

Title: **Does alcohol outlet density differ by area-level disadvantage in Metropolitan Perth?**

Running Title: Licence density and area disadvantage

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Abstract

Introduction and Aims: Research suggests there are area-level disparities in alcohol outlets, with greater density in disadvantaged areas. In part, this might be explained by the inequitable distribution of retail, attracted by lower rents to disadvantaged neighbourhoods. This ecological study examines the distribution of liquor licences in Perth, Australia, and whether discrepancies in the distribution of retail land-uses could account for a socio-economic gradient.

Design and Methods: Area disadvantage was determined for each Statistical Area 1 (SA1) using the Australian Bureau of Statistics Index of Relative Socio-economic Disadvantage, and licence locations were mapped in GIS. Negative binomial loglinear models examined whether licence densities within SA1s differed by area disadvantage, controlling for demographics and spatial correlation. Models included an offset term, so the estimated effects of area-level disadvantage were on licences per km², or licences per retail destination.

Results: In the area-based analyses, for every unit increase in disadvantage decile (i.e., a reduction in relative disadvantage), general licences reduced by 15% ($p=0.000$), and liquor stores reduced by 7% ($p=0.004$). These gradients were not apparent when licences were examined as a function of retail, however for every unit increase in disadvantage decile, the density of on-premise licences per retail destination increased by 14% ($p=0.000$).

Discussion and Conclusions: The direction of the socio-economic gradient for general licences and liquor stores in Perth is concerning, as all licences selling packaged alcohol were more abundant in disadvantaged areas. However, the over-representation of packaged liquor in disadvantaged areas may relate to the increased provision of retail.

Keywords: Alcoholic beverages, geographic information systems, vulnerable populations, licensure, Australia

Introduction

The most disadvantaged groups in society continue to have the poorest health and the highest exposure to health-damaging risk factors [1]. Tackling upstream environmental factors is an important approach to minimising health inequalities, as factors intrinsic to the neighbourhood may disproportionately affect the health of residents [1]. This resonates particularly for socio-economically disadvantaged populations who are less likely to have the resources to choose neighbourhoods, potentially amplifying health inequalities [2].

In public health there is increasing research and policy interest in the relative availability of health compromising products, such as alcohol, tobacco and fast food in areas of socio-economic disadvantage [3]. This has in part been facilitated by the rising application of geographic and spatial mapping to public health issues. A growing body of literature has examined whether a socio-economic gradient exists, with greater availability of alcohol outlets in more disadvantaged neighbourhoods. International studies generally support the notion that alcohol outlet density is greater in low income or minority neighbourhoods [4-14], despite numerous methodological differences including scale (i.e., nation versus city), type of licence examined (e.g., on-premise, off-premise, all types), measurement of licence density (i.e., by population, roadway miles or land area), and study focus (i.e., on the socio-demographic correlates of licences, versus focusing on socio-economic gradient with or without controlling for population characteristics).

However, there are exceptions, in Glasgow the distribution of alcohol outlets varied by area disadvantage, but not systematically, as historical planning decisions appeared to impact alcohol access (e.g., social housing schemes developed with few proximate amenities) [15]. There is also some evidence that the direction of the socio-economic gradient can differ for different licence types. In Melbourne, for example, liquor stores and licenced clubs were more prevalent in disadvantaged areas, but hotel and restaurant licences were more prevalent in less disadvantaged areas [14]. Livingston (2012) suggested this patterning of licences made 'economic sense', as licences selling cheaper alcohol tended to be more prolific in more disadvantaged areas, and those selling alcohol at a higher price point tended to be located in less disadvantaged areas.

The increased availability of alcohol outlets has implications for local residents' health and wellbeing, with studies suggesting a greater availability of alcohol outlets increases individual-level alcohol consumption [16-19]. To illustrate, a study of West Australian adults found that for each additional liquor store present in the neighbourhood (i.e., within 1.6 km of home), the mean number of standard drinks of alcohol consumed per drinking day increased by 1 percent and the mean number of days of harmful alcohol consumption increased by 6 percent [17]. However, there is mixed evidence on whether the relative availability of alcohol outlets in deprived areas actually translates into increased alcohol consumption amongst residents in these areas. In a US study, Pollock et al. (2005) found a mismatch whereby alcohol outlets were more concentrated in disadvantaged areas, but individual-level analyses revealed those in the

