

## RESEARCH REPORT

# Socioeconomic status and tobacco expenditure among Australian households: results from the 1998–99 Household Expenditure Survey

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**Objective:** To investigate the relation between socioeconomic status (SES) and tobacco expenditure among Australian households.

**Design and setting:** Cross sectional study (The Household Expenditure Survey 1998–99) by the Australian Bureau of Statistics, based on a multi-stage national sample of 9682 households.

**Participants:** From selected households, all members aged 15 and over were interviewed.

**Main results:** Lower SES was associated with higher odds of reporting tobacco expenditure. Among smoking households, those from lower SES spent more of their funds on tobacco. For example, households headed by a person with no educational qualification spent 34% more on tobacco than those headed by a person with a university degree. Blue collar households spent 23% more than professional households. Percentage of total household expenditure on tobacco in the first income quintile was 62% more than that of households in the fifth quintile.

**Conclusion:** Antismoking interventions and policies that are specifically aimed at lower SES groups can potentially improve social equality. They can also ameliorate social inequalities in health, given that much of the SES differentials in morbidity and mortality are attributed to the pronounced SES gradient in smoking.

Tobacco use is the largest single cause of mortality and morbidity in Australia. It is estimated to kill over 19 000 Australians each year and is responsible for about 10% of the entire national burden of disease and injury.<sup>1</sup> It is also associated with a diminution of household funds and lowered standards of living. In Australia, being a smoking household and, among smoking households, spending more on tobacco is strongly associated with an increased chance of experiencing financial stress. Even among high income households, smoking is shown to be a significant predictor of financial stress.<sup>2</sup> This association has also been observed internationally.<sup>3–5</sup>

There is solid evidence that lower socioeconomic status (SES) is associated with higher likelihood of smoking.<sup>6–8</sup> Not only individual level indicators of SES (for example, education, income and occupation) are related to smoking, but area level indicators of disadvantage are shown to be significant predictors of smoking, such that for example people living in disadvantaged neighbourhoods are more likely to be smokers, after controlling for relevant individual level factors.<sup>6</sup>

While the association of SES and smoking has been well established, SES variations in household expenditure on tobacco have received scant attention. It will be of concern if lower SES households, which already have limited financial resources, are more likely to report tobacco expenditure or spend a larger proportion of their funds on tobacco. My aim was to investigate the relation between SES and whether or not a household reported tobacco expenditure, using the 1998–99 Household Expenditure Survey in Australia. My aim was also to examine SES variations in amount spent on tobacco among smoking households.

## METHODS

### Sample

The 1998–99 Household Expenditure Survey conducted by the Australian Bureau of Statistics (ABS) provides detailed

information on expenditure, income, and household characteristics of a national sample of 6892 households from private dwellings.<sup>9</sup> A stratified multistage area sample design was used in which collection districts were selected at the first stage, blocks at the second stage, and dwellings at the last stage. The strata were local government areas in capital cities, and major urban centres, minor urban, and rural parts in other regions. Data collection involved personal interviews and two week expenditure diaries distributed among all residents aged 15 and over from selected households. Response rate was 77%.

### Measurement

Respondents were asked to report expenditure on tobacco in the past two weeks. For each household the dataset provided a single tobacco expenditure variable, which is the sum across household members. This was halved to represent weekly expenditure. About 92.5% of reported tobacco expenditure pertained to cigarettes, and nearly all to smoking tobacco. Six measures of socioeconomic status were used: income, education, occupation, unemployment, type of housing occupancy, and index of relative socioeconomic disadvantage (IRSD).

The sample was divided into quintiles of equivalent household after tax income. Household income in the Household Expenditure Survey refers to gross receipts of recurring and usually regular cash flows.<sup>9</sup> It includes employee, own business, property, and cash transfer income. It was set to zero when a household had a negative income. This occurred in 40 cases where there were losses from business or property. To adjust for family size and composition I

**Abbreviations:** SES, socioeconomic status; ABS, Australian Bureau of Statistics

used the updated organisation for economic cooperation and development (OECD) equivalence scale of 1.0 for the first adult, 0.5 for each subsequent adult, and 0.3 for each child.<sup>10</sup> The application of equivalence scales allows for a comparison of the standards of living of households with varying size and composition. Many Australian income studies have used Henderson equivalence scales developed by the Commission of Inquiry into Poverty.<sup>11</sup> However, as these scales only apply to families (income units) and not to households, I used the OECD scale.

