

BMJ Open Early evidence about the predicted unintended consequences of standardised packaging of tobacco products in Australia: a cross-sectional study of the place of purchase, regular brands and use of illicit tobacco

Michelle Scollo, Meghan Zacher, Sarah Durkin, Melanie Wakefield

To cite: Scollo M, Zacher M, Durkin S, *et al*. Early evidence about the predicted unintended consequences of standardised packaging of tobacco products in Australia: a cross-sectional study of the place of purchase, regular brands and use of illicit tobacco. *BMJ Open* 2014;4:e005873. doi:10.1136/bmjopen-2014-005873

► Prepublication history for this paper is available online. To view these files please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2014-005873>).

Received 6 June 2014
Accepted 20 June 2014



CrossMark

Cancer Council Victoria,
Centre for Behavioural
Research in Cancer,
Melbourne, Victoria, Australia

Correspondence to
Dr Michelle Scollo;
mscollo@cancervic.org.au

ABSTRACT

Objectives: To test for early evidence whether, following the standardisation of tobacco packaging, smokers in Australia were—as predicted by the tobacco industry—less likely to purchase from small mixed business retailers, more likely to purchase cheap brands imported from Asia and more likely to use illicit tobacco.

Design: Serial cross-sectional population telephone surveys in November 2011 (a year prior to implementation), 2012 (during roll-out) and 2013 (a year after implementation).

Setting/participants: Smokers aged 18 years and over identified in an annual population survey in the Australian state of Victoria (2011: n=754; 2012: n=590; 2013: n=601).

Main outcome measures: Changes between 2011 and 2013 in: proportions of current smokers who purchased their last cigarette from discount outlets such as supermarkets compared with small mixed business retail outlets; prevalence of regular use of low-cost brands imported from Asia and use of unbranded tobacco.

Results: The proportion of smokers purchasing from supermarkets did not increase between 2011 (65.4%) and 2013 (65.7%; p=0.98), and the percentage purchasing from small mixed business outlets did not decline (2011: 9.2%; 2012: 11.2%; p=0.32). The prevalence of low-cost Asian brands was low and did not increase between 2011 (1.1%) and 2013 (0.9%; p=0.98). The proportion reporting current use of unbranded illicit tobacco was 2.3% in 2011 and 1.9% in 2013 (p=0.46). In 2013, 2.6% of cigarette smokers reported having purchased one or more packets of cigarettes in non-compliant packaging in the past 3 months; 1.7% had purchased one or more packets from an informal seller in the past year.

Conclusions: One year after implementation, this study found no evidence of the major unintended consequences concerning loss of smoker patrons from small retail outlets, flooding of the market by cheap Asian brands and use of illicit tobacco predicted by opponents of plain packaging in Australia.

Strengths and limitations of this study

- The dual-frame (landline and mobile phone) sample design used in this study obtains more representative samples than online or landline-only phone surveys.
- A limitation is that recent purchase of potentially illicit branded (contraband) tobacco was only assessed in one survey year (2013), and therefore we could not determine whether it had increased between 2011 and 2013.
- As with other surveys, respondent error and misreporting may have affected prevalence estimates for illicit unbranded tobacco, considering its illegal status. However, the extent of this misreporting should not have changed over time.
- The survey was only conducted in Victoria and only among English-speaking residents; a larger national sample would be desirable to provide a more robust test of claims.

INTRODUCTION

Legislation mandating standardised packaging of tobacco products came into force in Australia at the end of 2012.¹ All Australian tobacco products are required to be packaged in a uniform drab dark brown with standardised lettering and position of brand and variant names² and prominent text and photographic health warnings comprising 75% of the front and 90% of the back of each pack.³ So far, Australia is the only country to have introduced such a policy, although legislatures in New Zealand⁴ and the Republic of Ireland⁵ are in the process of considering draft legislation. While the UK Government backed away from such a measure in mid-2013,⁶ it later commissioned a review of the evidence, published in April

2014,⁷ headed by eminent paediatrician Sir Cyril Chantler, which included consideration of the early experience from Australia.

Opponents of the legislation in Australia claimed that standardised packaging would have three major unintended consequences.^{8–12} First, it was argued that it would create confusion for retailers faced with packs of uniform appearance. This, it was argued, would result in increases in pack retrieval and overall serving times,¹³ impatience with queuing among customers, and a consequent shift in patronage, sales and profits from small mixed businesses (often locally owned) to large discount outlets such as supermarkets (generally run by large corporations).¹⁴ Second, opponents argued that it would result in a general devaluing of brands—the so-called ‘commoditisation’ of tobacco products¹²—leading among other things to the increased use of cheap brands sourced from Asia^{15 16} and increased use of illicit tobacco. Third, it was argued that the standardised appearance of the packs would make them easier to counterfeit¹⁶ and that this—combined with the reduced valuing of brands—would lead to an increase in the use of contraband cigarettes, once again disadvantaging retailers and advantaging ‘criminal gangs’ purported to be widely involved in its distribution.¹⁷ Many of the same arguments have been proffered by those opposed to the introduction of standardised packaging in the UK.^{18–21}

Surveys conducted for Philip Morris Limited immediately after and 9 months after the implementation of the Australian plain packaging legislation reported that high percentages of retailers believed that serving times had increased.²² However, studies objectively timing pack retrieval among a random sample of stores before, during and after the introduction of the legislation did not corroborate these perceptions,^{23 24} detecting only a slight and extremely short-lived increase in serving time immediately following implementation.^{24 25} The first objective of the current study was to assess any change in the usual place of purchase of tobacco products among smokers at a time long enough after implementation to allow retailers an opportunity to adapt to the changed packaging. In particular, this study assessed whether there had been a shift among consumers between 2011 and 2013 from use of small mixed businesses to discount outlets such as supermarkets.

