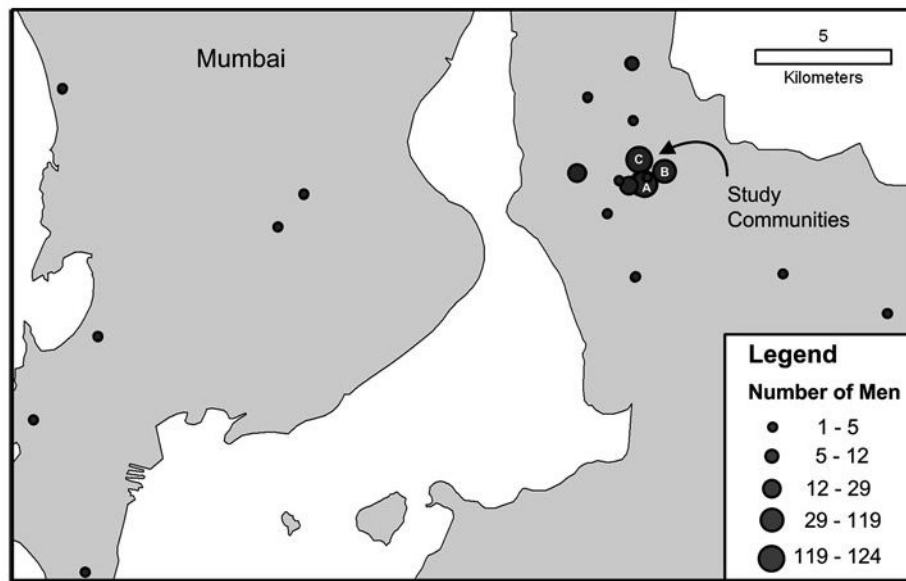


Fig. 2. The number of men who reported usually drinking with friends by community location of usual drinking place within the Mumbai metropolitan region. The graduated symbols corresponding to study Communities A, B, and C are labeled

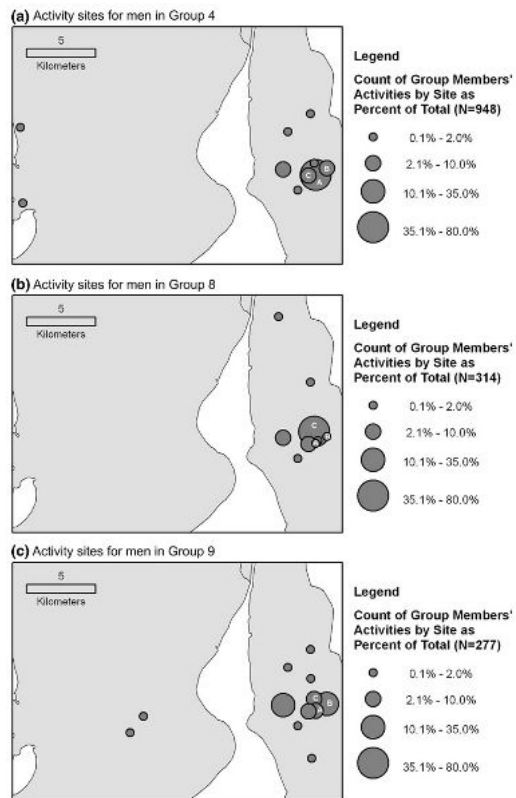


Fig. 3. Spatial activity patterns for men in Group 4 (a), men in Group 8 (b), and men in Group 9 (c). The total number of activities mapped for the group is given. Mapped locations include usual places for engaging in the eight leisure time activities and locations where men last drank any of five types of alcohol. The graduated symbols corresponding to study Communities A, B, and C are labeled

Table 1
Types of places where men usually drank with friends

| Type of place | Places | | Men | |
|---------------------|--------|---------|--------|---------|
| | Number | Percent | Number | Percent |
| Bar/Restaurant | 39 | 8.2 | 285 | 37.9 |
| Tadi Madi Center | 1 | 0.0 | 1 | 0.0 |
| Wine shop | 2 | 0.0 | 2 | 0.0 |
| Country liquor shop | 1 | 0.0 | 10 | 0.1 |
| Daru Ka Adda | 5 | 0.1 | 9 | 0.1 |
| Home | 248 | 52.0 | 248 | 33.0 |
| Friend's home | 104 | 21.8 | 104 | 13.8 |
| Other indoor | 49 | 10.3 | 52 | 6.9 |
| Outdoors | 28 | 5.9 | 40 | 5.3 |
| Total | 477 | 100.0 | 751 | 100 |