least disadvantaged areas were most likely to report heavy alcohol consumption [9]. And yet, disadvantaged communities continue to suffer the greater burden of alcohol-related health problems. The ‘alcohol harm paradox’ encapsulates the complexity of this phenomenon, whereby lower income populations consume the same (or lower) levels of alcohol than more affluent populations, but experience greater alcohol-related morbidity and mortality [20, 21]. Several reasons may account for this paradox, including a confluence of other negative health behaviours (e.g., smoking, physical inactivity), different patterns of alcohol consumption (e.g., fewer, but heavier drinking sessions), the cumulative impact of historical drinking patterns, or alternatively, that the paradox is false and residents in disadvantaged areas under-report their drinking levels [21, 22]. Patterns of reporting bias by low income groups are unclear, however there is evidence that infrequent drinkers [23], and those who consume higher levels of alcohol [24] underreport their drinking.

While the direct link between the provision of alcohol outlets and alcohol consumption in disadvantaged neighbourhoods is disputed [9], there is consistent evidence that the broader harms associated with alcohol outlets are inequitably borne by low income communities. Ecological studies link alcohol outlets to a range of community-level harms including violent crime and assaults [25, 26, 13, 27]; child maltreatment and physical abuse [28] and homicides [29]. Moreover, a recent Australian study suggests that access to alcohol outlets may indeed differentially impact the health of residents in disadvantaged communities. Badland et al. (2015) identified an interaction effect, whereby proximity to an alcohol outlet within 400m or 800m of home was associated with poorer self-rated health among residents in disadvantaged areas, but proximity to licences had no impact on residents in more affluent areas [30]. This underscores the need to understand the spatial distribution and socio-economic patterning in liquor licence locations.

Despite consistent evidence of a socio-economic gradient in liquor licences [4-14], and that these outlets have disproportionately damaging effects on the residents in disadvantaged areas [25, 26, 13, 27-30], few studies have explored the mechanism explaining the distribution of liquor licences. Numerous studies of the socio-economic patterning of alcohol outlets have suggested that commercial land-use zoning practices could account for the density of liquor licences [14, 7, 10, 8, 11], but none have explicitly tested this. For example, Han and Gorman (2014) proposed that outlets tend to be co-located with the other destinations that people access when going about their daily routines (e.g., shopping, work); and Pearce et al. (2008) suggested the socio-spatial patterning of food and alcohol is most likely impacted by land values and planning practices, with lower rents enticing businesses into more deprived areas. One exception is a study by Morrison et al. (2015), who drew on economic theories of the geography of retail [31, 32]. They found evidence supporting the hypothesis that the socio-economic patterning in alcohol outlets could be explained by businesses purposively selecting locations as close as possible to populations with greater demand for alcohol (i.e., high income populations), but where retail rent is as modest as possible (i.e., relatively disadvantaged areas) [32]. This mechanism is not exclusive to alcohol outlets, and would be true

of retail generally, and raises the possibility that the concentration of alcohol outlets in disadvantaged areas may be a product of lower land/rent values attracting more mixed-use development to these neighbourhoods.

In Western Australia, one of the primary objectives of the Liquor Control Act 1988 is to 'minimise harm or ill health caused to people, or any group of people, due to the use of liquor'. However, in order to manage and mitigate alcohol-related harm, there needs to be a greater understanding of how liquor licences are distributed, and whether and why licences are more prevalent in more disadvantaged areas. Indeed, there have been repeated calls for local evidence to help guide liquor licencing policy and inform the review of new licence applications [33]. To date, Australian studies examining the social patterning of alcohol licences in urban centres have focused exclusively on Melbourne, Victoria [14, 32] and work in other geographic areas is needed to better assess the generalisability of findings. Thus, this study examines whether residents' exposure to different liquor licences types (i.e., general licences, on-premise licences, club licences and liquor stores) is related to area socio-economic status in Perth, Western Australia, independent of the structure of the local population (i.e., age, gender, visitors). Furthermore, we extend earlier work by testing whether any socio-economic gradient in area-level access to liquor licences could be explained by the inequitable distribution of retail destinations in lower socio-economic neighbourhoods.