During the course of the campaign against standardised packaging of tobacco products, British American Tobacco Australia warned that if the legislation went ahead, then cheap tobacco from overseas, in particular from Asia, would ‘flood the market’.²⁶ A second objective of this study was to assess whether the prevalence of use of cheap brands produced by manufacturers located in Asia increased among smokers between 2011 and 2013.

Australia is an island nation geographically isolated from other Asian-Pacific countries. Transport of tobacco from other countries is not cheap and easy as it is in many other parts of the world and the Australian

Government has not regarded illicit tobacco as a major problem to date.²⁷ The majority of seizures of smuggled tobacco at ports over the past 10 years have been for raw *unbranded* loose tobacco known locally as chop-chop.²⁸ The most recent government-funded survey found that 1.4% of smokers in 2010 used unbranded tobacco ‘half the time or more’.²⁹ Illicit *branded* cigarettes (counterfeit and other contraband cigarettes smuggled into the country without payment of customs duty) have also been noted in Customs seizures since 2001, but in much smaller quantities than unbranded loose tobacco. Quantities of such cigarettes seized have been increasing since 2008–2009 but there have been corresponding falls in quantities of unbranded tobacco.²⁸

A tobacco company-funded report by the high-profile London-based international accounting and consultancy firm KPMG LLP, published late in 2013,³⁰ estimated that more than one in six smokers (17.5%) used unbranded illicit tobacco in 2013, compared with 14.2% in 2012 (no CIs or tests of significance reported). This estimate was criticised for being biased as the sample was a self-selected group of internet users.³¹ Accordingly, a third objective of this study was to compare the prevalence of use of unbranded illicit tobacco before and after implementation of standardised packaging legislation using the annual telephone population survey of Victorians that employed a random digit dial (RDD) sampling method to achieve a representative sample.

The KPMG LLP report on illicit tobacco in Australia also stated that 9.8% of cigarettes analysed in a discarded pack study conducted by company MS Intelligence were from non-domestic packs, almost all of which (9.7% of all cigarettes analysed) were presumed to be contraband cigarettes. This represented an increase of more than 150% in the prevalence of such cigarettes since 2012.³⁰ Empty Pack Studies are problematic in that they tend to over-represent the cigarette packs that end up in litter in public places compared with those disposed of in domestic and work-based rubbish disposal systems.^{32–34} Such studies also cannot distinguish between foreign packs that are illegally smuggled into Australia and those brought in by residents and visitors who have purchased them overseas and brought them in either under personal import limits or with the required duty having been paid.³³ The assumptions used by KPMG LLP to estimate the non-legitimate compared with the legitimate imports have been heavily criticised.^{32 33} Consumers do not necessarily know whether the cigarettes they purchased in Australia are contraband; however, two important indicators of likely illicit status on which consumers *can* report are whether packs purchased bear the required Australian health warnings, and whether they have been purchased from informal sellers such as a market stall or from someone selling from the back of a car or van. A final objective of this study is to establish the prevalence of such purchases in 2013. **Box 1** below provides definitions of each of the terms used in this study.

METHODS

Study design and participants

We used data from the 2011, 2012 and 2013 Victorian Smoking and Health Surveys. These cross-sectional telephone surveys were undertaken with representative samples of adults aged 18 years and over and residing in the general population of the Australian state of Victoria. The surveys were in the field from 2 November to 5 December 2011 (inclusive), from 1 November to 3 December 2012, and from 7 November to 11 December 2013.

Computer-assisted telephone interviews were conducted using a dual-frame survey design incorporating samples generated by random digit dialling (RDD) into landline and mobile phones. Primary approach letters notifying residents of a 'community survey of health attitudes and behaviours' were sent to residential addresses which could be matched to verified landline phone numbers. Because Australian mobile phone numbers have no geographic identifier, it was not possible to match addresses to mobile numbers, and letters were not sent to those recruited for the survey via mobile phone RDD.

Up to nine call attempts were made to landline telephones and up to four attempts were made to mobile phones to complete an interview. To correct a bias for telephone surveys which tend to reach more females and older participants, interviewers recruiting for the landline survey asked to speak to the youngest male aged 18 or over at home at the time of the call, and if no males were available, the youngest adult female in the household was selected to participate. Within the mobile RDD sample, the individual answering the call was considered to be the target for screening. A quota was applied to the landline sample to ensure that approximately 70% of interviews were conducted with metropolitan residents and 30% with rural residents, reflecting the population distribution of Victoria. Given the absence of geographic identifiers for the mobile numbers, no quota was applied to the mobile sample and state of residence was established on contact.

In all survey years, verbal consent was obtained from participants at the start of each interview, and interviews were conducted in English only. The overall response rate, defined as completed interviews as a proportion of the sample who could be contacted within the call cycle and who were identified as eligible for the survey, was 59% in 2011, 63% in 2012 and 59% in 2013.

In total, n=4500 people were interviewed in 2011 and n=4004 and n=4001 people were interviewed in 2012 and 2013, respectively. Mobile phone interviews comprised 35.8% of these interviews, though the percentage was slightly higher in 2013 than other years (2011: 34.8%; 2012: 34.6%; 2013: 38.2%). For the current study, we included respondents who identified as daily, weekly or less than weekly smokers of tobacco products (2011: n=754; 2012: n=590; 2013: n=601).

