Socioeconomic area disparities in tobacco retail outlet density: a Western Australian analysis

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Abstract

Objective: To examine the association between tobacco outlet density and area socioeconomic status (SES) in Western Australia.

Design and setting: Ecological cross-sectional study investigating the relationship between the area SES of, and the density of tobacco retail outlets in, WA suburbs and towns for the Perth metropolitan area, and at the regional and state level. SES was determined using the 2006 Australian Bureau of Statistics Index of Relative Socioeconomic Advantage and Disadvantage (IRSAD) and classified into quartiles (very low, low, high and very high); tobacco outlet data were sourced from the WA Department of Health register of retailers licensed to sell tobacco at May 2011.

Main outcome measure: Tobacco outlet density rate (per 10 000 residents).

Results: In WA overall, suburbs and towns with a very low IRSAD had more than four times the number of tobacco outlets compared with those with a very high IRSAD ($P < 0.001$). This trend was similar when analyses were restricted to the Perth metropolitan area and to regional areas. Suburbs and towns in regional WA with a very low IRSAD had more than five times the number of tobacco outlets than those with a very high IRSAD ($P < 0.001$).

Conclusions: This study provides the first Australian evidence of a strong relationship between area SES and tobacco outlet density. Findings are consistent with a number of United States studies that report higher tobacco outlet densities in lower SES or minority neighbourhoods. The results underscore the importance of policy approaches to limit the number of tobacco retail licences granted, and to reduce the geographic density of outlets in more disadvantaged suburbs and towns.

While Australia has been applauded internationally for its lead on plain packaging for cigarettes[1] and, previously, for being at the forefront of tough tobacco advertising restrictions, tobacco remains as readily available as dietary staples like bread and milk. There are an estimated 35 000 tobacco retail outlets in Australia,[2] and two states (Queensland and Victoria) do not even require a licence to sell tobacco. The pervasive availability of tobacco products is at stark odds with the harm caused by tobacco[2] and with the progress that has been made in most other areas of tobacco control.

In public health more broadly, there is growing research and policy interest in the relative availability of unhealthy products (ie, tobacco, alcohol, fast food) in more socioeconomically disadvantaged areas. A number of United States studies have reported higher densities of tobacco outlets in neighbourhoods with lower socioeconomic status (SES),[3-5] or in areas with lower household incomes and a greater proportion of residents from minority groups.[6-8] By contrast, the only published Australian study on this subject to date found no relationship between SES and tobacco outlet density in the Hunter region of New South Wales (comprising two regional cities and rural towns).[9] However, this study also suggested a relationship between perceived tobacco availability and consumption, with 85.7% of smokers reporting that they were within walking distance of a tobacco outlet during the course of day-to-day activities. Its authors noted that reducing the availability of tobacco stands benefited smokers who wished to quit,[9] a point that has been made in other articles calling for regulation of the retail environment.[10]

Methods

We used an ecological cross-sectional design to investigate the relationship between local area SES and the density of retail outlets selling tobacco in Western Australia in 2011. Local areas were defined by Australian Bureau of Statistics (ABS) suburb boundaries,[11] with the "suburb" equating spatially to a single town outside of metropolitan Perth and larger regional centres. Using ABS classifications, suburbs were classified as metropolitan if they fell within the Perth Statistical District, and non-metropolitan if they fell outside this boundary.[11] Analysis was undertaken at several levels, including whole of state, metropolitan Perth (where 71.6% of the state's population resides), regional WA and five larger regional centres.[11]

Measures

Area-level socioeconomic status: this was determined using the 2006 ABS Index of Relative Socioeconomic Advantage and Disadvantage (IRSAD), where lower values indicate more disadvantage.[12] The SES of suburbs and towns were classified into quartiles, using the IRSAD percentiles.

Suburb or town population: this was sourced from the 2006 census and was used as a denominator in the computation of a per capita tobacco outlet density rate, to account for the likelihood of suburbs or towns with larger populations having more tobacco outlets.