Educational qualification of the head of the household was divided into: without post-school qualification; basic/skilled vocational qualification, or undergraduate/associate diploma; and bachelor's degree or higher. Occupation of the head of household was coded based on the Australian standard classification of occupations<sup>12</sup> and divided into: blue collar, including tradespersons, production and transport workers, and labourers; white collar, including clerical, service, and sales workers; and professional, including managers, administrators, professionals, and associate professionals.

"Unemployment" distinguished households with one or more unemployed persons. Type of housing occupancy was divided into renter, purchaser, outright owner, and other (for example, rent free occupation).

IRSD is an area socioeconomic index compiled at the collection district level by the ABS. It includes such variables as the income, education, occupation, housing, household composition, and English fluency of residents.<sup>13</sup> IRSD was classified into quintiles and attached to the household individual records.

## Analysis

The unit of analysis is the household. The statistical package Stata was used for all analyses. Jackknife replicate weights provided by the ABS were used for the computation of standard errors.<sup>9</sup> This technique entails a data dependent way of estimating standard errors and takes into account the complex sample design.<sup>14, 15</sup> Although computation of standard errors using replicate weights is labour intensive it does not require information on primary sampling units and stratification, which is not normally provided by the ABS. In all multivariate analyses, number of persons aged  $\geq 15$ , number of men aged  $\geq 18$ , and age of head of household were controlled for.

Logistic regression was used to assess the association of SES indicators with smoking status. Ordinary least squares (OLS) regression was used to estimate the effect of covariates on tobacco expenditure. Tobacco expenditure was positively skewed. Among smoking households, the range of tobacco expenditure in the past two weeks was \$0.03 to \$232, yet 90% spent \$66 or less. Consequently, tobacco expenditure was transformed to the natural logarithm scale. Thus, regression coefficient estimates represent the effect of covariates on the logarithm of tobacco expenditure. Alternatively, when the coefficient is exponentiated, it represents the factor by which tobacco expenditure changes as the result of one unit change in the covariate, as further described below.

## RESULTS

Some 25%, 43%, and 32% of the households were headed by a person aged  $< 35$ , 35–54, and  $\geq 55$ , respectively. The mean number of persons aged  $\geq 15$  was 2, and that of males aged

**Table 1** Smoking status and tobacco expenditure of households by SES

SES indicator	% In sample (n = 6892)	% Smoking household	p for $\chi^2$ *	Tobacco expenditure† (n = 2291)	p for F‡
Household income			0.547		<0.001
First quintile	20.03	32.99		26.09	
Second quintile	19.95	31.62		29.89	
Third quintile	20.00	33.57		36.27	
Fourth quintile	20.00	34.99		34.59	
Fifth quintile	19.99	32.82		34.46	
Education			<0.001		0.002
No qualification	45.92	36.32		33.72	
Diploma	35.17	34.03		31.56	
Degree	15.78	19.76		27.14	
Unknown	3.13	46.54		33.58	
Occupation			<0.001		<0.001
Blue collar	22.18	43.96		36.85	
White collar	14.06	38.40		32.80	
Professional	29.24	27.56		31.05	
Not applicable	34.52	28.92		28.65	
Unemployment			<0.001		0.668
One or more unemployed person	9.06	51.70		31.85	
No one unemployed	90.94	31.35		32.39	
Housing tenure			<0.001		0.230
Renter	28.22	46.91		30.85	
Purchaser	29.78	35.08		32.64	
Owner	39.61	22.21		33.78	
Other	2.42	30.03		36.3	
Index of relative socioeconomic disadvantage			<0.001		0.884
First quintile (high disadvantage)	19.75	39.50		33.43	
Second quintile	20.42	34.96		32.14	
Third quintile	19.58	34.51		31.98	
Fourth quintile	19.85	30.99		31.22	
Fifth quintile (low disadvantage)	18.02	24.45		32.49	
Unknown	2.38	39.55		33.35	

Source: 1998–1999 Household Expenditure Survey, Australian Bureau of Statistics (ABS). \*p Value for the relation between SES indicator and smoking status. †Average weekly tobacco expenditure (\$) for smoking households. ‡Tobacco expenditure had a positively skewed distribution. To test for the significance of its relation with SES indicators, it was first transformed to a natural logarithmic scale. The reported significant of F statistic pertains to the regression of the logarithm of tobacco expenditure on SES indicator.

