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National Tobacco Control Policies: Do They Have a Differential Social Impact?

Project Final Report



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IMPORTANT NOTES

The use of the term SES (socioeconomic status) within the analysis section implies that the result is found for both measures of SES (household income and education level).

Both education level (EDUC_CAT) and household income are grouped into three categories as below

Household income is considered low if under £15,000, moderate if between £15,000 and £30,000 and high if above £30,000.

Education level is considered low if the respondent's highest attainment is school or vocational qualifications, moderate if the respondent has some college or some university qualification (eg. completed only the first year of a university degree) and high if the respondent has a university degree or postgraduate qualification.

This study uses data from the ITC four country project and the term ITC survey generally refers to this particular ITC project.

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Section 2.2.2 is partly taken from Thomson et al. (2006).

PREFACE

WHAT THIS STUDY ADDS TO KNOWLEDGE?

This report discusses the impact that changes in UK tobacco control policies (between 2002 and 2005) have had on smokers, and – for the first time – how, if at all, this impact varies by socioeconomic status (SES). Three policy changes were examined: enlarged warning labels; the ban on tobacco advertising and promotions; and the elimination of light and mild product descriptors. The latter has not received much previous research attention.

Data from the International Tobacco Control Policy Evaluation Project (ITC project) were used to explore differences across four time periods between 2002 and 2005, before and after policy changes were enacted.

In line with previous research, our results show that the European Union's enlargement of warning labels has led to increased awareness and processing of warning messages by smokers. Similarly, the UK's advertising and promotions ban has led to substantial reductions in tobacco marketing awareness by smokers. On the other hand, the elimination of light/mild descriptors in the UK has been less successful. It has had little perceptible influence on smokers' beliefs about light/mild cigarettes, and the findings show that smokers continue to use other cues - such as the colouring of packets - as surrogates for light/mild labelling to determine the type of cigarettes they are purchasing.

Finally, the key aim of this study was to examine whether or not the policies had a differential effect across socioeconomic status. It is clear from the analyses that, whilst minor variations were apparent, and some of these even reached statistical significance, no consistent or important differences emerged. The policies are, to all intents and purposes, having an equivalent impact across the social scale.

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EXECUTIVE SUMMARY

Decreasing smoking prevalence by encouraging smokers to quit and discouraging smoking uptake is a major policy issue for many countries across the world. The Framework Convention on Tobacco Control (FCTC) has heightened the need for policy changes to meet minimal standards of tobacco control policy. Researchers are now developing an evidence base for the FCTC recommendations and one major international study set up to focus on this task is the International Tobacco Control Policy Evaluation Project (ITC project). This analysis uses the ITC four country study, which is taking place in the United Kingdom, Canada, United States and Australia. It employs a natural experimental design and is following a cohort of 2,000 smokers in each country.

This analysis extends the ITC four country study's work by looking at the impact policy changes may be having across socioeconomic status (SES). Three major policy changes took place in the UK during the course of the study: enlarged warning labels; the ban on tobacco advertising and promotion; and the elimination of light and mild product descriptors. All three were examined.

Four waves of ITC data were included in the analysis to provide a longitudinal assessment of each policy with a random sample of smokers. Telephone interviews were used to assess response to the policies, as well as smoking knowledge, attitudes and behaviour. The data were analysed using generalized linear modelling (GLM) and latent growth curve analysis. SES measures focused on household income and education level.

These analyses show that the enhanced warning labels have led to increased awareness and processing of warning messages by smokers and that the advertising and promotions ban has driven substantial reductions in tobacco marketing awareness by smokers. On the other hand, the elimination of light/mild descriptors has been less successful. It has had little perceptible influence on smokers' beliefs about the harmfulness of light/mild cigarettes, and the findings show that smokers continue to use other cues - such as the colouring of packets - as surrogates for light/mild labelling to determine the type of cigarettes they are purchasing.

The key aim of this study was to examine whether or not the policies had a differential effect across socioeconomic status. It is clear from the analyses that, whilst minor variations were apparent, and some of these even reached statistical significance, no consistent or important differences emerged. The policies are, to all intents and purposes, having an equivalent impact across the social scale.

Some limitations are noted, these being associated with the methods of analysis. Using two methods of analysis and two measures of SES means that some inconsistencies will be found. However, where results are the same, stronger evidence for the findings are found. Therefore, this report weighs up the evidence of the different methods of analysis when drawing conclusions.

1.0 INTRODUCTION

1.1 Smoking: A Global Health Problem

All over the world smoking is considered to be a major health and social issue. Taking up smoking is one of the most negative lifestyle choices that an individual can make as 50% of lifelong smokers die due to their habitⁱ. Smokers on average live 14 years less than non-smokers and also tend to have more health complications which lead to deathⁱⁱ. Smoking is thought to be the cause of 30% of cancer deaths in developed countries, such as the UKⁱⁱⁱ which highlights the serious effect of smoking on one's health. Annually, around the world, five million people die of smoking related diseases. By 2020 this figure is expected to rise to ten million people per year^{iv}. Many disabilities can also be caused by smoking, for instance smoking is known to cause blindness^v. Given this background it is important for governments to try to persuade smokers to engage in smoking cessation and for society as a whole to be aware of the risks of smoking. It is known that most smokers wish that they had not started smoking and that around 70% of smokers would like to give up^{vi}. Effective policies can firstly help and support smokers wishing to give up; secondly, protect non-smokers from the damaging effects of second-hand smoke which causes around 10,000 deaths annually in the United Kingdom (UK)^{vii}; and thirdly, prevent adolescents from starting smoking.

In order to help address the tobacco epidemic, the World Health Organization (WHO) has led the formation of the first public health treaty called the Framework Convention on Tobacco Control (FCTC)^{viii}. The FCTC sets out a range of minimum standards on tobacco policies which governments should adhere to. These policies cover many areas including warning labels, advertising restrictions and smoking in public places. Currently 168 countries have signed the treaty with 138 countries having ratified it.

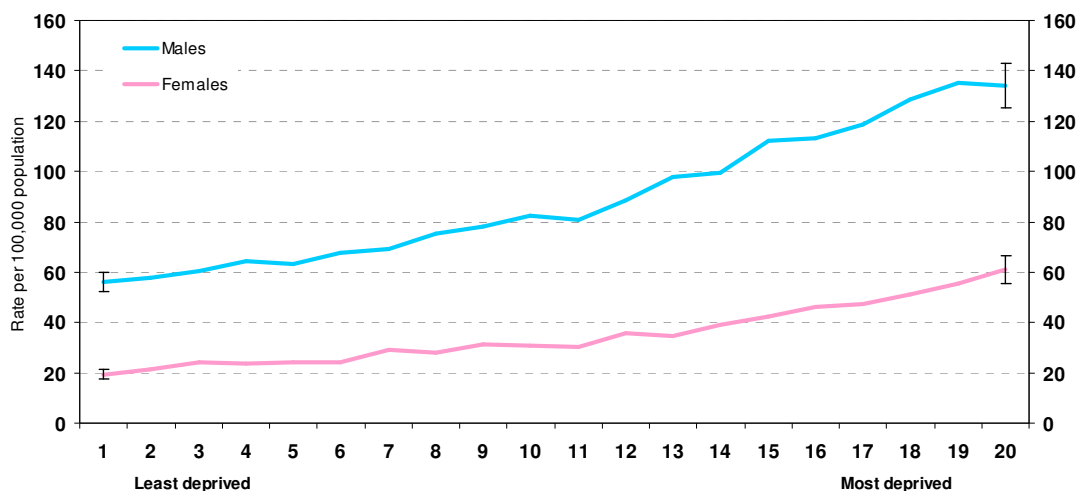
The research community is now beginning to explore the impact of the FCTC on smokers by studying the effects of policy changes before and after new regulations are introduced. One major project exploring policy effectiveness as well as providing an evidence base for the FCTC is the International Tobacco Control Policy Evaluation Project (ITC project). This is exploring the effect of FCTC policy changes on smokers across 15^{ix} countries. Recent findings from the study have been published in a special supplement of the journal Tobacco Control^x, and overall it concluded that the FTCT policies are having an impact on smokers. The majority of the findings published to date have focused on the full sample of smokers and have neglected the possible differences attributable to socioeconomic status in the effectiveness of the FCTC policies which have been introduced. This current study attempts to fill this research gap and explores the effectiveness of UK policy changes over the period of data collection (2002 to 2005) across different socioeconomic groups. The next section explores previous research on smoking and health inequalities.

