

Original Investigation

Smokers of illicit tobacco report significantly worse health than other smokers

Campbell K. Aitken, Tim R. L. Fry, Lisa Farrell, & Breanna Pellegrini

Abstract

Introduction: The aim of this study was to ascertain whether the health of past and current smokers of illicit tobacco (chop-chop) differs from that of smokers of licit tobacco.

Methods: The design was a telephone survey, stratified by state, using computer aided telephone interviewing, with households selected by random digit dialing from the telephone white pages. Setting was all Australian states and territories, 1,621 regular tobacco smokers aged 18+ years. Measures were social and personal characteristics of tobacco smokers, smoking histories and patterns, and health status (SF-8 and disability weights). Binary logistic regression was used to identify variables associated with current and lifetime chop-chop use.

Results: Compared with licit-only tobacco smokers, current users of chop-chop had significantly greater odds of beginning smoking aged <16 years (odds ratio [OR] 1.65, 95% CI = 1.09–2.50), of reporting below-average social functioning (OR 1.61, 95% CI = 1.06–2.44), and of a measurable disability (OR 1.95, 95% CI = 1.08–3.51). Lifetime chop-chop users were relatively likely to be less than 45 years of age (OR 1.82, 95% CI = 1.38–2.39), report below-average mental health (OR 1.61, 95% CI = 1.22–2.13) and above-average bodily pain (OR 1.40, 95% CI = 1.06–1.85), smoke more than 120 cigarettes/week (OR 1.39, 95% CI = 1.06–1.83), and to have begun smoking aged <16 years (OR 1.33, 95% CI = 1.01–1.75).

Discussion: Current and lifetime users of chop-chop report significantly worse health than smokers of licit tobacco. Investigation of how to communicate this finding to current and potential chop-chop smokers is warranted.

Introduction

It has been suggested that 6%–8% of tobacco consumed globally each year is illicit (Merriman, Yurekli, & Chaloupka, 2000). The trade in illicit tobacco (tobacco illegally grown, manufactured and/or smuggled, and illegally sold) represents an economic loss to governments estimated at US\$40–50 billion in 2006 (Framework Convention Alliance, 2008) and affects all countries regardless of their level of development, including the United States, and China, the world's single biggest tobacco market (Joossens & Raw, 2000; Lee & Collin, 2006). Similarly, the Australian market for illicit tobacco has thrived over recent decades as increasing taxation forced licit cigarette prices high by international standards (Lal & Scollo, 2002).

In most countries, the trade in illicit tobacco is dominated by smuggling and counterfeiting; in Australia, the tobacco black market is dominated by a form of illicit tobacco known as chop-chop (Geis, 2005; PricewaterhouseCoopers, 2005). Until Australian commercial cultivation of tobacco in 2008 (Scollo & Winstanley, 2008), chop-chop was sourced primarily by diversion from licensed growers; bales of minimally processed tobacco would be purchased or stolen (Geis, Cartwright, & Houston, 2004) and distributed by organized crime groups (Australian National Audit Office, 2002). In addition, Australian chop-chop was and is still sourced from unlicensed domestic growers or suburban homegrown production (Bittoun, 2004; Geis, 2005).

There is some international smuggling of illicit and counterfeit tobacco products into the Australian domestic market, as well as diversion of duty-free tobacco products and illegal Internet sales (PricewaterhouseCoopers, 2005). Sources of illicit tobacco in Australia resemble the various sources of contraband tobacco in Canada, with the exception of the tax-excused cigarettes

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designated for sale on reserves to First Nation Canadians, which are diverted to the broader community (Luk, Cohen, & Ferrence, 2007). In particular, chop-chop in Australia is similar to contraband tobacco in Canada sourced from domestic production by illegal manufacturers (Luk et al.). Illicit tobacco is sold in Australia either loose in unbranded packages or in prefilled cigarette tubes by growers or “under the counter” at a variety of street markets and other retail establishments such as petrol stations and convenience stores (Bittoun, 2002; Geis, 2005; PricewaterhouseCoopers), as previously described in Canada and elsewhere (Callaghan, Victor, Tavares, & Taylor, 2008). The considerable price differential between licit and illicit tobacco is assumed to be the primary driver of demand for illicit tobacco the world over (Arnott, Joossens, Bianco, Assunta, & Oggwell, 2008; Geis; Tsai, Sung, Yang, & Shih, 2003). In Australia, illicit tobacco is generally held to cost about a third of the price of licit tobacco by weight (Geis), and an estimated 1 in every 17 cigarettes smoked in Australia contains chop-chop (PricewaterhouseCoopers). By comparison, it was calculated that 1 in 4 cigarettes smoked in Ontario and Quebec in 2006 was illegal (McLaughlin, 2007).