Methods

We used an ecological cross-sectional design to investigate the association between area-level socio-economic status, and access to different alcohol licence types in the Perth metropolitan area. The unit of analysis was the Australian Bureau of Statistics (ABS) Statistical Areas Level-1 (SA1), which is the smallest unit for the release of Census data. SA1s generally have a population of 200 to 800 persons, and an average population of about 400 persons. All SA1s that fell within the metropolitan region and had been allocated a decile ranking in the ABS Index of Relative Socio-economic Disadvantage (IRSD) were included in the study (n=3947). SA1s were not allocated an IRSD decile ranking if their resident population was too low or there was poor quality data (n=177) [34]. The excluded SA1s were checked with aerial photography, which revealed they comprised non-residential land uses, such as swamps, golf courses, parks, airports, lakes/water bodies, cemetery, large industrial areas, undeveloped bush, farm land, educational institutions and shopping centres.

Outcome: Liquor licence addresses were sourced from the Department of Racing Gaming and Liquor (WA), the state government agency with sole responsibility for managing liquor licencing in the state, in September 2012. Licence locations were geocoded in ArcGIS version 10.2 and the count of each licence type within each SA1 calculated. The overall geocoding success rate for liquor licences was 91%, although the geocoding rates varied for different licences types (e.g., the rate for liquor stores was 92%, whereas the

rate for club licences was 87%). The main reason for non-match was insufficient address information and licences falling outside the study area. While manual re-matching increased geocoding rates, some outlets were not able to be geocoded after extensive web-based research.

We focused on four licence types: (1) general licences (e.g., unrestricted hotels and taverns that allow on-premise consumption and take away sales); (2) on-premise venues (e.g., restricted hotels and taverns, nightclubs, restaurants and small bars that allow consumption at the venue only); (3) liquor stores (i.e., take away sales only); and (4) clubs (e.g., sporting and social clubs that allow members and their guests to consume alcohol at the club, and restricted club licences that allow the sale of take away liquor to members). Two different density measures were created: (1) an area-based density measure: the number of licences per 10km² of the gross SA1 land area; and (2) a retail-based density measure: the number of licences per 100 retail destinations. For the latter measure, the retail destinations were sourced from a commercial database (i.e., SENSIS Yellow Pages extracted in 2012), addresses were geocoded, and the counts within each SA1 computed.

Independent variable: Area socio-economic status was determined using the IRSD deciles. Decile 1 (i.e., a low score) indicates SA1s with relatively greater disadvantage (e.g., many people with no qualifications or low skilled occupations, less car ownership), whereas decile 10 indicates a relative lack of disadvantage (e.g., few people with no qualifications or low skilled occupations, greater car ownership) [34].

Adjustment variables: To ensure that any trends observed with area socio-economic disadvantage were independent of the population structure of the local neighbourhood, analyses adjusted for the proportion of the population that were male, median population age, and the ratio of visitors on census night to the usual resident population. Characteristics of the SA1 population were sourced from the ABS 2011 census.

Statistical analysis

Means were calculated for the licence densities within each SA1 by area disadvantage decile, based on counts, licences per 10km², and licences per 100 retail destinations. Negative binomial loglinear regression models examined whether area disadvantage decile was associated with the count of licences within the SA1s. Each set of models included a different offset term, so that the estimated effects of area-disadvantage were on: (1) alcohol licences per unit of land area; and (2) alcohol licences per retail destination. In each respective set of models, the log of the land area, or log of retail destinations was included as the offset term. These models were run with and without adjustment for local population characteristics (i.e., proportion of males, median population age, and visitors to the area), and accounted for any spatial autocorrelation. The empirical semi-variogram of the (non-spatial) model residuals did not indicate consistent evidence of declining correlation with increasing distance between centroids of SA1 areas and the estimation procedures for fitting spatial models which allowed such correlation often did not

converge. Therefore, we chose to accommodate any possible spatial correlation by allowing the SA1 areas within the same larger Statistical Area 2 (SA2) to be correlated and employing robust standard errors. Each SA2 area comprises about 25 contiguous SA1 areas and is about the size of a suburb with approximately 10,000 people. This method gave essentially the same results compared to when the spatial model did fit.

Results

The mean number of licences of each type, land area (km²), number of retail destinations and population demographics of the SA1 areas within each disadvantage decile are outlined in Table 1. On average, the number of liquor licences of each type in the SA1s was very low (e.g., mean values for on-premise licences ranged from 0.06 to 0.26).

Table 2 presents the mean number of licences per 10km² for each SA1 area by disadvantage decile. In these models, the log of the SA1 land area was included as the offset, so the relative change is for licences per unit of area. Model 1 shows the results for the single factor model (i.e., including IRSD decile and licence types only), and Model 2 adjusted for local population characteristics (i.e., proportion of males, median age, and visitors on census night). This additional adjustment had minimal impact on the results. For every increase in IRSD decile (i.e., a reduction in relative disadvantage), the density of general licences reduced by 15 percent (Model 2: relative reduction=0.850; p=0.000), and liquor stores reduced by 7 percent (Model 2: relative reduction=0.930; p=0.004). There was no association between on-premise licences or club licences and area disadvantage.