1.2 Smoking and Health Inequalities

For the purposes of this report socioeconomic status (SES) refers to an individual's higher or lower place in the social hierarchy or social stratification system (cf. Klontoff et al. 1994). SES has been reported by many researchers to be strongly associated with smoking behaviour (eg. Jarvis and Wardle 1999, Siahpush 2003, Shohaimi et al. 2003). Researchers have also found that social inequalities in smoking prevalence have been widening in the past few decades in many western societies such as the UK, Spain and the United States (Jarvis and

Wardle 1999, Fernandez et al. 2001, Nelson et al. 1994). Findings also show the effect of deprivation on cancer incidence, as is shown in **Figure 1.1**. This chart clearly shows the strong association between lung cancer incidence and deprivation using the Carstairs index of deprivation. Presently in the UK, 26% of males and 23% of females are smokers^{xi}. These figures are higher for lower SES groups as can be seen in **Table 1.1** and further highlight the inequality of smoking. Overall these statistics highlight the need to explore SES differences. Many researchers have explored this issue, but some authors note the lack of policy-related SES study (Graham and Kelly 2004) which this research aims to address.

Figure 1.1 Lung cancer age standardised incidence by deprivation category, England and Wales, 1993



(Adapted from <http://info.cancerresearchuk.org/cancerstats/types/lung/incidence/>)

Table 1.1: Prevalence of cigarette smoking by socio-economic classification based on current or last job of the household reference person. Persons aged 16 and over. Great Britain: 2003 (%)

| | Large Employers & Higher managerial | Higher professional | Lower managerial & professional | Inter-mediate | Small employers /own account | Lower supervisory and technical | Semi-routine | Routine |
|-------|-------------------------------------|---------------------|---------------------------------|---------------|------------------------------|---------------------------------|--------------|---------|
| Men | 19 | 16 | 22 | 26 | 25 | 30 | 34 | 33 |
| Women | 13 | 11 | 20 | 22 | 20 | 26 | 30 | 33 |

(Adapted from <http://www.ash.org.uk/>)

SES may also be related to other demographic factors. Jefferis et al. (2004) comment that “smoking is strongly patterned by age and social position” (p13) therefore it may also be appropriate to explore the interaction between age and SES. Richards et al. (2003) found that heavy smoking is associated with cognitive impairment and decline in mid-life. This is an important finding as research by Argo and Main (2004) also found that warning labels are less effective for older populations. This further highlights possible associations between age and SES as well as heaviness of smoking.

In a separate stream of research exploiting the types of measures of SES, Huisman et al. (2005) found that different SES measures (education and income) are more or less related to smoking depending on country, age and gender. This highlights the need to use more than one indicator of SES and furthermore to explore both gender and age interactions with SES

measures. Findings from Huisman et al.'s study in general revealed that, across the EU, education remained related to smoking for both genders but that income related only to smoking among males.

Recent findings from ITC studies exploring SES differences have found that knowledge of the health risks of smoking is highest among smokers with higher education and income levels (Siahpush et al. 2006a) and that lower levels of education were associated with higher nicotine dependence (cf. Siahpush et al. 2006b) . Lower income smokers also had less intention to quit than those with a high income.

In conclusion, these research findings highlight the need to explore the possibility of differential impacts of tobacco control policies across SES groups. These results also indicate that SES may interact with other demographic factors such as gender, age and heaviness of smoking, thus underlining the need to explore a combination of SES effects. The next section will outline policy changes that occurred during the study period for the UK and the other three countries (United States, Canada, and Australia) for comparison purposes.

1.3 Smoking: The Policy Environment


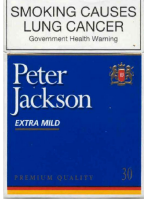
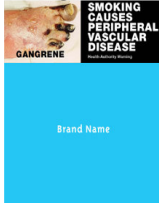


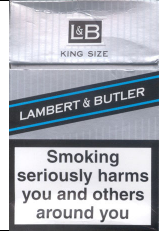
Since 2002, three main tobacco policy changes have taken place in the UK, these being the introduction of larger warning labels, the advertising and promotions ban and the ban on the use of the terms “light” and “mild” to describe cigarettes. These areas will be the focus of this report.

1.3.1 Warning Labels Enlargement

Warning labels are a very cost effective way of increasing smokers' awareness and knowledge about the harmful nature of tobacco. Smokers are exposed to the warnings at both the point of purchase and the point of use, giving rise to a regular reinforcement of the negative aspects of smoking. Given that communicating the harmful nature of tobacco remains a key tobacco control policy for many governments, warning labels provide a possible effective strategy. Research findings suggest that smokers do regard warning labels as a means of obtaining health information and further suggest that warning labels have increased smokers' awareness of the risks of smoking (Hammond et al. 2006)).

The FCTC recommends under article 11 that warning labels should be 50% or more of the principal display areas but shall be no less than 30% and they may be in the form of or include pictures or pictograms. Findings of the ITC project (Hammond et al. 2006) suggest that increasing the size of the warning label makes the warning message more salient and noticeable. Larger warnings also increase content specific knowledge and the likelihood that the smoker will think about quitting and actually quit. Results also suggest that graphic warnings, such as those in Canada, are preferable over textual warnings. **Table 1.2** provides details of the policies across the four countries.

Table 1.2: Warning label policies across the four countries before and during the study

| Country | Policy in 2002 and details of any change | Example pre 2002 | Example post 2002 |
|----------------------|--|---|--|
| Canada | Pictorial warning labels were introduced in 2001 in Canada. Sixteen warning labels are rotated and cover 50% of the pack face. |  | No change 2002-2005 |
| Australia | The Australian policy was introduced in 1995 and consists of six warnings which cover over 25% of the front and 33% of the back of the pack. The labels are in black and white. Note: In March 2006 pictorial warnings covering 30% of the front and 90% of back were introduced. As is shown in the picture. |  | No change 2002-2005  |
| United States | The 1984 US policy consists of four rotated warnings on the side of the pack covering around 5% of the total pack surface space. |  | No change 2002-2005 |
| UK | The 1992 UK warning label policy consisted of six warnings covering 6% of the face of the pack with warnings written in black. The new EU policy was introduced in the UK in January 2003 and required 30% of the front of the pack to contain one of two messages with 40% of the back containing one of 14 rotating warnings. |  |  |

1.3.2 Advertising and Marketing Restrictions

Although tobacco advertising on television has been banned in most countries since the 1960's, other forms of tobacco promotion have been allowed to continue. These forms of promotion include billboard, magazine and newspaper advertising as well as direct mail, price promotions, coupon schemes and sports and arts sponsorship. Indeed, even although international sponsorship is banned within the UK, cross border advertising is currently still a problem. Formula 1 motor racing in countries such as Malaysia still allow tobacco advertising which can be seen on UK terrestrial television. Research findings support the requirement for comprehensive advertising and promotion bans. Indeed Saffer and Chaloupka (2000) found that only comprehensive tobacco advertising bans are effective as tobacco companies simply switched to other forms of promotion if limited bans were introduced. Evidence does suggest that advertising increases tobacco consumption and thus comprehensive bans are justified (Andrews and Franke 1991). The FCTC also calls for comprehensive bans under article 13.