Tobacco outlet data: these were sourced from the WA Department of Health (DoH) by Cancer Council WA in May 2011. The tobacco retailer data were geocoded by the DoH, which allowed the number of outlets per suburb or town to be identified using a geographic information system (ArcGIS 10.0, Esri). These counts were then joined back to the IRSAD and population data for analysis.

Statistical analysis

The "tobacco outlet rate" was calculated as the number of tobacco outlets per 10 000 residents. We investigated the association between the per capita tobacco outlet rate and suburb SES IRSAD using a negative-binomial model with offset to account for the usual residential population. The negative-binomial model was used to calculate rate ratios, representing the ratio of the number of tobacco outlets per capita in the comparison group to the

number per capita in the reference category. Rate ratios and their 95% confidence intervals were calculated for each IRSAD quartile. Suburbs in the highest quartile of IRSAD were used as the reference category.

Ethics approval

Approval for this study was obtained from the Human Research Ethics Committees of the WA DoH and the University of Western Australia.

Results

There were 911 suburbs and towns in WA overall. The number of tobacco outlets per capita for suburbs and towns with a low IRSAD was more than twice as high as that for suburbs or towns with a very high IRSAD (Box). Suburbs and towns with a very low IRSAD had more than four times the number of tobacco outlets per capita than those with a very high IRSAD ($P < 0.001$).

For the 296 metropolitan suburbs, the number of tobacco outlets per capita for suburbs with a very low IRSAD was almost 50% higher than the number per capita for those with a very high IRSAD ($P < 0.001$).

The strongest associations between SES and tobacco outlet density were observed for the 608 suburbs and towns outside Perth (ie, regional WA). The number of tobacco outlets per capita for suburbs and towns with a very low IRSAD was more than five times higher than for those with a very high IRSAD ($P < 0.001$). The effect size decreased markedly with increasing IRSAD quartiles.

The five major regional centres in which further analysis was undertaken were Albany (19 suburbs or towns), Bunbury (16), Busselton (6), Geraldton (17), and Kalgoorlie–Boulder (12). In all of these regional centres except Bunbury, tobacco outlet density was inversely associated with SES.

Discussion

This is the first Australian study to confirm an inverse relationship between tobacco outlet density and area SES. The excess of tobacco outlets in lower SES areas is of public health concern for a number of reasons.

First, there are already marked socioeconomic disparities in Australia in smoking prevalence rates, barriers to smoking cessation and cessation success,[13] and tobacco use can contribute to the financial hardship experienced by smokers in disadvantaged circumstances.[13] It has been argued that environments that support easy access to tobacco products can undermine people's intentions to quit or cut down tobacco consumption.[14]

Second, the concentration of tobacco outlets in more disadvantaged neighbourhoods may accentuate the scope for addiction, making it harder for people to quit or not relapse.

Third, overall vulnerability to poor health is exacerbated if tobacco outlets are more concentrated in areas where people at higher risk of negative health outcomes live.[15] This is the case in Australia, where behavioural risk factors such as alcohol consumption, smoking and poor nutrition are more likely to cluster among populations with lower SES, and where lower SES groups are overrepresented in preventable mortality and morbidity.[16]

Fourth, from an economic perspective, a higher density of tobacco retailers creates a competitive market that may stimulate price discounting, in turn influencing consumption levels as smokers with lower incomes may be particularly sensitive to the price of tobacco products. This is similar to the economic rationale for restricting alcohol outlet density.[17] The price elasticity of demand for tobacco products is more pronounced in lower SES groups.[18]

Finally, despite the significant progress made in Australia by banning visible point-of-sale display of tobacco products and advertising, cigarette dispensing cabinets are typically located at the front of stores, where payments are made, so tobacco availability is still in effect "on display". The normalisation of tobacco as perpetuated by its widespread availability is of concern across the socioeconomic spectrum, but this is exacerbated when outlets are overly represented in lower SES neighbourhoods, where smoking prevalence and acceptability are already higher.