Table 3 presents the licences per 100 retail destinations in each SA1 area by disadvantage decile. In these models, the log of the count of retail destinations was included as the offset, so the relative change is for licences per retail destination. In these models, there was no significant association between general licences, liquor stores or club licences and area disadvantage, however there was an association for on-premise licences. For every increase in IRSD decile (i.e., a reduction in relative disadvantage), the density of on-premise licences increased by 14 percent (Model 2: relative reduction=1.140; p=0.000).

Discussion

This study tested whether the distribution of liquor licences differed by area-level socio-economic status in the Perth metropolitan area. In our area-based licence analyses, we identified that access to general licences (i.e., those allowing alcohol consumption at the venue and take away sales) and liquor stores (i.e., take away sales only) was greater in areas with *more* relative disadvantage. In contrast, a somewhat comparable study set in metropolitan Victoria identified a socio-economic gradient for all licence categories - with general and on-premise licences more common in advantaged areas, and packaged liquor and club licences were more common in more disadvantaged areas [14]. The different direction of the socio-

economic gradient for general licences in Perth is concerning, as both liquor stores and general licences (i.e., all licences that sell packaged alcohol to the public) were more abundant in areas with greater relative deprivation.

In Australia, packaged liquor sales account for about 80 percent of all alcohol consumed [35]. The presence of more outlets reduces the real cost of alcohol (i.e., monetary price and convenience of purchase) ensuring residents have ready access to cheaper, packaged liquor [25] and can contribute to a greater acceptance of alcohol and the normalising of alcohol consumption among residents living in more disadvantaged areas [36]. This may be compounded by the fact that area disadvantage (as measured by the ABS IRSD) is also characterised by lower levels of car ownership [34], which could facilitate a greater reliance on the immediate neighbourhood facilities. In Perth, public transport services in many areas are poor, particularly in outer suburban areas where housing is more affordable [37]. Indeed, a Victorian survey found that proximity to home ranked second only to cheaper price when respondents rated their criteria for selecting a packaged liquor outlet [38].

The increased availability of packaged liquor licences in areas of greater relative disadvantage in Perth is also alarming, given the body of Australian and international evidence linking alcohol outlets with broader community-level harms and violence (e.g., violent crime, assaults, domestic violence) [25, 26, 13, 27, 39, 28]. Similarly, findings from Western Australia highlight a connection between the availability of packaged liquor and community violence. An ecological study conducted at the local government area (LGA) scale found packaged alcohol sales correlated with interpersonal violence in residential settings, and with violence at on-premise outlets (possibly explained by 'preloading') and other public places [26]. This underscores the potential that the observed socio-economic gradient in packaged liquor licences could further aggravate health inequalities.

We repeated our analyses to examine liquor licences as a function of the local retail environment, and there was no association between area disadvantage and general licences or liquor stores. Thus, the greater concentration of these licences in relatively disadvantaged areas may be a consequence of more mixed land uses in these areas. Additional analyses (results not shown) confirmed a socio-economic gradient exists in the provision of retail destinations, where with each increase in IRSD decile (i.e., a reduction in relative disadvantage), retail destinations reduced by 8 percent ($p=0.000$). This pattern is consistent with a Swedish study that found all types of goods and services (e.g., grocery stores, restaurants, liquor stores, fast food, health care, monetary services, and so on) were more prevalent in mid/high deprivation areas, than low deprivation areas [8]. Together, our results indicate there is more retail (generally) in relatively disadvantaged areas, and general licences and liquor stores comprise part of this retail environment, but not disproportionately more by area disadvantage. That is not to imply there is no social patterning of liquor licences, but simply, the observed socio-economic gradient (based on land area) can be explained by the greater provision of retail land-uses in relatively disadvantaged areas.