The UK ban was introduced in stages as detailed below:

- Main advertising ban – 14th February 2003 (end of most “conventional” advertising such as billboards, magazines/newspapers, direct mail and internet).
- Promotions – 14th May 2003 (end to coupon schemes).
- Domestic sponsorship – 30th July 2003.
- Point of sale – 21st December 2004 (end of large advertising and new rule to allow only one A5 sized advert in retail outlets).
- Brandsharing – 31st July 2005 (use of brand name for other products is banned unless significantly different).
- International sponsorship – 31st July 2005.

Similar bans have been in place in Canada since 1997 and Australia since 1992. **Table 1.3** gives a summary across the four countries.

Table 1.3: Advertising and marketing restrictions across the four countries over the study period

| | | CA | US | AU | UK | | | |
|--------------------|------------------|----|----|----|------|------|------|------|
| | | | | | 2002 | 2003 | 2004 | 2005 |
| Advertising | TV | ● | ● | ● | ● | ● | ● | ● |
| | Radio | ● | ● | ● | ○ | ● | ● | ● |
| | Movie | ○ | - | ● | ● | ● | ● | ● |
| | Billboards | ● | ● | ● | ○ | ● | ● | ● |
| | Newspapers/mags | ○ | - | ● | - | ● | ● | ● |
| | Store | ● | ○ | ○ | - | - | ○ | ○ |
| Sponsorship | Sports | - | ○ | ○ | - | - | ○ | ● |
| | Arts | - | ○ | ○ | - | - | ○ | ● |
| Promotions | Free samples | ● | ○ | ○ | - | ● | ● | ● |
| | Special price | - | ○ | - | - | ● | ● | ● |
| | Gift/discount | ● | ○ | ○ | - | ● | ● | ● |
| | E-mail | ○ | - | ● | - | ● | - | ● |
| | Mobile phone | ○ | - | ● | - | ● | ● | ● |
| | Direct mail | ○ | - | ○ | - | ○ | ○ | ○ |
| | Branded clothing | ○ | ● | ● | - | - | - | ● |
| | Competitions | ○ | - | ● | - | ● | ● | ● |
| | Internet sites | - | - | ● | ○ | ● | ● | ● |
| | Leaflets | ○ | - | ● | - | ● | ● | ● |
| | Signs | ○ | - | ● | - | - | ○ | ○ |

(● = complete ban , ○ = partial ban, - = no ban)

(Adapted but extended from Harris et al. 2006)

1.3.3 Mild / Light Descriptors Ban

The UK and Australia have banned the use of the terms “light” and “mild” during the course of the study. The UK ban was part of the wider EU warning labels legislation and was implemented in September 2003 while Australia implemented a ban during late 2005 and early 2006. The FCTC under article 11, also calls for the removal of these misleading terms. Canada is also due to implement a ban soon. Although these terms are banned in the UK other terms have been used by tobacco companies in their place (eg. Marlboro light became Marlboro gold) and packet colour coding has remained the same.

The next section discusses the ITC project in detail.

2.0 THE INTERNATIONAL TOBACCO POLICY EVALUATION PROJECT - BACKGROUND, DESIGN AND METHODS

2.1 Background

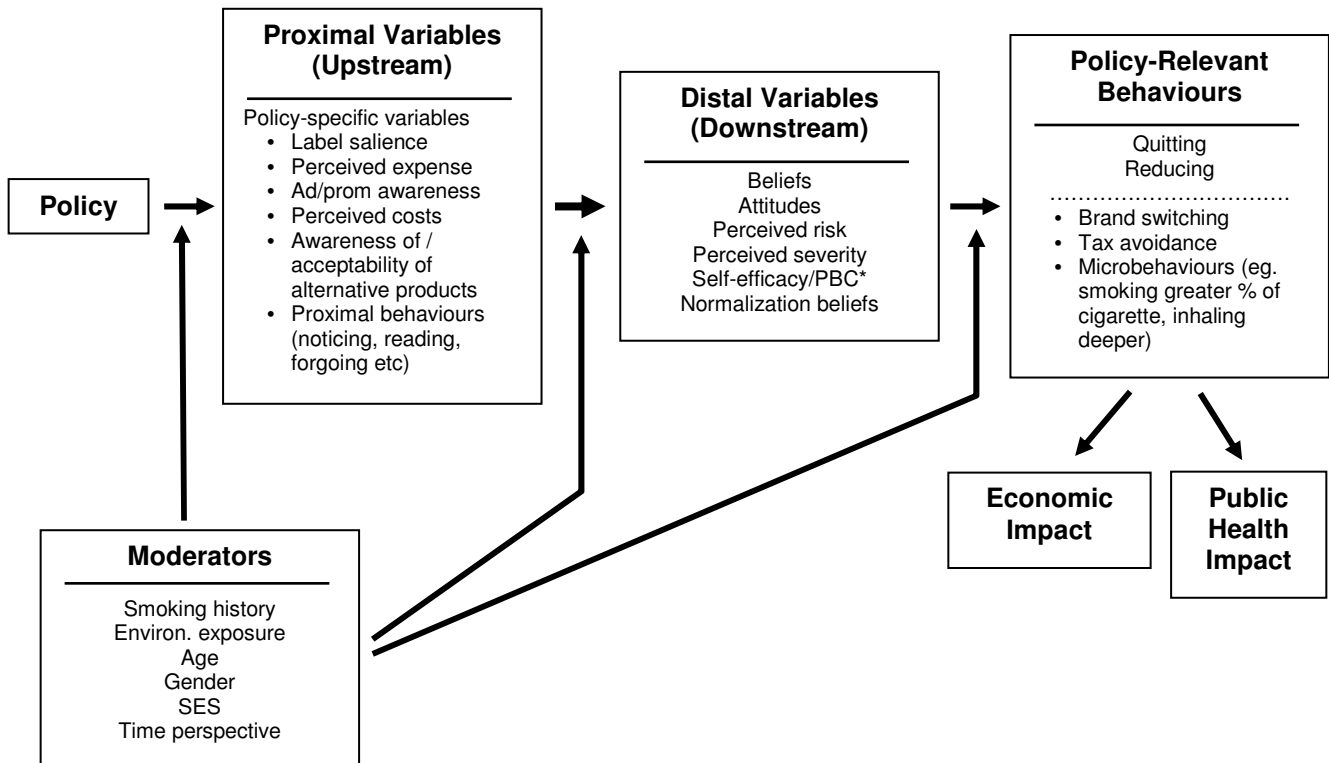
The overarching aim of the ITC collaboration is to evaluate the psychosocial and behavioural effects of nation-level tobacco control policies throughout the world. The study started in 2002 capturing views from 2,000 smokers in each of the United Kingdom, Australia, Canada and the United States. These countries were chosen as it was considered likely that policy changes would be introduced through the FCTC. Funding allows a cohort study whereby individuals are followed-up annually until 2009, thus giving 8 waves of data.