Measures

Respondent's sex, age and highest level of educational attainment (up to and including year 12 of high school;

Box 1 Definitions related to cheap tobacco in Australia

Purchase channels in Australia

Supermarkets—large national chains with outlets in most major cities and towns.

Small mixed businesses—convenience stores, newsagents, delicatessens and corner stores selling a wide range of goods, often referred to in Victoria as 'milk bars'.

Specialist tobacconists—stores which exclusively or almost exclusively sell tobacco products.

Petrol stations—almost all of which are owned by major oil companies and operated directly by the companies or by franchisees.

Other channels (eg, the internet, duty-free stores, nightclubs, casinos, cafés and vending machines) and informal sources such as persons selling from market stalls or from their cars in parking bays or car parks.

Supermarkets and tobacconists in Australia tend to sell cigarettes at prices discounted well below the recommended retail prices generally adopted by petrol stations, convenience stores and small mixed businesses.³⁹

Asian brands sold in Australia

Cigarettes imported into Australia from manufacturers located in Asian countries include *Yuxi* produced by ATA International, *Bohem*, *Esse* and *This Plus* produced by the KT & G company in South Korea and *Chunghwa* and *Double Happiness* produced by the Shanghai Cigarette Factory, *Huanghelou* produced by the Whuhan cigarette factory and *Shuangxi* produced by the China Tobacco Guangdong companies in China.⁴⁰ Where smokers reported having purchased these brands in Australia, customs duty may not have been paid by the importer (and so such packs may be illicit). Even with tax paid, these brands of cigarettes tend to be significantly cheaper than those manufactured by the major tobacco companies, with recommended retail prices ranging from \$9.10 for a pack of *Yuxi 20s* to \$12.10 for a pack of *Chunghwa 20s* compared with \$18.75 for a pack of Australia's leading brand produced by British American Tobacco Australia, *Winfield 25s* (and \$15.30 for a pack of *Winfield 20s*).⁴⁰

Illicit tobacco in Australia

Illicit unbranded tobacco is generally sold in plastic bags, either as loose tobacco or pre-rolled into cigarettes. This form of tobacco in Australia is generally known as 'chop-chop'.

Illicit branded tobacco products (mostly cigarettes) are smuggled into Australia without payment of customs duty. Such *contraband* tobacco products include:

Products imported by registered importers or manufactured by registered tobacco companies but diverted from the legitimate supply chain;

Cheap white cigarettes that are manufactured legally in the country of origin, but are intended specifically for the illicit market and are sold without duty having been paid in the destination country; or

Counterfeits of known brands (or even counterfeits of cheap whites). Consumers can easily report whether they smoke unbranded tobacco; however, they may not know whether the branded cigarette packs they have purchased are contraband. Cigarettes likely to be contraband are defined in this study as cigarettes purchased in Australia that did not carry the required Australian health warnings, and cigarettes purchased from informal sellers.

above year 12) were recorded. An index³⁵ ranking postal areas from low to high disadvantage, based on the 2011 Census data, was used to classify respondents into three

socioeconomic status (SES) groups. The low-SES group comprised people who lived in postcodes in the bottom 40% of ranked postal areas, the mid-SES group included those who lived in postcodes ranked between 41% and 80%, and respondents in the high-SES group lived in postcodes ranked between 81% and 100% of postcodes.

Smoking status was determined by asking all respondents how often they currently smoked 'cigarettes, cigars, pipes or any other tobacco products' (daily, at least weekly, less often than weekly or not at all); those who smoked any tobacco product at least 'less often than weekly' were considered smokers and were included in our sample. Smokers were then asked how often they smoked factory-made (FM) cigarettes and how often they smoked roll-your-own (RYO) cigarettes. Thus, some respondents were classified as smokers, but did not smoke FM or RYO cigarettes (rather being cigar and/or pipe smokers only). Regular (daily and weekly) smokers of FM and/or RYO cigarettes were asked how many FM cigarettes they smoked per day or per week, and/or how many RYO cigarettes they smoked. We combined these figures (for those who smoked both FM and RYO cigarettes and divided rates for those who smoked weekly by seven) to assess total daily consumption.

Usual place of purchase

In all years, current smokers were asked to identify the store type from which their tobacco products were typically purchased. We configured responses into five categories: supermarkets, specialist tobacconists, small mixed businesses, petrol stations, 'other' venues and informal sellers. See [box 1](#) for detailed definitions.

Low-cost Asian brands

Regular smokers of FM cigarettes were asked to report their regular brand (the brand smoked most often). After excluding from the analysis those who did not have a regular brand, did not know their regular brand or gave a brand of RYO tobacco instead of FM cigarettes (2.7% of regular FM smokers in 2011, 3.3% in 2012 and 1.5% in 2013), we created an indicator variable to code whether the reported brand was a low-priced product imported from a manufacturer located in Asia. The provenance of brands was determined through examination of packs purchased in the course of other studies, listings of trademark owners in recent copies of the *Australian Retail Tobacconist*,^{36–38} and internet searches; examples are listed in [box 1](#).