The illicit tobacco trade is regularly described as a critical public health issue because lower prices enable greater consumption and more damage to health and simultaneously decrease the money available for state-funded health care (Arnott et al., 2008; Lee & Collin, 2006). The public health significance of increased consumption of a substance with known health hazards is unarguable, but almost nothing is known about the relative health risks of smoking tobacco obtained illicitly. Illicit tobacco can be adulterated by producers and sellers to increase weight and therefore profits (Bittoun, 2002, 2004), grown using techniques that elevate concentrations of heavy metals and other toxic substances (Pappas, Polzin, Watson, & Ashley, 2007; Stephens, Calder, & Newton, 2005), or simply mishandled in ways that increase the potential for damage to consumers’ health (Bittoun, 2004). Furthermore, the perceptions of illicit tobacco consumers seem to be in direct opposition to these health harms; evidence collected by the authors and others shows that some Australian smokers consider illicit tobacco to be relatively unadulterated, more “natural” and therefore less damaging to health than licit tobacco and that this also influences decisions to smoke it (Aitken, Fry, Grahlmann, & Masters, 2008; Bittoun, 2004). What little medical literature there is on the topic suggests that illicit tobacco use is in fact associated with more harm to users’ health than licit tobacco (Bittoun, 2002, 2004).

In this article, we report the results of a survey of Australian tobacco smokers designed to produce new information about the health of people who smoke or have smoked illicit tobacco relative to those who smoke only licit tobacco.

Methods

Questionnaire

As a design prelude to the telephone survey, the authors conducted three focus groups with illicit tobacco smokers in late 2006 (Aitken et al., 2008). On the basis of the focus groups, we designed a questionnaire to collect information about the health, social, and personal characteristics of licit and illicit tobacco smokers, their smoking histories and patterns, and their health status. (The questionnaire also investigated the economic

thresholds and decision-making processes of illicit tobacco users, data which will be described elsewhere.)

Measurements of health status over the 4 weeks preceding the survey were made using the SF-8 (QualityMetric, Lincoln, RI), a widely used, psychometrically sound, multipurpose short-form survey of health status. The SF-8’s eight questions relate to distinct domains of health and allow generation of two summary measures for physical and mental health. SF-8 output is scored and standardized using norm-based methods based on studies conducted in the United States in 2000 (Ware, Kosinski, Dewey, & Gandek, 2001).

Sample selection

A highly reputable market research firm was commissioned to use our questionnaire to collect data in an Australia-wide telephone survey of tobacco smokers. A three-phase pilot of 10 completed interviews per phase was conducted and the questionnaire was modified slightly as a result. The sample was stratified by state (New South Wales/Australian Capital Territory, Queensland, Victoria/Tasmania, Western Australia, South Australia/Northern Territory) and selected by random digit dialing from the telephone white pages. A minimum of six call attempts was made to each household to establish contact, and up to five attempts were made to interview an identified eligible household once initial contact had been established. A letter describing the study was mailed to any respondent or household that requested one. Interviews were conducted using Computer-Aided Telephone Interviewing (CATI).

Eligibility

To begin the questionnaire, respondents had to be aged at least 18 years and self-identify as a regular tobacco smoker. Respondents were asked if they had “ever” smoked illicit tobacco, and if so were asked a series of questions specifically about illicit tobacco usage. The selection criteria were changed during the course of the survey to boost numbers of illicit tobacco users, which meant that some former illicit tobacco users were asked a modified set of illicit tobacco-specific questions.

Analysis

All specific health conditions reported by survey participants were assigned a disability weight extracted from an Australian Burden of Disease report (Mathers, Vos, & Stevenson, 1999).