The survey is based on a conceptual model, which can be seen in **Figure 2.1**. This model builds on the principal that each policy will have an influence on behaviour through a sequence of psychological events. The policy is expected to have an initial effect on proximal variables which are the closest measures of the effects of the policy. These proximal variables affect more distal variables such as attitudes which mediate the relationship on behavioural variables. Variables such as SES are hypothesized to be moderators and may moderate the relationships found at any stage along the causal sequence. This causal chain model is a general model which can be applied to the ITC project data as a whole, and from this overarching model specific policy relevant models can be derived which focus on single or multiple policies. Since the proximal variables provide the best indicators of the success of the policy, this report has concentrated on these measures. Nevertheless, some distal variables have also been utilized to assess belief or cognitive changes as a result of changes in policies.

The ITC survey can be used to evaluate the effectiveness of the FCTC as implemented in the ITC countries. Specifically, the ITC survey can be used to evaluate changes in packaging and labelling (FCTC article 11); this covers both enlarged warning labels and branding cues. The survey also covers restrictions or bans on advertising, promotion and sponsorship (FCTC article 13); protection from environmental tobacco smoking (FCTC article 8); price and taxation issues (FCTC article 6); cessation and dependence (FCTC article 14); and finally some aspects of education, communication, training and public awareness of the dangers of tobacco use (FCTC article 12).

In addition to exploring the effects of national policies, regional level differences can also be explored if sample sizes are adequate. This is particularly useful in Canada and the United States where taxation and environmental smoking restrictions are considered sub-national issues.

Figure 2.1: Conceptual model for effects of tobacco control policies



* Perceived behavioural control

Source: Fong et al. (2006)

The main findings of the ITC project have recently been published in a special supplement of the journal *Tobacco Control*^{xii} and can be accessed freely from http://arts.uwaterloo.ca/~itc/Research_Products/publications.htm. A summary of the findings of the ITC project is given in **Table 2.1**. These findings are based on results of the Wave 1 and Wave 2 surveys.

Table 2.1: Summary of findings from the ITC Four Country Survey

| Policy | Findings |
|--------------------------------|--|
| Warning labels | Increasing warning label size makes the warning more salient and noticeable for smokers; increases content specific knowledge; and increases the likelihood that smokers think about quitting smoking and quit smoking. Graphic warning labels appear to have a greater impact than text only labels. |
| Smoke-free | Compliance with comprehensive smoke-free legislation can be achieved when accompanied by pre-implementation campaigns. Comprehensive smoking bans do not cause smokers to shift their smoking behaviour to their homes; instead bans in public places promote voluntary establishment of smoking bans at home. Smoking bans promote quitting behaviour and help smokers to remain abstinent following a quit attempt. |
| Marketing | UK's comprehensive advertising ban significantly reduced smokers' exposure to pro-tobacco marketing and messages. Introducing controls on labelling reduced smokers' misperceptions of light and mild cigarettes. |
| Product regulation | The level of tobacco-specific nitrosamines (a potent carcinogen) found in the smoke of leading cigarette brands varied widely across countries. Setting minimum toxin cigarette yields using standard ISO testing is ineffective because tobacco companies respond by increasing filter ventilation, a design change for which smokers compensate by increasing their puff volume. |
| Tax and price | Tax avoidance varies considerably across countries and is more frequent among younger, non-white, male, higher income smokers who smoke more cigarettes per day. The increasing prevalence of roll-your-own cigarettes is also a response to higher cigarette prices. The use of a low and untaxed source of cigarettes is associated with a lower likelihood of quitting smoking. |
| Psychosocial predictors | Lower socioeconomic status (SES) is associated with lower awareness of the harms of smoking and greater misunderstanding about nicotine. In each of the four countries lower SES was associated with higher levels of nicotine dependence and self-efficacy for quitting. Intention to quit and negative attitudes about smoking are important predictors of making a quit attempt, but degree of nicotine dependence is the main factor that predicts cessation among those who have made a quit attempt. |

(Adapted from Fong et al. 2006)

2.2 Design and Method

2.2.1 Natural Experimentation

Since it is not possible to conduct randomized control trials to evaluate the impact of national level policies, natural experimentation is used. Natural experimentation is not commonly used in public health research but some researchers are calling for its increased use (Petticrew et al. 2005) as the evidence base for public health interventions is weak. Natural experimentation is commonly used for observational studies where it is not possible for the researcher to use a control group. In the case of the ITC four country survey methodology, countries act as control groups. This helps to determine if the trend in the data is caused by the policy change or simply because public views are changing. One of the benefits of this methodology is that it is possible to explore the effect of multiple policy changes as each policy area is measured at each time point. Having multiple countries with different policies also allows the evaluation of how different policies work and potentially provides evidence of which policies work best.

2.2.2 Timeframe and Sample

Since Wave 4, the ITC survey is being conducted annually from August to December. The first two waves of the study were specifically timed to be able to capture changes taking place in the UK. Wave 1 was collected between October and December 2002 (prior to any policy changes taking place), while Wave 2 was collected approximately six months later between

May and August 2003. Wave 3 was collected approximately one year later, between June and December 2004. Finally, Wave 4 was collected between September and December 2005.

The sample at the recruitment stage consisted of adult smokers over 18 years of age who had smoked at least 100 cigarettes in their lifetime and had smoked at least once in the last 30 days. The sample size was set at 2,000 as this allowed for attrition in the cohort as well as allowing the possibility of detecting changes in national proportions with high statistical power. At Wave 1, within each country, the population was stratified into several geographic regions. The number of strata assumed for weighting purposes ranged from 12 in the United States and the UK to 14 in Canada and Australia. Quotas were assigned for the numbers of respondents in each of the strata, in order to ensure representation proportional to a measure of regional population size. Eligible households were then randomly selected, using random-digit dialling (RDD) methods, until the within stratum quotas were met. A household was deemed to be eligible if it contained at least one eligible smoker. In households with multiple eligible smokers, the Next Birthday Method was used to select a single respondent. No substitution within the household was permitted, except where it was known that the selected respondent would be absent for the entire fieldwork procedure. In three of the countries (Canada, the United States and the UK) samples have been generated by Survey Sampling International (SSI) using their RDD B list assisted methodology. In Australia, a comparable sampling frame was developed especially for the project. Smokers who have subsequently quit have been retained in the sample because their responses as quitters to many of the questions are of interest. Furthermore, retaining former smokers allows observation of any transitions to other types of tobacco products, relapses back to smoking and subsequent efforts to stop smoking among those who do relapse.

In order to ensure that the number of completed surveys at each wave is at least 2,000 per country, respondents lost to attrition have been replaced. Replenishments have been carried out using the same sampling design and calling protocol as in Wave 1 recruitment. Any given replenishment sample is thus representative of the population at the time of data collection for the new wave to which they correspond, rather than those lost to follow-up. As the survey proceeds, data from continuing and replenishing respondents can be examined and compared to assess the influence of “time-in-sample” on the outcome variables. For example, it is possible to examine the extent to which the replenishing respondents behave differently from their counterparts recruited at earlier waves, and the extent to which continuing respondents are still a representative sample of the population of smokers. Panel attrition at each wave can be modelled as depending on age, gender, education and other factors, including health status and smoking cessation intentions at previous wave(s).