Our findings underscore the merits of considering whether the time has come to regulate the number of outlets able to sell a product that is known to kill around 15 500 Australians each year.[19] In Australia, tobacco retail licensing is the remit of state and territory governments, and none have implemented any restrictions on the number of licences they grant. This is in stark contrast to the processes applied to alcohol, for which decisions to grant new liquor licences in a given area require the public interest to be considered.[20] Internationally, California is the only notable example where cities and towns have the power to enact ordinances on land use through licensing and zoning regulations and where the location of tobacco retailers is regulated.[21]

While any move to restrict the number of tobacco outlets in Australia will no doubt evoke some opposition, as noted previously,[10] various precedents exist for governments restricting either the number or location of other types of commercial activity. Sometimes this is on the grounds of public health or the public good, as in the case of alcohol outlets or restrictions on nightclubs or

Rate ratio of number of tobacco outlets per capita by Index of Relative Socioeconomic Advantage and Disadvantage (IRSAD) category for suburbs and towns in Western Australia, 2011

	All WA suburbs and towns* ($n = 911$)		Perth metropolitan area*† ($n = 296$)		Regional WA* ($n = 608$)	
IRSAD (percentile)	Rate ratio (95% CI)	*P*	Rate ratio (95% CI)	*P*	Rate ratio (95% CI)	*P*
Very low (< 25th)	4.14 (3.00–5.71)	< 0.001	1.48 (1.17–1.87)	< 0.001	5.51 (4.12–7.36)	< 0.001
Low (25th to < 50th)	2.12 (1.55–2.92)	< 0.001	1.19 (0.94–1.52)	0.157	2.60 (2.00–3.38)	< 0.001
High (50th to < 75th)	1.43 (1.15–1.79)	0.002	1.10 (0.87–1.40)	0.430	1.87 (1.34–2.60)	< 0.001
Very high (≥ 75th)	1.00		1.00		1.00	

* For all WA suburbs and towns, Perth metropolitan area and regional WA, the *P* value for linear trend was < 0.001.
† Perth metropolitan area analysis (296 suburbs) excluded seven suburbs with very high tobacco outlet counts or that were not generally representative of residential suburbs (eg, Rottnest Island, Naval Base). ◆

adult stores.[10] Given our observation of the far higher number of outlets per capita in areas of lower SES, advocacy for restricting the number of tobacco outlet licences granted has evidence-based merit.

One limitation of our study is the lack of data on smoking behaviour. However, our primary aim was to examine the relationship between area SES and tobacco retail outlet density. Further, 2006 census data were linked with tobacco outlet information from 2011; while it would have been preferable to use 2011 census data, most of our analyses were complete before these data were released.

Further research linking geospatial retail outlet data to smoking prevalence data is needed to investigate the relationship between tobacco outlet density and smoking prevalence in Australia, as has been done in some US studies. Added insights would be gained if this could be linked to data on quit attempts, smoking cessation success and triggers for relapse, given the hypothesised association between ease of access and opportunities for unplanned purchases and relapse. More broadly, there is merit in investigating the spatial clustering of tobacco, alcohol and unhealthy food outlets in lower SES areas, as the dense collocation of such outlets can compound disparities in health behaviours and health outcomes in more disadvantaged areas.