An Access database was converted into an SPSS data file for analysis. Univariate associations with illicit tobacco use were assessed using chi-square tests and *t* tests, then binary logistic regression was used to find the model of best fit for health, sociodemographic, economic, and other variables independently associated with current and lifetime (ever) illicit tobacco use. In most cases, continuous variables (e.g., age of beginning smoking) were dichotomized using median values or nearby meaningful whole numbers. United States population norms were used as midpoints for SF-8 scores. Variables that demonstrated a significant association in univariate analysis ($p < .1$) were trailed as candidate predictors in logistic regression models.

Ethics

Ethics approval was obtained from RMIT University’s Human Research Ethics Committee.

Results

The telephone survey began on Monday, 12 March 2007, and was completed on Friday, 15 June 2007. CATI interviews took an average of 9 min to complete.

Response rate

CATI operators made 46,449 calls to fixed-line telephone numbers, of which 43,869 (94.4%) did not result in an interview for one or more reasons (13,298 disconnected numbers, 19,934 with respondents out of target age range or not current or former smokers, 2,404 business numbers, etc). Of 2,580 calls which connected with an eligible householder, 1,621 resulted in a complete interview, giving a response rate of 62.8%.

Sample characteristics

Smokers who participated in our survey were aged 44.4 years on average (range 18–93) and 77% were born in Australia. As shown in Table 1, in selected important sociodemographic respects, our sample is similar to smokers who participated in Australia’s National Drug Strategy Household Survey in 2004 (Morley, Hall, Hausdorf, & Owen, 2006).

General patterns of tobacco use

The vast majority of participants (1,550/1,621 = 95.6%) reported smoking tobacco every day. Of daily smokers, 85.9% smoked tailor-made cigarettes, 29.0% roll-your-own cigarettes, 7.5% cigars, and 2.1% pipes. Of all people who smoked tailor-made cigarettes, 19.3% also smoked roll-your-own cigarettes at least occasionally. The median number of tailor-made cigarettes smoked per day was 20 (range, 1–120). Fifteen respondents (1.0%) said that they smoked cannabis, most at least weekly.

Prevalence of illicit tobacco use

A majority (58.3%) of respondents had heard of illicit tobacco. Of 1,621 respondents, 556 (34.3%) had ever smoked illicit tobacco, and 97 (6.0%) described themselves as current (occasional through to exclusive) illicit tobacco users. Sixty current or former illicit tobacco smokers (10.8%) reported smoking illicit tobacco exclusively at some time. Nevertheless, as previously noted, the selection criteria were changed during the course of the survey in order to include more people who had ever used illicit tobacco, so the final proportions do not accurately reflect the prevalence of illicit tobacco use among Australian smokers. Eligibility criteria were changed on 27 April 2007, to which point 135 of 551 respondents

(24.5%) were smokers who had ever used illicit tobacco and 39 (7.1%) were smokers who described themselves as at least occasional illicit tobacco users. Of 97 current illicit tobacco smokers surveyed, nine (9.3%) reported smoking no other type of tobacco.

Predictors of current illicit tobacco use

The significant predictors of current illicit tobacco use in univariate and multivariate analysis are shown in Table 2. The “age” variable was a significant predictor of current illicit tobacco use only in continuous form and was retained in the multivariate model for adjustment purposes.

Predictors of lifetime illicit tobacco use

Five variables were independently and significantly associated with lifetime (ever) illicit tobacco use; they and the strengths of their associations are shown in Table 3, along with their univariate odds ratios and those of variables which were not significant predictors.

Discussion

Our data suggest that nearly a quarter of Australian smokers have smoked illicit tobacco at some time, and just over 7% are at least occasional users. These figures appear to be low by international standards. In the United Kingdom, it is estimated that one in six cigarettes and around half of “hand-rolling” tobacco smoked is illicit (Her Majesty’s Revenue and Customs and Her Majesty’s Treasury, 2006). In Canada, it was estimated that 22% of smokers were consuming illegal tobacco products in 2007 (Royal Canadian Mounted Police, 2008). It appears that a substantial proportion of illicit tobacco consumed in both the United Kingdom and Canada is smuggled, rather than grown and manufactured illicitly as seems to be the case with Australian illicit tobacco. Nevertheless, with 23% of approximately 16.7 million Australians aged 15+ being smokers (Australian Bureau of Statistics [ABS], 2006; ABS, 2008), our estimates imply that more than 200,000 Australians used illicit tobacco products at least occasionally in 2006.