Each respondent was given a small incentive for taking part, equating to about £7 per telephone call. In the UK, the incentive was a £7 Boots voucher as well as a “thank you” letter naming the research institution and giving contact details. The initial recruitment call lasted about ten minutes and the main survey calls last about 40 minutes on average. The “thank you” letter and voucher are sent approximately a week before individuals are called back (for each main survey wave). Further details of the ITC methodology are provided in Thompson et al. (2006).

2.2.3 Questionnaire

The Wave 1 questionnaires can be found in Appendix 1. Given that the ITC questionnaire extends to some 38 pages, it is not constructive to give details of all the questions asked in this section. Nevertheless it is possible to outline overall themes covered. Specific details of the questions used in the analysis will be given in the results section.

The survey's introductory script gives details about the project and ensures that the correct respondent is on the telephone. The first main set of questions covers smoking behaviour, including amount smoked, how they smoke and any quit attempts made since the last survey. The second set of questions covers knowledge of the constituents and health effects of tobacco. The first policy to be explored is that of warning labels, the next, awareness of tobacco advertising and promotion activities. Sources of purchase of tobacco products are covered in the next section, which also deals with the quantity of and where the respondent buys cigarettes. This is one of the longest sections within the questionnaire. A short section on beliefs about light and mild cigarettes follows, before a section on alternative nicotine delivery products which mainly assesses the use of smokeless tobacco products. This section then feeds into discussing nicotine replacement therapy use and general cessation activities such as the use of quit lines. The final policy area relates to smoking restrictions, covering policy restrictions in the area where they live as well as personal choices, such as rules about smoking at home and in their car. The penultimate sections cover general beliefs about smoking, tobacco companies/industry, as well as quitting, perceived risk and health worries. Demographics are covered at the end of the survey.

2.2.4 Response Rates and Sample Sizes

Table 2.2 provides details of the sample sizes obtained for each wave including details of the additional replenishment sample sizes. **Table 2.3** and **Table 2.4** provide further details of completion and agreement rates which are explained below.

Agreement rate is defined as the percentage of target smokers (that is, those who are known to satisfy the inclusion criteria and who the survey interviewer actually speaks to) who agree to be in the survey.

Completion rate is the percentage of those target smokers who agreed to be in the survey who actually completed the survey (most often this survey is conducted one week after the initial recruitment call).

Table 2.2: Total sample sizes across the waves for each country

| | Canada | United States | United Kingdom | Australia | Total * |
|---------------|----------------------|----------------------|----------------------|----------------------|------------------------|
| Target | 2,000 | 2,000 | 2,000 | 2,000 | 8,000 |
| Actual Wave 1 | 2,207 | 2,138 | 2,400 | 2,303 | 9,048 |
| Actual Wave 2 | 2,189 (1,672+517) | 2,025 (1,341+684) | 2,121 (1,865+256) | 2,135 (1,876+259) | 8,470 (6,754+1,716) |
| Actual Wave 3 | 2,106 (1,563+543) | 2,088 (1,199+889) | 2,080 (1,494+586) | 2,103 (1,571+532) | 8,377 (5,827+2,550) |
| Actual Wave 4 | 2,029 (1,510+519) | 2,005 (1,263+742) | 2,045 (1,542+503) | 2,031 (1,669+362) | 8,110 (5,984+2,126) |

* The Wave 2, 3 and 4 Total comprises two groups: the first figure = continuing cohort respondents (those respondents who completed a survey at the previous Wave), and the second figure = replenishment respondents (those respondents newly recruited at each Wave to replace respondents lost to attrition since the previous Wave; the same sampling frame was used to recruit these replenishment respondents).

Table 2.3: Agreement and completion rates for Wave 1

| | Canada | United States | United Kingdom | Australia |
|-----------------|---------------|----------------------|-----------------------|------------------|
| Agreement Rate | 78.5% | 77.0% | 78.7% | 78.8% |
| Completion Rate | 87.5% | 84.6% | 87.9% | 89.8% |

Table 2.4: Retention rates for Waves 2, 3 and 4

| | Canada | United States | United Kingdom | Australia | TOTAL |
|--------|---------------|----------------------|-----------------------|------------------|--------------|
| Wave 2 | 75.8% | 62.7% | 77.7% | 81.5% | 74.6% |
| Wave 3 | 71.2% | 59.1% | 70.5% | 73.6% | 68.7% |
| Wave 4 | 71.6% | 60.5% | 74.1% | 79.4% | 71.4% |

The next section will discuss specific methodological considerations pertinent to the current project.

3.0 PROJECT METHODOLOGY

This chapter discusses the analytical methods employed to analyse the data and the measures of SES used as well as providing the sample profile. The chapter begins with a discussion of the assumptions and data processing decisions made.

3.1 Sample Details

A number of participants were excluded from the analysis ($n = 305$). Only smokers who had not changed education or income level throughout the four waves of data were used, as this simplified the analysis and conclusions on SES differences and ensured that those in each SES group were consistent across the waves. In addition, in order to adequately explore the impact of the policy on individuals, only those who had completed all four waves of data were included.

It should also be noted that this report is mainly based on the data provided by the UK respondents, however some results from other countries are included for comparison. These results from the other countries apply to the full sample of individuals from the four waves and are not broken down into SES groups.

Finally it should be noted that there were insufficient non-white respondents in the sample to enable separate analysis by ethnicity.

3.2 Analytical Methods

Several methods have been employed to analyse the data provided in this report. Chi-square tests have been used to explore single wave differences in SES for categorical data. These tests have been employed with questions which have been introduced for a single wave, such as those introduced in Wave 4 to explore packaging cues used by smokers. The main method employed in this report is generalized linear modelling (GLM) which is a common method employed to explore longitudinal effects by ITC researchers (Thomson et al. 2006). In addition, structural equation modelling (SEM) techniques have been employed through the use of latent growth modelling. This technique has been used for some policies such as the advertising ban and warning labels enlargement where decreasing or increasing trends are expected. Details of these more complicated statistical methods are given below.

3.2.1 Generalized Linear Modelling

Generalized linear modelling (GLM) is a technique which is used for exploring repeated measures captured at different time points with the same sample of respondents. The technique can be considered to be an extension of multiple regression. However, the technique focuses on exploring one dependent variable over time and can account for both within-subjects and between-subjects variations. Covariates such as SES can also be included in the model and interaction terms can also be specified and examined. For this study, interactions between the wave and SES, as well as SES and gender, age and heaviness of smoking index (HSI), were also included. This allowed an in-depth investigation into factors which interact with SES.

The limitations of this method are that usually only one variable can be explored at a time and so modelling how items relate to each other is not standard practice with this technique. This limitation can be overcome by the use of SEM and, in particular for longitudinal research, the use of latent growth curve modelling. However, to keep results consistent across methods similar analyses are undertaken which focus on one variable at a time.

3.2.2 Structural Equation Modelling

Structural equation modelling (SEM) is an analytical tool which has gained widespread credibility resulting in substantial usage in many disciplines (Hershberger 2003), particularly within the social sciences. “SEM is a comprehensive statistical approach to testing hypotheses about relations among observed and latent variables” (Hoyle 1995, p1), eg. between questionnaire items and concepts such as ‘healthy’. Observed variables (also referred to as indicator or measured variables) are variables that can be directly measured whereas latent variables (often referred to as constructs) are concepts which can not be measured directly. SEM appraises theoretical or hypothesised models which link latent and observed variables, and provides the researcher with a statement of the ‘goodness-of-fit’ for each model with regard to the data collected. This allows the researcher to make a judgement on the performance of a model via a range of fit measures and indices. Crucially, SEM allows researchers the freedom to specify statistical models that they believe represent closely the true underlying theoretical model which requires assessment. Another feature of SEM is its ability to assess simultaneously correlational relationships and structural relationships specified in a model. Structural relationships are assumed to be of a causal nature where one variable (observed or latent) impacts another. This is often termed a directional relationship whereas correlational relationships are considered to be non-directional. Furthermore, SEM allows the specific modelling and assessment of measurement errors associated with measured variables to take account of the reality in data capture, particularly for the social sciences.