A combination of economic forces, planning and zoning practices, and characteristics of the local population could contribute to the greater availability of packaged liquor in deprived areas in Perth. First, lower land values and rents in relatively deprived areas make them appealing to businesses [10, 32, 8], particularly if they are in close proximity to higher demand populations [32]. Second, current zoning and licencing practices in Australia provide relatively few barriers to new outlets, particularly when liquor stores are considered a 'retail' land use rather than a 'special' or 'restricted' land use, as is the case in Western Australia [33], and there are no current policies regulating liquor licences in disadvantaged areas [30]. Local planning schemes can include a set of standards and development requirements designed for the individual local government agency, and there has been a push by the Western Australian Local Government Association (WALGA) that these could (and should) include specific requirements for alcohol-related development. Differentiating between shops/retail and various types of liquor stores would allow a local government to have greater control and flexibility when considering applications for the installation of these uses in particular locations and circumstances. Indeed, WALGA are encouraging local governments to revise their town planning schemes to re-classify alcohol outlets from retail to special land uses to increase control of the alcohol environment [33]. Finally, it may be more difficult for disadvantaged communities to effectively harness community resistance and successfully challenge new licence proposals [14].

Our retail-based analyses also highlighted that on-premise licences were more prevalent in less disadvantaged areas (a finding not apparent in the area-based analyses). While less disadvantaged areas tend to have fewer retail destinations, proportionately more of their retail environment comprises on-premise licences. This category included hotels and taverns with restricted licences, nightclubs, restaurants and small bars (although restaurants were more numerous than other licence types). In Australia, food prepared outside the home (i.e., dining out and fast food) accounts for the largest proportion of food budgets, followed by alcoholic beverages, however the average weekly spend increases as household income increases [40]. Thus, the disproportionate supply of on-premise licences in more affluent areas may relate to businesses targeting locations within commercially zoned land that is convenient to a higher spending population.

This study has several limitations, primarily associated with its ecological, cross-sectional study design. We used aggregated, area-level data to examine the association between socio-economic disadvantage and different licence types, with and without controlling for local population characteristics. We cannot infer that residents in these areas frequented their local outlet, or consumed more alcohol because of these outlets; rather this paper documents the socio-economic patterning in outlet types and offers a plausible explanation for this pattern. However, our study has merit, as numerous studies have alluded to the distribution of retail/commercial land as a mechanism explaining the socio-economic patterning of licences, but this is rarely examined. Indeed, to our knowledge, this is the only study to date to examine whether the socio-economic patterning of alcohol is independent of the distribution of other retail destinations.

Other strengths include our unit of analyses (i.e., smaller geographical areas), use of detailed licence data from the Department of Racing Gaming and Liquor (WA), and focus on different licence types that facilitate the comparison of our findings those in another Australian city [14].

Conclusion

A socio-economic gradient exists in the distribution of liquor licences in metropolitan Perth, with general licences and liquor stores more prevalent in neighbourhoods with greater relative disadvantage (i.e., all licence types that sell packaged liquor to the public). This finding is alarming, given the body of national and international evidence associating packaged liquor with community harms. The most likely explanation for the social patterning in packaged liquor is its co-location in pockets of retail development, and the socio-economic gradient that exists more broadly for all retail destinations. While there are currently no spatial policies in place in Australia to manage the availability of alcohol in disadvantaged areas [30], the apparent over-representation of packaged liquor licences in disadvantaged areas should be taken into account in mechanisms that review applications for new liquor licences.

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Table 1 Descriptive information each disadvantage decile

Decile	n	General	On-premise	Clubs	Liquor stores	Land area (km ²)	Retail destinations	Median Age	Proportion male	Proportion of visitors
		Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
1	129	0.10 (0.32)	0.12 (0.53)	0.17 (0.41)	0.09 (0.38)	0.50 (1.67)	4.38 (12.92)	39.74 (13.18)	0.49 (0.05)	0.03 (0.03)
2	275	0.08 (0.31)	0.06 (0.48)	0.07 (0.26)	0.10 (0.35)	0.31 (0.43)	2.87 (10.85)	36.42 (9.02)	0.50 (0.03)	0.04 (0.04)
3	331	0.06 (0.26)	0.07 (0.38)	0.10 (0.39)	0.08 (0.30)	0.60 (3.08)	2.34 (7.17)	37.08 (9.51)	0.50 (0.04)	0.03 (0.05)
4	360	0.04 (0.19)	0.08 (0.48)	0.09 (0.39)	0.12 (0.35)	0.77 (5.06)	2.54 (8.90)	36.76 (8.56)	0.50 (0.04)	0.03 (0.04)
5	389	0.07 (0.33)	0.16 (0.92)	0.11 (0.41)	0.08 (0.31)	1.88 (14.58)	2.75 (8.24)	37.78 (8.36)	0.50 (0.04)	0.03 (0.04)
6	375	0.09 (0.58)	0.23 (2.66)	0.11 (0.43)	0.08 (0.30)	6.67 (53.69)	2.78 (8.60)	37.14 (6.85)	0.50 (0.03)	0.03 (0.07)
7	437	0.11 (0.99)	0.23 (1.57)	0.12 (0.42)	0.07 (0.28)	2.51 (19.21)	3.14 (20.67)	37.04 (6.29)	0.50 (0.03)	0.04(0.08)
8	490	0.07 (0.46)	0.26 (1.43)	0.10 (0.43)	0.10 (0.30)	1.15 (5.03)	2.94 (10.02)	37.31 (5.87)	0.50 (0.03)	0.03 (0.07)
9	568	0.05 (0.26)	0.20 (1.27)	0.08 (0.37)	0.07 (0.25)	1.13 (7.08)	2.55 (9.89)	37.77 (5.60)	0.50 (0.03)	0.03 (0.08)
10	593	0.03 (0.20)	0.16 (0.84)	0.12 (0.38)	0.06 (0.28)	0.46 (1.22)	1.93 (6.61)	39.22 (5.37)	0.50 (0.03)	0.03 (0.07)