**Table 2** Adjusted odds ratios\* and 95% confidence intervals from logistic regression of smoking status on SES indicators (n = 6892)

Variables	OR (95% CI)
Household income	
First quintile	0.96 (0.41 to 2.24)
Second quintile	0.81 (0.01 to 73.07)
Third quintile	0.82 (0.01 to 57.26)
Fourth quintile	0.92 (0.15 to 5.73)
Fifth quintile	1.0
Education	
No qualifications	2.31 (1.87 to 2.86)
Diploma	1.95 (1.64 to 2.32)
Degree	1.0
Unknown	2.86 (2.14 to 3.83)
Occupation	
Blue collar	1.41 (1.16 to 1.70)
White collar	1.28 (1.02 to 1.59)
Professional	1.0
Not applicable	1.35 (1.04 to 1.76)
Unemployment	
One or more unemployed persons	1.43 (1.11 to 1.83)
No one unemployed	1.0
Housing tenure	
Renter	2.37 (2.04 to 2.75)
Purchaser	1.46 (1.23 to 1.75)
Owner	1.0
Other	1.20 (0.82 to 1.77)
Index of relative socioeconomic disadvantage	
First quintile (high disadvantage)	1.65 (1.39 to 1.95)
Second quintile	1.44 (1.19 to 1.74)
Third quintile	1.43 (1.19 to 1.72)
Fourth quintile	1.26 (1.07 to 1.48)
Fifth quintile (low disadvantage)	1.0
Unknown	1.77 (1.39 to 2.24)

Source: 1998–1999 Household Expenditure Survey, Australian Bureau of Statistics (ABS). \*Odds ratios pertain to the odds of being a smoking household. They are adjusted for the number of persons aged  $\geq 15$ , number of men aged  $\geq 18$  and age of head of household.

$\geq 18$  was 1. Average tobacco expenditure as a percentage of household expenditure varied from 7.7% in the lowest income quintile to 2.4% in the highest quintile. Table 1 shows sample characteristics, smoking status, and tobacco expenditure of households by SES.

Table 2 presents the association of SES indicators with smoking status of households. All covariates except income were significantly associated with smoking. For example, odds of tobacco expenditure was 2.3 times greater for households headed by a person with no educational qualification than those with a university degree, 1.4 times greater for blue collar than for professional households, and 2.4 times higher for renters than for households that own their home.

Table 3 shows the results of the regression on SES indicators of the logarithm of tobacco expenditure and tobacco expenditure as a percentage of total household expenditure. Education and occupation had a significant positive effect on tobacco expenditure. Households headed by a person with no educational qualification and a diploma spent, respectively, 34% ( $e^{0.30}-1$ ) and 25% ( $e^{0.22}-1$ ) more on tobacco than households headed by a person with a university degree. Blue collar households spent 23% ( $e^{0.21}-1$ ) more than professional households. Turning to the effect of SES on percentage spent on tobacco, there were more numerous significant coefficients than was the case for amount spent on tobacco. Notably, percentage spent on tobacco among households in the first and second income quintile were, respectively, 62% ( $e^{0.48}-1$ ) and 77% ( $e^{0.57}-1$ ) more than that in households in the fifth quintile. Similarly education, occupation and IRSD had significant effects,

**Table 3** Regression of natural logarithm of tobacco expenditure and tobacco expenditure as percentage of total household expenditure, on SES indicators for smoking households (n = 2291)