3.2.3 Latent Growth Curve Modelling

Latent growth curve modelling (LGCM) is a technique which is an extension of SEM. This technique has been developed as a versatile tool for studying longitudinal change. This is a relatively new method of analysis developed during the 1980’s (Bryk and Raudenbush 1987, Rogosa et al. 1982). This method requires repeated measures of the same variable at multiple time points for the same individual. This variable is modelled using both the initial status (intercept) and the rate of change (slope or trend). The slope can be modelled as linear, quadratic or customised to the actual rather than expected values. The model also allows for association between the intercept and the slope; this gives an indication of the nature of the relationship between the two aspects of change. Factors such as gender and SES can be included in the model. These additional constructs or variables can then be hypothesised to predict changes in the intercept or slope. This method has been employed with SES in the latent growth curve models analysed. Other variables can be included in the model and relationships between the intercepts and slopes tested. For example one may explore if noticing warning labels has an impact on reading warning labels over time. The method works best with a number of waves of data, as the trend in the data can be modelled more

accurately. The trends modelled can be both increasing, as in the case of noticing warning labels, and decreasing, as in the case of noticing tobacco promotion.

3.3 Measures of SES

There are many ways in which SES can be measured, these measures are generally categorised into three main categories: individual, household and neighbourhood (Krieger et al. 1997). **Table 3.1** provides examples of these types of measures. Several potential indicators of SES are included in the ITC dataset, these consist of education level, household income, working status, number of telephones for personal use and for the UK postcode data is available. A related indicator of SES that is also captured, namely smoking induced deprivation, asks respondents if they have spent money on cigarettes which they should have used for other household necessities such as bills. Some researchers advocate that occupation is the best measure of SES (Powers 1981), and traditional approaches commonly use measures of occupation, income or education level. Other variables which may be included are employment status, possessions and the presence of reading materials in the home.

Table 3.1: Measures of SES by category

| Category | Type of measure |
|---------------|--|
| Individual | Personal income, education level, working status |
| Household | Household income |
| Neighbourhood | Postcode, crowding |

Research has shown that indicators of SES such as education and household income are not interchangeable (eg. Winkleby et al 1992, Huisman et al. 2005) and that these measures can be dependent on other factors such as gender and age (House et al. 1990, 1994). This suggests that different measures of SES capture different types of health inequality and reveal how different factors relate to health outcomes. Research into the optimal way to measure SES is now being investigated (Duncan et al. 2002). However this discussion highlights the importance of using multiple measures of SES and also assessing their interactive effect with other factors such as gender and age. It is also important to consider more fully the benefits and limitations of the two main methods of assessing SES that are available in the ITC data, these being education level and household income.

3.3.1 Education

Those with a higher education level are more likely to engage in health-enhancing behaviours (Ross and Wu 1995) like joining a health club. Education level is a reliable measure of SES as most people are aware of the number of years that they attended school or the highest qualification that they attained. However, because education is generally undertaken during early adulthood, this SES measure serves as a good marker for early life circumstances (Smith et al. 1998). Older people may become educated in other ways with on the job training and promotion through key skills that they have obtained. Thus their level of formal education may not relate well to their work circumstances or level of responsibility. This argument is particularly important because the sample of smokers within the ITC dataset tend to be middle-aged and thus a formal education level gained in early adulthood may not be as important an SES indicator for this group. Education level is also considered to be an important determinant of both individuals' work and economic circumstances (Psacharopoulos 1985). Both work and economic circumstances are known to have an

impact on health, indeed smoke-free laws protect those who work in offices better than those who work outside, eg. gardeners and street cleaners who by occupation classification would belong to a lower SES group. Those with less money have less disposable income to spend on better quality food items and this potentially impacts their health.

3.3.2 Income

Household income is a widely used measure of SES, particularly in the United States (Duncan et al. 2002). Household income differs from education in that it is not a personal measure of SES but a family or household assessment of SES. This measure is considered to assess an individual's standard of living and perhaps gives a clearer indication of a person's economic position at the point of asking. It also reflects current working status of those in the household. A possible problem associated with household income is that the respondent may not have equal access to the household family income. Thus this measure may inflate the amount of income that they have available to them. Another problem with this measure is that it may not be an accurate indicator of wealth for retired respondents.

3.3.3 Additional Thoughts on SES Measures

Given that neither education level nor household income can accurately and completely represent SES, it is advisable to use both measures within the analyses. This helps to overcome the limitations of a single measure and allows comparisons and contrasts across the results obtained. One other point which should be noted is that the majority of SES research undertaken in the UK has focused on occupation as the key indicator of SES (Graham and Kelly 2004). However this measure is not available to use for the current research. Some researchers have also advocated that measures of SES can be combined into an index, although several researchers have criticized this methodology (eg. Liberatos et al. 1988) as results based on index measures are hard to interpret. Within the current research both measures, education level and household income, will be used independently.

3.4 Sample Profile

All analyses were conducted using either SPSS version 14 or Amos 5.0. Amos is a specialist program for conducting structural equation modelling and latent growth curve analysis. The sample profile is given here for the UK respondents. Demographic information for the other ITC countries is available at <http://www.itcproject.org/new/Downloads/supplementaryTables.pdf>.

The demographic profile for the 708 UK respondents who took part in all four waves and did not report a change in any SES indicator during these waves is provided in **Table 3.2**.

Table 3.2: Sample profile for the UK

| Variable | Categories | Number (Percentage of respondents) |
|-----------------------------------|---|------------------------------------|
| Gender | Male | 283 (40.2) |
| | Female | 421 (59.8) |
| Age at recruitment | 18-24 | 15 (2.1) |
| | 25-39 | 137 (19.5) |
| | 40-54 | 288 (40.9) |
| | 55-max | 264 (37.5) |
| Household composition (at Wave 1) | Single adult smoker | 227 (32.2) |
| | All adult smokers | 158 (22.4) |
| | Mixed adult household | 319 (45.3) |
| Income categories | Under £6,500 | 78 (11.1) |
| | £6,500 - £15,000 | 155 (22.0) |
| | £15,001 - £30,000 | 237 (33.7) |
| | £30,001 - £40,000 | 90 (12.8) |
| | £40,001 - £50,000 | 44 (6.3) |
| | £50,001 - £65,000 | 21 (3.0) |
| | £65,001 - £95,000 | 18 (2.6) |
| £95,001 and over | 6 (0.9) | |
| Education level | Secondary, vocational 1, 2, trade | 312 (44.3) |
| | Secondary advanced, vocational 3 | 157 (22.3) |
| | Further, college, no degree | 127 (18.0) |
| | Some university | 18 (2.6) |
| | University degree | 60 (8.5) |
| | Post-graduate | 24 (3.4) |
| Marital status (at Wave 4) | Married | 359 (51.0) |
| | Separated | 29 (4.1) |
| | Divorced | 90 (12.8) |
| | Widowed | 71 (10.1) |
| | Common law | 33 (4.7) |
| | Single | 119 (16.9) |
| Ever tried to quit smoking | Yes | 562 (79.8) |
| | No | 139 (19.7) |
| Dependents under 18 | Yes | 234 (33.2) |
| | No | 470 (66.8) |
| Frequency of alcohol use | Every day | 58 (8.2) |
| | 5-6 days per week | 38 (5.4) |
| | 3-4 days per week | 82 (11.6) |
| | 1-2 days per week | 187 (26.6) |
| | At least once a month but less than once a week | 114 (16.2) |
| | Less than once per month | 98 (13.9) |
| | Abstinent in last year | 118 (16.6) |