Table 2

Group characteristics

| | Group | | | | | | | | | | All |
|---|-------|-----|-----|------|-----|-----|-----|-----|-----|-----|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| Number of men | 99 | 201 | 117 | 202 | 157 | 112 | 117 | 99 | 74 | 61 | 1,239 |
| Community A | 27 | 0 | 18 | 130 | 5 | 0 | 102 | 0 | 9 | 21 | 312 |
| Community B | 31 | 0 | 29 | 55 | 0 | 112 | 7 | 0 | 44 | 30 | 308 |
| Community C | 41 | 201 | 70 | 17 | 152 | 0 | 8 | 99 | 21 | 10 | 619 |
| Age (mean) | 23 | 24 | 24 | 24 | 24 | 25 | 24 | 25 | 23 | 24 | 24 |
| Age moved to Mumbai (mean) | 14 | 10 | 12 | 8 | 12 | 14 | 7 | 12 | 11 | 13 | 11 |
| Number of leisure activities (mean) | 0 | 2.2 | 1.3 | 2.7 | 1.1 | 1.8 | 1.4 | 1.6 | 2.3 | 1.9 | 1.7 |
| Index of TV/movie exposure (mean) | 3.0 | 4.5 | 4.1 | 4.1 | 4.3 | 3.0 | 4.4 | 4.1 | 4.5 | 3.6 | 4.0 |
| Alcohol consumption (mean number of drinks in last month) | 0 | 5.2 | 2.3 | 12.1 | 3.9 | 8.4 | 4.2 | 6.6 | 4.6 | 3.4 | 5.6 |
| Index of alcohol self efficacy (mean) | 0.8 | 3.8 | 2.7 | 3.6 | 3.4 | 2.9 | 3.1 | 3.5 | 3.3 | 2.7 | 3.1 |
| Never married (percent) | 47 | 42 | 44 | 44 | 38 | 21 | 35 | 20 | 49 | 36 | 38 |
| Number of non-wife Partners (mean over last year) | 0.0 | 0.3 | 0.1 | 0.6 | 0.1 | 0.2 | 0.2 | 0.3 | 0.6 | 0.2 | 0.3 |
| Number of times unprotected sex with non-wife partner (mean over last year) | 0.0 | 1.3 | 0.1 | 2.0 | 0.1 | 0.5 | 1.3 | 0.3 | 5.0 | 1.3 | 1.1 |
| Ever had unprotected sex (%) | 3 | 10 | 2 | 11 | 4 | 6 | 8 | 5 | 11 | 7 | 7 |
| Index of condom use risk (mean) | 1.4 | 1.9 | 1.5 | 2.0 | 1.9 | 2.4 | 2.0 | 2.4 | 1.8 | 2.0 | 1.9 |

Table 3
Results of stepwise discriminant analysis

| Function | Eigenvalue | % of Variance | Cumulative % | Canonial Correlation |
|---|---------------|---------------|--------------|----------------------|
| Eigenvalues | | | | |
| 1 | .198 | 61.6 | 61.6 | .407 |
| 2 | .081 | 25.1 | 86.7 | .273 |
| 3 | .038 | 12.0 | 98.7 | .192 |
| 4 | .004 | 1.3 | 100.0 | .065 |
| Test of functions | Wilks' Lambda | Chi-square | Df | Significance |
| Wilks' Lambda | | | | |
| 1 through 4 | .741 | 369.700 | 36 | .000 |
| 2 through 4 | .887 | 147.141 | 24 | .000 |
| 3 through 4 | .959 | 51.664 | 14 | .000 |
| 4 | .996 | 5.240 | 6 | .513 |
| | Function 1 | Function 2 | Function 3 | Function 4 |
| Standardized canonical discriminant function coefficients | | | | |
| Age moved to Mumbai | -.268 | 0.86 | .919 | .437 |
| Index of alcohol efficacy | .739 | -.213 | .480 | -.480 |
| Index of TV/movie exposure | .214 | -.518 | .043 | .895 |
| Number of drinks in last month | .335 | .852 | -.063 | .450 |