Unbranded illicit tobacco

Survey items regarding unbranded tobacco differed slightly between years. In 2011 and 2012, all smokers were asked, "In the past 12 months, have you *purchased* any unbranded tobacco, sometimes referred to as 'chop-chop' and sold in plastic bags as loose tobacco or rolled into unbranded cigarettes," while in 2013, they were asked if they had *smoked* any unbranded tobacco. A further question in 2013 asked on how many

occasions they had purchased unbranded cigarettes and/or unbranded loose tobacco. We configured these variables to create a measure of whether or not the respondent had purchased any type of unbranded tobacco in the past 12 months.

In 2011 and 2012, those who had purchased unbranded cigarettes and/or unbranded loose tobacco were asked whether they currently smoked each type daily, weekly, less than weekly or not at all. In 2013, all those who had smoked unbranded tobacco in the past 12 months were asked how often they currently smoked it, using the same categories. A second measure of use indicated whether a respondent had both *purchased* unbranded tobacco in the past 12 months and currently used it daily, weekly or less than weekly.

Cigarettes that may have been contraband

To assess the prevalence of non-compliant packs in 2013, cigarette smokers were asked whether they had seen any packs for sale in Australia in the past 3 months that did not have plain brown packaging and large Australian health warnings. Those who had were asked to estimate how many they had purchased in the past 3 months. To assess the extent of use of packs from suspicious sources, all current smokers were asked whether they had purchased packs of cigarettes 'from someone selling informally, for example from a market stall, or from the back of their car or van' in the past 12 months, and to estimate how many they had purchased.

Analysis

All data were weighted by age and sex to the 2011 Australian Bureau of Statistics Census for Victoria.⁴¹ A design weight took into account the relative chance of inclusion in the landline or mobile phone frame, as well as chance of selection based on the number of landlines in each household and number of in-scope people per household.

Analyses were carried out in Stata V.12.1.⁴² To determine whether the predicted unintended consequences of plain packaging could be detected between 2011 and 2013, we used logistic regression. Specifically, we assessed changes in odds of smokers purchasing from supermarkets, small mixed businesses and other types of retail outlets, changes in prevalence of use of low-cost Asian brands among regular smokers of FM cigarettes and changes in prevalence of use of unbranded illicit tobacco among all smokers. While unadjusted (but weighted) percentages are reported, we present ORs, CIs and p values adjusted for sex, age group (ages 18–29, 30–49 or 50 and above), SES, education and phone type (mobile or landline).

RESULTS

Sample characteristics

[Table 1](#) sets out the demographic characteristics of smokers in the weighted sample over each of the 3 years.

Table 1 Demographic and smoking characteristics of current smokers, by year

	2011 N=754 Per cent	2012 N=590 Per cent	2013 N=601 Per cent
Sex			
Male	55.0	59.0	57.9
Female	45.0	41.1	42.1
Age group, years			
18–29	31.3	29.6	26.1
30–49	43.7	43.4	42.2
50+	25.0	27.1	31.7
SES			
Low	36.5	38.0	38.0
Mid	41.2	39.8	44.9
High	22.3	22.2	17.2
Education			
Year 12 or below	49.6	60.9	55.5
Above year 12	50.4	39.1	44.5
Products			
FM cigarettes	88.8	91.0	86.7
RYO cigarettes	26.9	24.7	25.9
No cigarettes*	2.4	3.1	2.6
Reported daily consumption among regular cigarette smokers†	N=660	N=530	N=541
Mean (95% CI)	12.7 (11.7 to 13.8)	13.4 (12.0 to 14.8)	12.7 (11.7 to 13.7)

*Cigar or pipe smokers only.

†Regular cigarette smokers who did not report their consumption were excluded (n=14).

FM, factory-made; RYO, roll-your-own.

The demographic characteristics of the sample were consistent with those found in the largest national survey of drug use in Australia, which indicated that about 55% of Australian smokers in 2010 were male and about 45% were female.⁴³ The mean daily reported cigarette consumption was approximately 13 cigarettes per day in each year, which was slightly lower than that found in a national survey in 2010 (14.9).⁴⁴

Usual place of purchase

Unadjusted percentages regarding the usual place of purchase presented in table 2 provided no evidence of a shift from small mixed businesses to supermarkets. The odds of purchasing tobacco products from supermarkets did not significantly increase between 2011 and 2013 (adjusted (adj) OR=1.00, 95% CI 0.74 to 1.35, p=0.98), and odds of purchasing from small mixed businesses did not decline (adj OR=1.28, 95% CI 0.79 to 2.08, p=0.32; table 2). The odds of usually purchasing from tobacconists, petrol stations and ‘other’ store types also did not change significantly between 2011 and 2013.

Low-cost Asian brands

The prevalence of use of low-cost Asian brands among regular smokers of FM cigarettes was very low—under 2%—in all years (table 2) and did not significantly increase between 2011 and 2013 (adj OR=1.02, 95% CI 0.28 to 3.75, p=0.98).

Unbranded illicit tobacco

The percentage of smokers who had purchased unbranded illicit tobacco in the past 12 months ranged between 4% and 5% and did not change significantly between 2011 and 2013 (adj OR=0.80, 95% CI 0.39 to 1.64, p=0.54; table 2). The percentage that had purchased unbranded illicit tobacco in the past year and currently smoked it remained at approximately 2% in each year and also did not change significantly between 2011 and 2013 (adj OR=0.69, 95% CI 0.25 to 1.88, p=0.46).