Table 3.2 shows that the sample contains more females than males, and the majority of the sample are middle-aged adults. Around two thirds of the sample live with one or more smokers in their household. About two thirds of the sample has a household income less than £30,000, however this is not surprising given the overall low level of educational qualifications obtained by the respondents. Less than 15% of the sample attended university with 12% gaining a university degree. The sample is split fairly evenly by marital status in that around 55% live with a partner or are married versus those who are single or no longer with a partner. The majority (four fifths) of the respondents have tried to quit smoking unsuccessfully. One third of respondents have dependents under 18 years of age. The sample contains a high percentage of those who do not drink alcohol (17%) while most of the sample drink alcohol several times a week. The figures on the next few pages detail responses to measures over the four waves of data collected.

Figure 3.1 shows the number of cigarettes smoked by respondents in categories of number of cigarettes per day (NA represents smokers who have quit). It can be seen that the number of respondents smoking between 11 and 20 cigarettes per day has decreased over the four waves. The number of participants who have quit has also increased year on year. Most respondents consider themselves to have good health and the distribution of this variable has not changed over the four waves as can be seen in **Figure 3.2**. Most smokers use factory-made cigarettes. These smokers seem more likely to quit as **Figure 3.3** shows, the percentage

of roll-your-own cigarette users has remained stable over the four waves. **Figure 3.4** shows that those who are in work are likely to smoke differently on working and nonworking days. Around half of the smokers admit that they are very addicted to cigarettes, as shown in **Figure 3.5**. The next figure (**Figure 3.6**) shows that this perception and level of addiction results in around 80% of smokers feeling that it is somewhat to extremely hard for them to refrain from smoking for a day. The next three figures explore how the respondents smoke cigarettes (**Figures 3.7, 3.8 and 3.9**). These show that most of the participants smoke the entire cigarette and inhale into their chest. Around 50% smoke more than a few puffs while approximately 35% admit to taking as many puffs as they can. The final figure (**Figure 3.10**) shows that around 10-15% of the sample have experienced smoking induced deprivation (spending money on cigarettes which was needed to pay bills) at each wave.