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1 Daube MM, Chapman S. Tobacco plain packaging. *Med J Aust* 2012; 197: 272.
2 Gartner CE, Chapman SF, Hall WD, Wakefield MA. Why we need tobacco sales data for good tobacco control. *Med J Aust* 2010; 192: 3-4.
3 Novak SP, Reardon SF, Raudenbush SW, Buka SL. Retail tobacco outlet density and youth cigarette smoking: a propensity-modeling approach. *Am J Public Health* 2006; 96: 670-676.
4 Chuang YC, Cubbin C, Ahn D, Winkleby MA. Effects of neighbourhood socioeconomic status and convenience store concentration on individual level smoking. *J Epidemiol Community Health* 2005; 59: 568-573.
5 Ogneva-Himmelberger Y, Ross L, Burdick W, Simpson SA. Using geographic information systems to compare the density of stores selling tobacco and alcohol: youth making an argument for increased regulation of the tobacco permitting process in Worcester, Massachusetts, USA. *Tob Control* 2010; 19: 475-480.
6 Yu D, Peterson NA, Sheffer MA, et al. Tobacco outlet density and demographics: analysing the relationships with a spatial regression approach. *Public Health* 2010; 124: 412-416.
7 Hyland A, Travers MJ, Cummings KM, et al. Tobacco outlet density and demographics in Erie County, New York. *Am J Public Health* 2003; 93: 1075-1076.
8 Peterson NA, Yu D, Morton CM, et al. Tobacco outlet density and demographics at the tract level of analysis in New Jersey: a statewide analysis. *Drugs: Education, Prevention and Policy* 2011; 18: 47-52. doi: 10.3109/09687630903514891.
9 Paul CL, Mee KJ, Judd TM, et al. Anywhere, anytime: retail access to tobacco in New South Wales and its potential impact on consumption and quitting. *Soc Sci Med* 2010; 71: 799-806.
10 Chapman S, Freeman B. Regulating the tobacco retail environment: beyond reducing sales to minors. *Tob Control* 2009; 18: 496-501.
11 Australian Bureau of Statistics. Census of population and housing: census geographic areas digital boundaries, Australia, 2006. (ABS Cat. No. 2923.0.30.001.) http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/2923.0.30.001Main+Features12006?OpenDocument (accessed Oct 2012).
12 Australian Bureau of Statistics. Information paper: an introduction to Socio-Economic Indexes for Areas (SEIFA), 2006 (Preliminary). (ABS Cat. No. 2039.0.) http://www.abs.gov.au/AUSSTATS/abs@.nsf/papersbyReleaseDate/DB25EFD34C905A2ECA257417001196E7?OpenDocument (accessed Oct 2012).
13 Turrell G, Hewitt BA, Miller SA. The influence of neighbourhood disadvantage on smoking cessation and its contribution to inequalities in smoking status. *Drug Alcohol Rev* 2012; 31: 645-652.
14 Pearce J, Hiscock R, Moon G, Barnett R. The neighbourhood effects of geographical access to tobacco retailers on individual smoking behaviour. *J Epidemiol Community Health* 2009; 63: 69-77.
15 Rodriguez D, Carlos HA, Adachi-Mejia AM, et al. Predictors of tobacco outlet density nationwide: a geographic analysis. *Tob Control* 2012; Apr 4. [Epub ahead of print.]
16 Australian Institute of Health and Welfare. Australia's health 2012. Canberra: AIHW, 2012. (AIHW Cat. No. AUS 156; Australia's Health No. 13.) http://www.aihw.gov.au/publication-detail/?id=10737422172 (accessed Feb 2013).
17 Livingston M. Alcohol outlet density and assault: a spatial analysis. *Addiction* 2008; 103: 619-628.
18 Scollo M. Price sensitivity among various population groups. In: Scollo MM, Winstanley MH, editors. Tobacco in Australia: facts and issues. 4th ed. Melbourne: Cancer Council Victoria, 2012: Section 13.1.4. http://www.tobaccoinaustralia.org.au/chapter-13-taxation/13-1-price-elasticity-of-demand-for-tobacco-produc (accessed Oct 2012).
19 Begg S, Vos T, Barker B, et al. The burden of disease and injury in Australia 2003. Canberra: Australian Institute of Health and Welfare, 2007. (AIHW Cat No. PHE 82.) http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=6442459747 (accessed Oct 2012).
20 Government of Western Australia Department of Racing, Gaming and Liquor. A note from the Director General explaining the making of decisions in the public interest [pamphlet]. http://www.rgl.wa.gov.au/ResourceFiles/Publications/Note_from_Director_General_pamphlet.pdf (accessed Oct 2012).
21 Public Health Law and Policy Technical Assistance Legal Center. Municipal authority to regulate the location and operation of tobacco retailers [memorandum]. 2002. California Department of Public Health. http://changelabsolutions.org/publications/location-tobacco-retailers (accessed Oct 2012). ❑