Cigarettes that may have been contraband

In 2013, 2.6% (95% CI 0.7% to 4.5%) of cigarette smokers reported that they had purchased at least one pack of cigarettes in the past 3 months in Australia which was not packaged as per Australian regulations. Too few cases were detected to estimate percentages purchasing various numbers of packs over the 3-month period; however, in this sample, 10 of the 15 smokers who reported having purchased any non-compliant packs had purchased fewer than 5 over the past 3 months and only 3 cigarette smokers reported having purchased more than 10. In addition, 1.7% (95% CI 0.3% to 3.2%) of cigarette smokers reported that they had purchased at least one pack of cigarettes in the past year from an informal seller such as a market stall or someone selling from the back of a car or van. Only three smokers reported having purchased more than five packs from such a source over the previous 12 months.

DISCUSSION

Examination of data from the annual Victorian Smoking and Health population survey revealed no evidence of an increase in the proportion of smokers purchasing their tobacco from supermarkets, and no evidence of a loss of business from small mixed businesses.¹⁴ There was no evidence of an increase in use of cheap tobacco products imported from Asian manufacturers¹⁵ There was also no indication of any increase over time. In the percentage of smokers reporting use of unbranded illicit tobacco. Further, the likely total number of cigarettes used that may have been contraband—based on the percentage of smokers and the total numbers of cigarettes purchased in Australia in non-compliant packaging and/or from an informal seller—appears to be small in 2013, a year after implementation of plain packaging.

This survey covered only the state of Victoria (where just under one-quarter of the Australian population reside).⁴⁵ It is possible that the purchasing patterns and rates of use of illicit tobacco are different in other jurisdictions. However, it should be noted that an industry-funded report purporting to estimate the extent of use of illicit tobacco in various areas of Australia estimated that use in Victoria was directly in line with its estimated national average.⁴⁶ Use of illicit tobacco may also be higher among some non-English speaking immigrant groups. The study was restricted to those who could speak English; however, it should be noted that only 2.6% of Australians cannot speak English at all.⁴⁷ The survey achieved consistent, reasonable response rates and is broadly representative of the population of smokers among Victorian adults, including the growing number of households that do not have landline phones.

It is very difficult to precisely quantify the extent of use of contraband cigarettes.⁴⁸ Sample sizes were too

small to allow robust estimations of amounts of such cigarettes purchased; however, the small number of smokers in 2013 reporting having purchased any cigarettes likely to be contraband suggests that the overall consumption of such cigarettes would be substantially lower than the amounts estimated on the basis of the discarded pack study conducted for tobacco companies and reported in the KPMG LLP study.³⁰ Discarded pack studies^{49–51} have been criticised for being unrepresentative and using non-random sampling.^{33 34 52} Smokers who discard packs in public places may differ systematically from those who dispose of packs in domestic rubbish or at work: for instance, they may be more likely to be tourists or other visitors to the country, who in turn may be more likely than the overall population of smokers to use and discard foreign-made cigarettes, including cigarettes purchased overseas and legitimately brought into Australia.³¹ Litter surveys may also over-represent the kinds of packs smoked by younger males, who are more likely to litter.⁵³ When efforts are made by academic researchers to ensure representative samples of litter, they produce estimates substantially lower than those produced by industry-funded litter surveys.³⁴ The low number of respondents reporting the purchase of cigarettes from informal sellers was in line with estimates for Australia in 2011 from the International Tobacco Control policy evaluation study which found that 0.4% of Australian smokers had purchased their last cigarette from an informal source such as informal sellers or family and friends.⁵⁴

It is possible that questions about the use of illicit unbranded tobacco may not be answered honestly by all respondents, given its illegal status. However, this applies equally in 2013 as it did in 2011. Questions concerning packs that were not compliant with package warnings carried no implication of illegal activity by the smoker

Table 2 Usual place of purchase, use of low-cost Asian brands, and use of unbranded illicit tobacco by year—unadjusted percentages and 95% CIs

	2011		2012		2013	
	Per cent	95% CI	Per cent	95% CI	Per cent	95% CI
Usual place of purchase*						
Supermarket	65.4	61.0 to 69.8	63.3	58.2 to 68.4	65.7	60.9 to 70.5
Small mixed businesses	9.2	6.5 to 11.8	14.6	10.8 to 18.5	11.2	7.9 to 14.6
Tobacconist	11.3	8.4 to 14.1	10.9	7.8 to 14.0	11.4	8.3 to 14.5
Petrol station	9.1	6.4 to 11.8	6.5	3.7 to 9.3	6.9	4.2 to 9.5
Other†	1.5	0.5 to 2.5	1.7	0.5 to 2.9	1.0	0.1 to 1.8
Don't know	3.5	1.7 to 5.4	3.0	1.1 to 4.9	3.8	1.7 to 5.8
Low-cost Asian brands‡	1.1	0.0 to 2.3	1.4	0.0 to 3.4	0.9	0.0 to 2.1
Unbranded illicit tobacco*						
Past 12-month use	4.4	2.4 to 6.3	4.9	2.4 to 7.4	4.0	2.0 to 6.0
Current use	2.3	0.8 to 3.8	2.2	0.3 to 4.1	1.9	0.6 to 3.1

*Includes all current smokers (2011: n=754; 2012: n=590; 2013: n=601).

†Includes internet, duty free, airports, overseas, cafés, vending machines and informal sources.

‡Includes regular (daily/weekly) smokers of factory-made cigarettes (total n=1551; 2011: n=584; 2012: n=496; 2013: n=472). Of these, n=39 (2011: n=16; 2012: n=16; 2013: n=7) did not have or did not know their regular brand or gave a brand of roll-your-own tobacco and are not included.

and questions about purchase from informal sellers were also asked in a matter-of-fact way that was unlikely to have raised concerns among participants.