Variables	Tobacco expenditure	Tobacco expenditure as % of total expenditure
	b	b
Household income		
First quintile (low income)	-0.35	0.48**
Second quintile	-0.18	0.57**
Third quintile	0.04	0.50**
Fourth quintile	0.05	0.29
Fifth quintile (high income)	Referent	Referent
Education		
No qualification	0.30**	0.38**
Diploma	0.22*	0.23*
Degree	Referent	Referent
Unknown	0.34*	0.36*
Occupation		
Blue collar	0.21**	0.32**
White collar	0.09	0.25**
Professional	Referent	Referent
Not applicable	0.14	0.61**
Unemployment		
One or more unemployed person	0.02	0.00
No one unemployed	Referent	Referent
Housing tenure		
Renter	0.02	0.02
Purchaser	-0.08	-0.22
Owner	Referent	Referent
Other	0.21	0.46**
Index of relative socioeconomic disadvantage		
First quintile (high disadvantage)	0.05	0.26*
Second quintile	0.01	0.07
Third quintile	0.01	0.12
Fourth quintile	-0.06	-0.04
Fifth quintile (low disadvantage)	Referent	Referent
Unknown	0.02	0.08
Constant	2.75	0.68
SEE	0.90	1.10
R <sup>2</sup>	0.06	0.24

Source: 1998–1999 Household Expenditure Survey, Australian Bureau of Statistics (ABS). Results are adjusted for the number of persons aged  $\geq 15$ , number of men aged  $\geq 18$  and age of head of household. \* $p < 0.05$ , two tailed test. \*\* $p < 0.01$ , two tailed test.

confirming the association of lower SES with percentage of household expenditure spent on tobacco.

## DISCUSSION

This was the first study to examine the association of several household SES indicators with tobacco expenditure. Consistent with previous findings at the individual level of analysis, I found that lower household education and occupational status, unemployment, rented housing, and living in disadvantaged areas were associated with a higher probability of reporting tobacco expenditure.<sup>6 16 17</sup> Income was not associated with the probability of tobacco expenditure. While a greater proportion of lower income persons smoke,<sup>6</sup> the proportion of households in which someone smokes is not higher for lower income households. This means that among households that do have a smoker, more of the household members in lower than higher income groups smoke. This may be attributable to weaker antismoking norms among lower income groups, which would mean that they model smoking behaviour more readily.

It was shown that, among smoking households, lower education and occupational status were associated with higher tobacco expenditure, after controlling for income and household composition. It was not surprising to find that

### Key point

- Lower SES is associated with higher odds of reporting tobacco expenditure. Among smoking households, lower SES households spent more of their household funds on tobacco.

expenditure on tobacco as a proportion of total household expenditure was higher among lower income households. However, it is noteworthy that lower education level, occupational status, living in rented housing, or in disadvantaged areas were associated with higher tobacco expenditure as a percentage of household expenditure. The social gradient in tobacco expenditure suggests that lower SES groups consume more cigarettes and thus are more addicted to nicotine. This is consistent with previous research that showed an association of deprivation (manual occupational class, rented housing, no car, unemployed, and living in crowded housing) with higher levels of cotinine among smokers in the UK, even after controlling for the number of cigarettes smoked per day.<sup>7</sup> It also is in keeping with the finding that there is an educational gradient in serum thiocyanate (a biomarker for exposure to tobacco smoke).<sup>18</sup> The fact that lower SES smokers are more addicted suggests that it is harder for them to quit and that antismoking interventions may be less effective for them.<sup>18</sup> This interpretation, however, is not entirely supported in the Australian context. While a paper under preparation shows that the SES gap in smoking prevalence has been widening significantly in the past two decades in Australia, another study showed that there was no change in SES variation in smoking prevalence after a successful national tobacco campaign.<sup>19</sup>

The finding that lower SES households spend more of their household funds on tobacco means that they have less money available for other products. Thus, quitting or cutting down smoking results in increased household funds, provides opportunities for expenditure on other products or services, and may improve standards of living. In fact non-smoking households are shown to be more likely to report expenditure on fruit/vegetables, eating out at restaurants, and insurance (health, life, house/content and non-compulsory motor vehicle).<sup>20</sup> Similarly, as mentioned above, spending less on tobacco is associated with a decreased chance of experiencing financial stress.<sup>2</sup> Thus, effective antismoking interventions for lower SES groups can potentially enhance social equality. They also can ameliorate social inequalities in health, given that much of the ubiquitous SES differentials in morbidity and mortality are attributed to the marked SES gradient in smoking.<sup>21</sup>

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### Policy implications

- Effective antismoking interventions for lower SES groups can potentially increase social equality. They also can ameliorate social inequalities in health, given that much of the ubiquitous SES differentials in morbidity and mortality are attributed to the marked SES gradient in smoking.

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