In multivariate analysis, relative to smokers of licit tobacco, current users of illicit tobacco had significantly greater odds of beginning smoking at younger than legal age, 60% greater odds of reporting below-average social functioning on the SF-8, and nearly twice the odds of reporting a measurable disability. Independent predictors of lifetime illicit tobacco use were less than 45 years, below-average mental health and above-average bodily pain, smoking more than 120 cigarettes/week, and beginning smoking at a younger than legal age.

Our results imply the existence of a relationship between illicit tobacco smoking and decreased mental and physical health. Due to the cross-sectional design of our survey, we are unable to attribute any causality to the relationship; the concurrent and independent significant associations between illicit tobacco smoking, high cigarette consumption, and younger age of smoking onset are also plausible explanations for reduced health, or may be markers for other important variables we did not measure. Nevertheless, the lack of influence of socioeconomic variables such as income, education level, and employment status suggests that illicit tobacco use is not simply a marker for lower socioeconomic status and its well-established association with

Table 1. Selected characteristics of respondents and smokers surveyed in the 2004 National Drug Strategy Household Survey

Proportion	Study	NDSHS
	% (95% CI)	% (95% CI)
Female	47.6 (45.2–50.1)	46.7 (45.3–48.0)
With tertiary qualifications	13.9 (12.3–15.6)	15.6 (14.6–16.5)
Employed full or part time	66.7 (64.5–69.1)	65.8 (64.5–67.1)

Note. NDSHS, National Drug Strategy Household Survey.

Table 2. Variables significantly associated with current illicit tobacco use

	Unadjusted		Adjusted	
	OR (95% CI)	<i>p</i>	OR (95% CI)	<i>p</i>
Began smoking aged <16 years	1.76 (1.17–2.66)	.007	1.65 (1.09–2.50)	.019
Age (years)	0.98 (0.97–1.00)	.025	0.98 (0.97–1.00)	.019
SF-8 social functioning <48	1.76 (1.17–2.66)	.007	1.61 (1.06–2.44)	.026
Disability weight >0	1.92 (1.09–3.38)	.023	1.95 (1.08–3.51)	.027
SF-8 mental health <49 ^a	1.54 (1.01–2.33)	.043		
SF-8 mental health summary <49	1.50 (0.99–2.26)	.055		
SF-8 bodily pain <50 ^b	1.43 (0.95–2.16)	.088		
SF-8 physical functioning <48	1.42 (0.94–2.15)	.095		
SF-8 physical health summary <49	1.31 (0.85–2.00)	.218		
>120 cigarettes smoked per week ^c	1.20 (0.79–1.81)	.390		
Income <\$500/week before tax	0.83 (0.55–1.27)	.391		
SF-8 role physical <48	1.21 (0.78–1.89)	.396		
SF-8 general health <49	0.85 (0.56–1.28)	.436		
SF-8 role emotional <47	1.15 (0.75–1.76)	.512		
SF-8 vitality <50	1.14 (0.76–1.72)	.532		
Did not complete high school	1.13 (0.75–1.71)	.560		
Age <45 years	1.10 (0.73–1.66)	.652		
Employed	0.92 (0.60–1.41)	.698		
COB (Australia vs. other)	1.06 (0.64–1.74)	.821		

Note. COB, country of birth; OR, odds ratio.

^aVariable was insignificant in multivariate analysis and detracted from model performance.

^bA lower score represents more pain.

^cLicit tailor-made or roll-your-own tobacco or illicit tobacco.

relatively poor health (Marmot, 2003). Our finding matches that of a study conducted in the United States which found that low-income smokers were no more likely to switch to less expensive, untaxed cigarettes than wealthier smokers (Hyland et al., 2005); this was explained as due to a minimum level of resources being necessary for a consumer to travel long distances or to use the Internet to take advantage of lower cigarette prices—an argument which seems equally applicable to the Australian context.