Analyses of recent research findings suggest that it is only industry-funded studies that are concluding that levels of use of illicit tobacco are increasing.⁵⁵ This survey found no evidence of an increase in use of illicit unbranded tobacco, findings that are corroborated by trends in overall amounts of unbranded tobacco detected in customs operations²⁸ and by retail audits which also showed no increase in availability of either unbranded or branded illicit tobacco following the introduction of plain packaging.²⁵

This study investigated changes 12 months after the start of Australian plain packaging legislation, and potential unintended consequences should continue to be monitored into the future in larger national samples of smokers. In the meantime, this study provides no evidence of the unintended consequences of standardised packaging predicted by opponents having eventuated 1 year after implementation.

Contributors MS, SD and MW conceived of the study. MZ carried out the analyses. All authors contributed to the writing and revisions of the manuscript and approved the final version.

Funding This study was supported by Quit Victoria with funding from VicHealth and the Department of Health for the Victorian Smoking and Health annual survey.

Competing interests None.

Ethics approval Ethics approval was obtained from the Cancer Council Victoria's Human Research Ethics Committee (HREC: 0018).

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement No additional data are available.

Open Access This is an Open Access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

REFERENCES

1. Tobacco Plain Packaging Act. 2011. <http://www.comlaw.gov.au/Details/C2011A00148>
2. Tobacco Plain Packaging Regulations. 2011. <http://www.comlaw.gov.au/Details/F2011L02644/Download>
3. Competition and Consumer (Tobacco) Information Standard. 2011. <http://www.comlaw.gov.au/Details/F2011L02766>
4. Select Committee of the New Zealand House of Representatives. Smoke-free Environments (Tobacco Plain Packaging) Amendment Bill. Secondary Smoke-free Environments (Tobacco Plain Packaging) Amendment Bill. 2014. http://www.parliament.nz/en-nz/pb/legislation/bills/00DBHOH_BILL12969_1/smoke-free-environments-tobacco-plain-packaging-amendment (accessed Mar 2014).
5. Oireachtas Joint Committee on Health and Children. Public Health (Standardised Packaging of Tobacco) Bill 2013—Request for Submissions. Secondary Public Health (Standardised Packaging of Tobacco) Bill 2013—Request for Submissions. 2014. http://www.oireachtas.ie/parliament/oireachtasbusiness/committees_list/health-and-children/submissionsontobaccopackaging/ (accessed May 2014).
6. Kmietowicz Z. Ministers are criticised after plans for plain pack cigarettes are put on hold. *BMJ* 2013;347:f4544.
7. Chantler C. *Independent review into standardized packaging of tobacco*. London: Kings College London, 2014. <http://www.kcl.ac.uk/health/packaging-review.aspx> (accessed May 2014).
8. Australian Association of Convenience Stores. AACS submission no 29 to the DOHA Inquiry into tobacco plain packaging. 2011. <http://www.yourhealth.gov.au/internet/yourhealth/publishing.nsf/Content/plainpack-tobacco-subs-a#.UOzuWKxqF9M> (accessed May 2014).
9. Alliance of Australian Retailers. Submission on the exposure draft of tobacco plain packaging bill and House Standing Committee on Health and Ageing Inquiry. 2011. <https://www.australianretailers.com.au/> (accessed May 2014).
10. British American Tobacco Australia. *Submission on the Tobacco Plain Packaging Bill 2011*. Department of Health and Ageing Consultation website Canberra, 2011. <http://www.yourhealth.gov.au/internet/yourhealth/publishing.nsf/Content/plainpack-tobacco-subs-b#.UOztA6xqF9M> (accessed 2 Jun 2014).
11. Imperial Tobacco Australia Limited. *Submission to the Department of Health and Ageing regarding the Tobacco Plain Packaging Bill 2012 (Exposure draft) and Consultation Paper*. Sydney, 2011. <http://www.yourhealth.gov.au/internet/yourhealth/publishing.nsf/Content/plainpack-tobacco-subs-i-k#.UOztA6xqF9M> (accessed 2 Jun 2014).