Index of relative Socio-economic disadvantage (decile) based on SA1 within Western Australia (a low score indicates relatively greater disadvantage in general; a high score indicates a relative lack of disadvantage in general).

General licences (unrestricted hotel and tavern); On-premise (Restricted hotel and tavern, restaurants, nightclub, small bar); Clubs (club and club restricted).

Table 2 Licences per 10 square kilometres for each SA1 area by disadvantage decile

Decile	Licences per 10 square kilometres			
	General	On-premise	Clubs	Liquor stores
1	4.27	7.20	5.53	3.69
2	2.47	1.61	2.00	5.13
3	2.40	2.90	3.53	2.70
4	0.99	2.40	3.11	4.25
5	1.76	5.24	3.76	3.19
6	4.10	10.19	2.99	3.37
7	3.27	7.62	4.73	2.85
8	1.80	11.31	3.59	4.73
9	2.07	9.64	2.80	3.65
10	1.32	7.02	5.18	2.91
Model 1				
Exp (B)	0.881	1.040	0.996	0.927
p-value	0.000	0.410	0.889	0.003
Model 2				
Exp (B)	0.850	1.047	0.999	0.930
p-value	0.000	0.325	0.976	0.004

Index of relative Socio-economic disadvantage (decile) based on SA1 within Western Australia (a low score indicates relatively greater disadvantage in general; a high score indicates a relative lack of disadvantage in general).

General licences (unrestricted hotel and tavern); On-premise (Restricted hotel and tavern, restaurants, nightclub, small bar); Clubs (club and club restricted).

Model 1: Negative Binomial Log-linear Regression: Single factor model with SES decile as independent variable, licences (count) as dependent variable and area (natural log) as offset variable

Model 2: Includes adjustment variables: Proportion of males, ratio of visitors on census night to usual population and median age.

Table 3 Licences per 100 retail destinations in each SA1 area by disadvantage decile

Decile	Licences per 100 retail destinations			
	General	On-premise	Clubs	Liquor stores
1	4.03	2.27	16.97	1.06
2	3.73	0.76	7.46	6.90
3	3.15	2.44	10.13	4.24
4	0.91	2.85	8.09	6.84
5	2.76	3.43	9.35	5.90
6	2.92	2.18	10.20	3.90
7	4.87	4.66	13.05	3.16
8	2.12	5.64	8.35	6.28
9	2.91	5.84	9.25	4.17
10	3.36	5.80	16.78	4.28
Model 1				
Exp (B)	0.970	1.144	1.040	0.985
p-value	0.224	0.000	0.131	0.489
Model 2				
Exp (B)	0.961	1.140	1.042	0.995
p-value	0.118	0.000	0.084	0.799

Analyses limited to SA1s with at least one retail destination (n=1857); Index of relative Socio-economic disadvantage (decile) based on SA1 within Western Australia;

General licences (unrestricted hotel and tavern); On-premise (Restricted hotel and tavern, restaurants, nightclub, small bar); Clubs (club and club restricted).

Model 1: Negative Binomial Log-linear Regression Single factor model with SES decile as independent variable, licences (count) as dependent variable and total number of retail destinations (natural log) as offset variable

Model 2: Includes adjustment variables: Proportion of males, ratio of visitors on census night to usual population and median age.