The public health message that emerges from our data is that people who smoke or have smoked illicit tobacco report significantly worse health than smokers of licit tobacco (who, of course, already have worse health than nonsmokers—Begg et al., 2007). If the association implied by our results is correct, how might the message that use of illicit tobacco is linked with relatively poor health be delivered, given that the behavior in question is the use of an illicit product? (Note that any campaign directed at illicit tobacco must be careful not to imply that licit tobacco is relatively healthy.) Illicit tobacco is either smuggled into Australia or grown illegally locally and sold “under the counter” as well as through social pathways (Geis, 2005); thus, no framework for information dissemination exists specifically related to illicit tobacco. A mass-media campaign would certainly reach illicit tobacco smokers but is unlikely to be a cost-effective way to change the behavior of fewer than 2% of the population (our 7.1% illicit tobacco prevalence estimate among smokers, multiplied by the 23% of Australian adults who smoke—ABS, 2006). Nevertheless, most illicit tobacco users also smoke licit tobacco, so it may be possible to deter them and potential illicit tobacco users through information dissemination at point-of-sale and warning labels on licit tobacco products (Quit Now, 2007; White, Webster, & Wakefield, 2008).

Limitations

The major limitation of our research is associated with the recruitment method. Sampling from listed subscribers to fixed-line telephone services inevitably under represents or neglects smokers who are young, renting rather than own their domiciles, impoverished or experiencing homelessness—groups who are logically relatively likely to take advantage of illicit tobacco’s lower cost (Cantrell, Hung, Fahs, & Shelley, 2008; Shelley, Cantrell, Moon-Howard, Ramjohn, & VanDevanter, 2007). (Such sampling also ignores people who use only mobile telephone services or whose fixed-line number is not listed.) The effects of this sampling bias could be significant, particularly with respect to the influence of economic factors on illicit tobacco use. Inclusion of the relatively low socioeconomic status groups listed earlier could increase representation of current illicit tobacco users, strengthen associations between illicit tobacco use and indicators of poor health, and increase the influence of other health measures in our models. The under representation of groups assumed to be more likely to smoke illicit tobacco also means that our estimates of the prevalence of former and current illicit tobacco use in the Australian population are likely to be highly conservative.

There are also potential limitations associated with our use of the SF-8, scoring for which is based on norms for the United States population and may not translate perfectly to the Australian context. In addition, the SF-8 unavoidably relies on perceived rather than actual health. Nonetheless, our rigorous sampling

Table 3. Variables significantly associated with lifetime illicit tobacco use

	Unadjusted		Adjusted	
	OR (95% CI)	p	OR (95% CI)	p
Age <45 years	1.71 (1.31–2.22)	.000	1.82 (1.38–2.39)	.000
SF-8 mental health summary <49	1.78 (1.37–2.32)	.000	1.61 (1.22–2.13)	.001
>120 cigarettes smoked per week ^a	1.37 (1.06–1.78)	.018	1.39 (1.06–1.83)	.018
SF-8 bodily pain <50 ^b	1.52 (1.17–1.97)	.002	1.40 (1.06–1.85)	.019
Began smoking aged <16 years	1.40 (1.07–1.83)	.013	1.33 (1.01–1.75)	.042
SF-8 mental health <49 ^c	1.74 (1.32–2.30)	.000		
SF-8 social functioning <48 ^c	1.70 (1.29–2.24)	.000		
SF-8 role emotional <47 ^c	1.69 (1.27–2.24)	.000		
SF-8 physical health summary <49	1.25 (0.94–1.65)	.121		
COB (Australia vs. other)	0.77 (0.55–1.08)	.126		
Did not complete high school	1.21 (0.93–1.57)	.161		
SF-8 vitality <50	1.20 (0.92–1.56)	.183		
SF-8 role physical <48	1.22 (0.91–1.64)	.188		
SF-8 physical functioning <48	1.19 (0.90–1.56)	.218		
Disability weight >0	1.30 (0.85–1.98)	.231		
In paid work	1.17 (0.89–1.54)	.268		
SF-8 general health <49	1.12 (0.86–1.46)	.390		
Income <\$500/week before tax	1.10 (0.84–1.43)	.482		

Note. COB, country of birth; OR, odds ratio; SF-8, eight-question short form.

^aLicit tailor-made or roll-your-own tobacco or illicit tobacco.

^bA lower score represents more pain.

^cVariable was insignificant in multivariate analysis and detracted from model performance.

and large sample size should have ensured that any distortions in the data resulting from these sources were evenly distributed.

Conclusion

Current and lifetime users of illicit tobacco report significantly worse mental and physical health than smokers of licit tobacco. Investigation of how best to communicate this finding to current and potential illicit tobacco smokers is warranted.

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Declaration of Interests

None declared.

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