12. Philip Morris Limited. Commoditising tobacco products through plain packaging will harm public health, violate treaties and does not meet the test of 'evidence-based policy'. Submission on the Tobacco Plain Packaging Bill Exposure Draft, Melbourne, 2011. <http://www.yourhealth.gov.au/internet/yourhealth/publishing.nsf/Content/plainpack-tobacco-subs-p#.UOzuWKxqF9M> (accessed 2 Jun 2014).
13. Deloitte. Potential impact on retailers from the introduction of plain tobacco packaging. February 2011. Alliance of Australian Retailers Sydney, 2011. https://www.australianretailers.com.au/downloads/pdf/deloitte/2011_01_31_AAR_Plain_Packaging2.pdf (accessed Mar 2013).
14. Deloitte. Plain packaging and channel shift. June. Alliance of Australian Retailers Sydney, 2011. https://www.australianretailers.com.au/downloads/pdf/deloitte/Potential_impact_of_channel_shift.pdf (accessed Mar 2013).
15. Padilla J. *The impact of plain packaging of cigarettes in Australia: a simulation exercise*. A report prepared for Philip Morris International. LECG Consulting Belgium Brussels, 2010. <http://www.yourhealth.gov.au/internet/yourhealth/publishing.nsf/Content/plainpack-tobacco-subs-p#.UOzuWKxqF9M> (accessed May 2013).
16. Crowe D. Campaign questions expensive plain packaging experiment. 2011. [http://www.bata.com.au/group/sites/bat_7wykg8.nsf/vwPagesWebLive/DO7WZEX6/\\$FILE/medMD8GX5XH.pdf?openelement](http://www.bata.com.au/group/sites/bat_7wykg8.nsf/vwPagesWebLive/DO7WZEX6/$FILE/medMD8GX5XH.pdf?openelement) (accessed May 17).
17. British American Tobacco Australia. Booming illegal tobacco costs government billions. Media release, Nov 4. BATA Sydney, 2013. http://www.bata.com.au/group/sites/BAT_7WYKGG8.nsf/vwPagesWebLive/DO9879X3?opendocument&SKN=1 (accessed May 2014).
18. British American Tobacco (BAT). UK Standardised Packaging Consultation: response of British American Tobacco UK Limited. 2012. [http://www.bat.com/group/sites/uk_3mfnen.nsf/vwPagesWebLive/DO8WZC5E/\\$FILE/medMD8WZC6J.pdf?openelement](http://www.bat.com/group/sites/uk_3mfnen.nsf/vwPagesWebLive/DO8WZC5E/$FILE/medMD8WZC6J.pdf?openelement) (accessed May 2014).
19. British American Tobacco (BAT). UK Standardised Appendix A, report of Dr. Jonathan Klick. Appendix A. 2012. [http://www.bat.com/group/sites/uk_3mfnen.nsf/vwPagesWebLive/DO8WZC5E/\\$FILE/medMD8WZC6J.pdf?openelement](http://www.bat.com/group/sites/uk_3mfnen.nsf/vwPagesWebLive/DO8WZC5E/$FILE/medMD8WZC6J.pdf?openelement) (accessed May 2014).
20. British American Tobacco (BAT). UK Standardised, report of Mr. Stephen Gibson. Appendix B. 2012. [http://www.bat.com/group/sites/uk_3mfnen.nsf/vwPagesWebLive/DO8WZC5E/\\$FILE/medMD8WZC6J.pdf?openelement](http://www.bat.com/group/sites/uk_3mfnen.nsf/vwPagesWebLive/DO8WZC5E/$FILE/medMD8WZC6J.pdf?openelement) (accessed May 2014).
21. Japan Tobacco International (JTI). Response to the Department of Health's consultation on the standardised packaging of tobacco products. 2012. <http://www.jti.com/how-we-do-business/key-regulatory-submissions/> (accessed May 2014).
22. Australian Association of Convenience Stores. Impact of plain packaging on small retailers—wave 2. 2013. <http://www.aacs.org.au/wp-content/uploads/2013/10/Impact-of-Plain-Packaging-on-Small-Retailers-W2-Final-Report.pdf> (accessed Feb 2014).
23. Carter O, Welch M, Mills B, *et al*. Plain packaging for cigarettes improves retail transaction times. *BMJ* 2013;346:f1063.
24. Wakefield M, Bayly M, Scollo M. Product retrieval time in small tobacco retail outlets before and after the Australian plain packaging policy: real-world study. *Tob Control* 2014;23:70–6.
25. Bayly M, Scollo M, Wakefield M. No lasting effects of plain packaging on cigarette pack retrieval time in small Australian retail outlets. *Tob Control* 2014. Published Online First: 30 May 2014. doi:10.1136/tobaccocontrol-2014-051683

26. Kelly J. Tobacco firms say it'll take two years to meet pack deadline. The Australian, National Affairs section. 2011. <http://www.theaustralian.com.au/national-affairs/tobacco-firms-say-itll-take-two-years-to-meet-pack-deadline/story-fn59niix-1226108594740>
27. Government of Australia. Explanatory Memorandum to Excise Tariff Amendment (Tobacco) Bill 2014. Secondary Explanatory Memorandum to Excise Tariff Amendment (Tobacco) Bill 2014. 2014. http://parlinfo.aph.gov.au/parlInfo/search/display/display.w3p;query=ld%3A%22legislation%2Fems%2Fr5172_ems_78ed6212-03a3-4669-9947-c3fc17c8b5e0%22 (accessed Apr 2014).
28. Australian Customs and Border Protection Service. *Annual report 2012–13*. Australian Government Canberra, 2013. <http://www.customs.gov.au/site/page4283.asp>
29. Australian Institute of Health and Welfare. *2010 National Drug Strategy Household Survey: survey report*. Drug statistics series no. 25, AIHW cat. no. PHE 145. Canberra: AIHW, 2011. <http://www.aihw.gov.au/publication-detail?id=32212254712&libID=32212254712&tab=2> (accessed 27 July).
30. KPMG LLP. *Illicit tobacco in Australia: 2013 half year report*. Sydney, 2013. http://www.bata.com.au/group/sites/BAT_7WYKG8.nsf/vwPagesWebLive/DO9879X3?opendocument&SKN=1 (accessed Nov 2013).
31. Quit Victoria. *Critique of, Illicit tobacco in Australia: half year report, 2013 by KPMG LLP*. Australia: Cancer Council Victoria Melbourne, 2013. <http://www.cancervic.org.au/plainfacts/browse.asp?ContainerID=plainfacts-myths> (accessed Apr 2014).
32. Quit Victoria. *Illicit trade of tobacco in Australia: a report prepared by Deloitte for British American Tobacco, Philip Morris Ltd and Imperial Tobacco Australia Limited: a critique prepared April 2013*. Australia: Cancer Council Victoria Melbourne, 2013. Quit Victoria (accessed Apr 2014).
33. Gilmore AB, Rowell A, Gallus S, *et al*. Towards a greater understanding of the illicit tobacco trade in Europe: a review of the PMI funded 'Project Star' report. *Tob Control* 2014;23(e1):e51–61.
34. Stoklosa M, Ross H. Contrasting academic and tobacco industry estimates of illicit cigarette trade: evidence from Warsaw, Poland. *Tob Control* 2014;23(e1):e30–4.
35. Australian Bureau of Statistics. *Technical paper: socio-economic indexes for areas (SEIFA) 2011*. Catalogue no. 2033.0.55.001. Canberra, Australian Capital Territory: ABS, 2013. <http://www.abs.gov.au/websitedbs/censushome.nsf/home/seifa2011?opendocument&navpos=260> (accessed Apr 2014).
36. NSW Retail Tobacco Traders' Association. Price lists—cigarettes. The Australian Retail Tobacconist 2011;81(no. 2. May–July):1–2 Not online.
37. NSW Retail Tobacco Traders' Association. Price lists—cigarettes. The Australian Retail Tobacconist 2012;84(no. 6 May–July):1–2 Not online
38. NSW Retail Tobacco Traders' Association. Price lists—cigarettes. The Australian Retail Tobacconist 2013;89(Aug–Nov):17 Not online.
39. Scollo M, Owen T, Boulter J. Price discounting of cigarettes during the National Tobacco Campaign. In: Hassard K. ed. *Australia's National Tobacco Campaign: evaluation report*, vol. 2. Canberra: Commonwealth Department of Health and Aged Care, 2000:155–200.
40. NSW Retail Tobacco Traders' Association. Price lists—cigarettes. The Australian Retail Tobacconist 2013;87(no. 1 Feb–May):1–2 Not online.
41. Australian Bureau of Statistics. *Population estimates by age and sex, regions of Australia, 2011*. Catalogue No. 3235.0. Canberra: ABS, 2012. <http://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/6D29D79856AA107ECA257BD60010DD6C?opendocument> (accessed Apr 2014).
42. Stata Statistical Software: Release 12 [program]. College Station, TX: StataCorp LP, 2011.
43. Australian Institute of Health and Welfare. National Drug Strategy Household Survey 2010 (computer file). Secondary National Drug Strategy Household Survey 2010 (computer file) June 2013. 2011. <http://www.ada.edu.au/social-science/browse/alcohol-tobacco-and-other-drugs/national-drug-strategy-household-survey> (accessed Jun 2013).
44. Scollo M. Chapter 2. Trends in tobacco consumption. Tobacco in Australia: facts and issues. 2013. www.TobaccoInAustralia.org.au
45. Australian Bureau of Statistics. *Population estimates by age and sex, regions of Australia, 2013*. Catalogue No. 3235.0. Catalogue No. 3235.0. Canberra: ABS, 2012.
46. Deloitte. Illicit tobacco trade atlas. Prepared for British American Tobacco Australia Limited, Philip Morris Limited and Imperial Tobacco Australia Limited Sydney, 2011. No longer on line at <http://www.illegaltobacco.com.au/>
47. Australian Bureau of Statistics. 2071.0—Reflecting a Nation: Stories from the 2011 Census, 2012–2013. ABS Canberra, 2011. <http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/2071.0main+features902012-2013>
48. International Agency for Research on Cancer. Chapter 8. *Tax avoidance and tax evasion. Effectiveness of tax and price policies for tobacco control*. Lyon, France: IARC, 2011.
49. KPMG. *Project Star 2010 results: a quantification of illicit trade in Europe*. Philip Morris International Switzerland, 2011. http://www.pmi.com/eng/tobacco_regulation/illicit_trade/documents/Project_Star_2010_Results.pdf (accessed Apr 2013).
50. KPMG. *Project Star 2011 results: a quantification of illicit trade in Europe*. Philip Morris International Switzerland, 2012. http://www.pmi.com/eng/tobacco_regulation/illicit_trade/pages/illicit_trade.aspx (accessed Apr 2013).
51. KPMG. *Project Star 2012 results: a quantification of illicit trade in Europe*. Philip Morris International, 2013. http://www.pmi.com/eng/tobacco_regulation/illicit_trade/pages/illicit_trade.aspx (accessed 16 Apr 2013).
52. Ciecierski C. Working paper—the market for legal and illegal cigarettes in Poland: a closer look at demand and supply-side characteristics. IDRC Working Paper Series, 2007. http://web.idrc.ca/fr/ev-119595-201-1-DO_TOPIC.html (accessed Nov 2013).
53. Beverage Industry Environment Council. *Measuring environmentally desirable behaviour in Australia. Littering Behaviour Studies 11*. Sydney: BIEC, 2001. <http://www.afgc.org.au/doc-library/category/9-packaging-recycling.html?download=64%3Alittering-behaviour-study-3-measuring-environmentally-desirable-behaviour> (accessed Mar 2014).
54. Guindon GE, Driezen P, Chaloupka FJ, *et al*. Cigarette tax avoidance and evasion: findings from the International Tobacco Control Policy Evaluation Project. *Tob Control* 2014;23(Suppl 1):i13–22.
55. Rowell A, Evans-Reeves K, Gilmore AB. Tobacco industry manipulation of data on and press coverage of the illicit tobacco trade in the UK. *Tob Control* 2014;23(e1):e35–43.