Figure 3.1: Number of cigarettes smoked per day

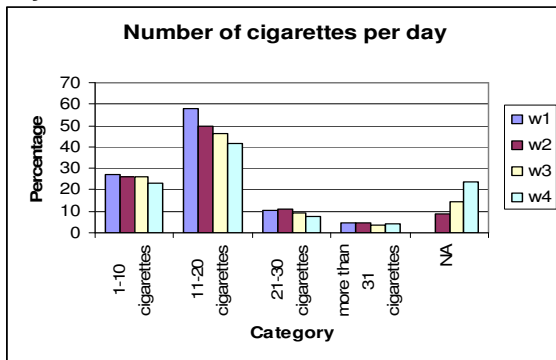


Figure 3.2: Perception of health

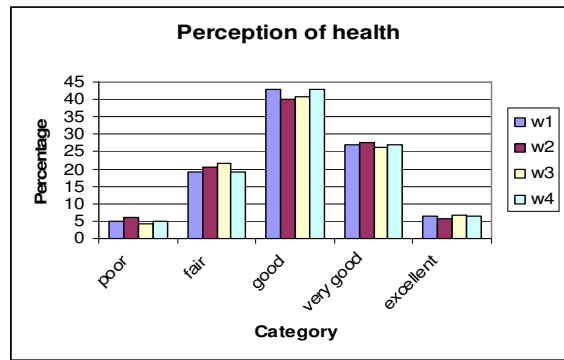


Figure 3.3: Type of cigarettes smoked

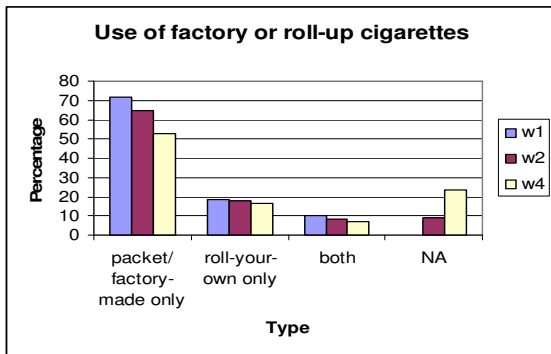


Figure 3.4: Use of cigarettes on work/non-work days

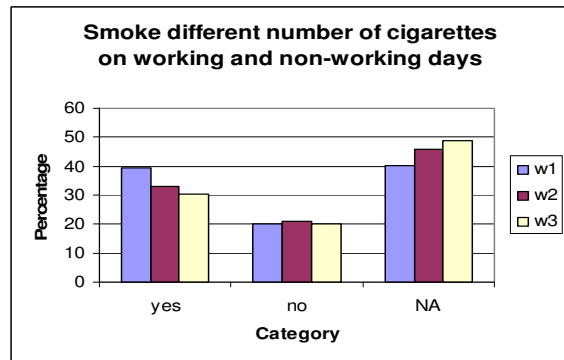


Figure 3.5: Perception of addiction

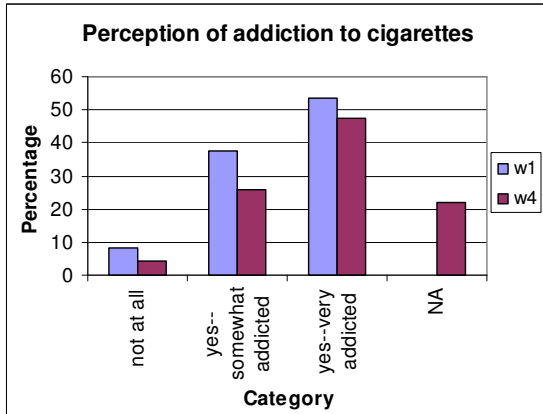


Figure 3.6: Difficulty in stopping smoking for a day

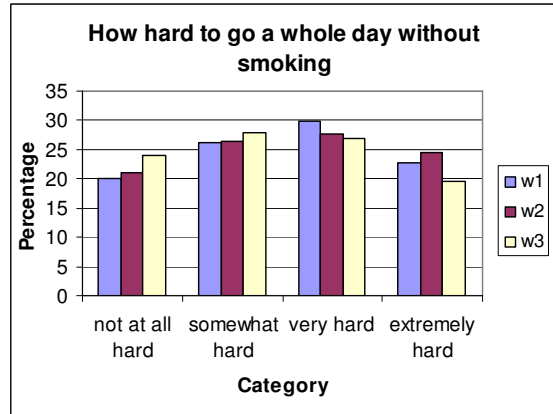


Figure 3.7: How much of cigarette smoked

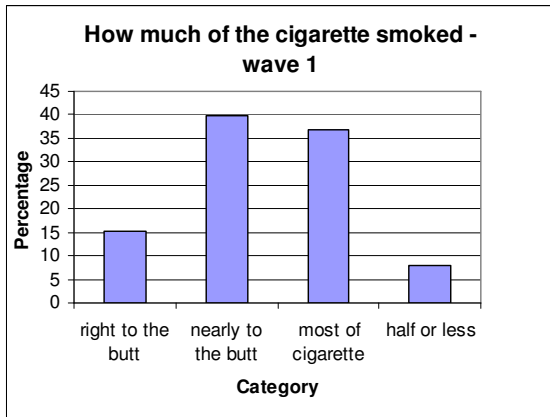


Figure 3.8: Inhale strength

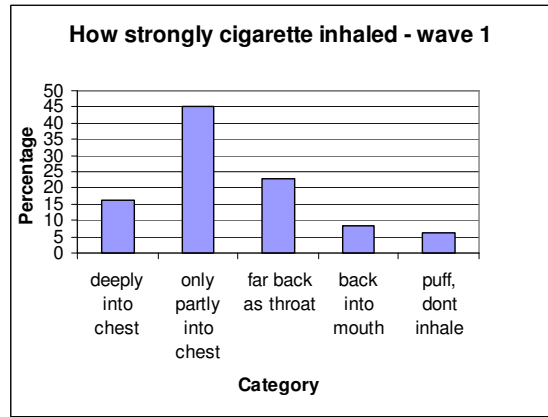


Figure 3.9: Number of puffs per cigarette

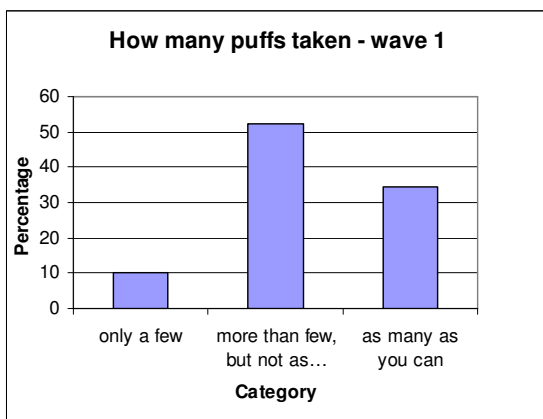
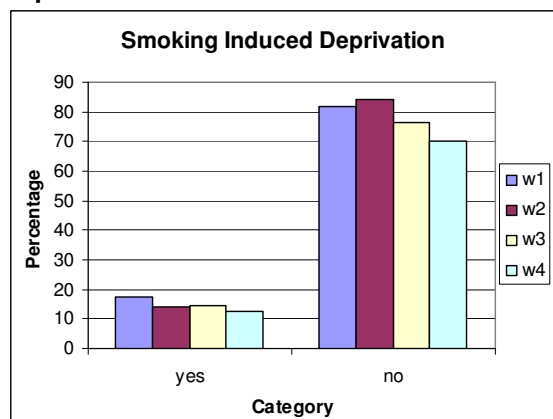


Figure 3.10: Experienced smoking induced deprivation



3.5 Sample Profile by SES

Appendix 2 gives full output of chi-square and ANOVA analyses conducted to explore the sample profile by SES. These results indicate that, as one may expect, proportionally less females are in the high income group and that the proportion of females in each education group are not statistically different. A high percentage of those who live in a low income household are aged 55 years and above; this group is also proportionally less educated. In terms of household composition, 55% of low income households contain a single smoker, while most high income smokers live in a mixed household. Most high income smokers are married, while a substantial proportion of low income smokers are widowed (24%). These two household results are likely to be linked, in that older and single respondents would tend to have lower household income and represent the sole smoker in that household. Tests on household composition by education level reveal no differences. Similar results are found for marital status by education level.

ANOVA results reveal that in terms of age, lower educated respondents are older, they also smoke significantly more than the younger and better educated groups and have a higher average HSI. The mean plots on pages 9, 10, 11 and 12 of **Appendix 2** show the differences pictorially. Exploring these three variables (age, cigarettes per day and HSI) by income reveals only significant age differences. Further ANOVA results exploring the smokers' perception of their health, reveal that those in the low education or low income groups state that they have poorer health.

Smoking behaviour questions were also assessed to determine if any SES differences exist. Results indicate that the SES groups do not differ in terms of type of cigarette smoked (roll your own or factory made) nor in terms of their perception of how hard it is to go for a day without smoking or how strongly they inhale. Nevertheless differences were found in that moderate and high income smokers reported proportionately more frequently that they smoked differently on a work day than a non work day. This result is to a large extent influenced by the high percentage of low income smokers who were not presently in work (70%). Similar results are found in terms of education category for this variable regarding smoking pattern across work and non work days. Low income (or low education level) smokers are more likely to smoke right to the butt of the cigarette than the other groups.

Overall these results reveal that on many profiling variables, the groups differ by SES. This must be taken note of in terms of interpreting research findings. The next chapter will address the impact of the warning labels policy on the sample and on different SES groups.

The findings section contains three main subsections, firstly reporting on the warning labels enlargement, secondly focusing on the light/mild ban and finally reporting on the advertising and promotions ban.

4.0 FINDINGS

4.1 Warning Labels

Figures 4.1, 4.2 and 4.3 show, for the overall sample, how the EU warning labels compare with those in the other three countries in terms of noticing warnings, noticing cessation information on packages and finally reporting that the labels have led them to think about quitting^{xiii}. Figure 4.1 clearly shows that the UK policy introduced between Wave 1 and 2 has had an effect on increasing awareness of warning labels in the UK sample which has been maintained over time. Prior to the change in policy, noticing warning labels in the UK was comparable with Australia, however the change in policy has resulted in the warnings being more salient and furthermore more influential in causing respondents to think about quitting (see Figure 4.3). Overall however, Figures 4.2 and 4.3 show that Canada's policy of pictorial warnings is more effective than the EU policy of text only warnings as a higher percentage of respondents notice specific information such as cessation advice and a higher percentage reported that warning labels led them to think about quitting. Nevertheless the policy change in the UK has had a positive and maintained effect over the four waves of data collected so far.

Figure 4.1: Noticing warning labels across the four countries

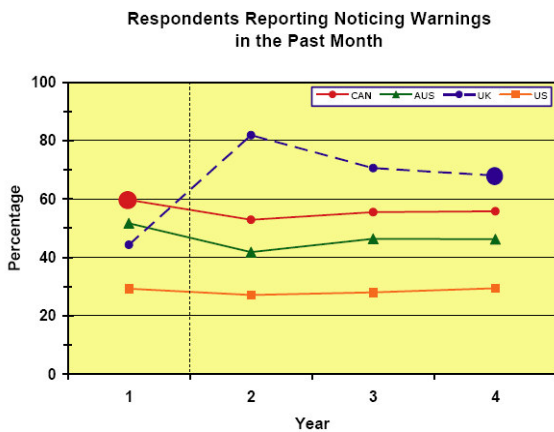


Figure 4.2: Noticing cessation information on warning labels across the four countries

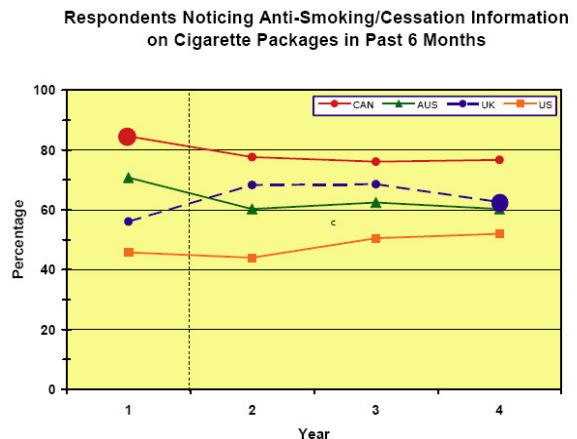
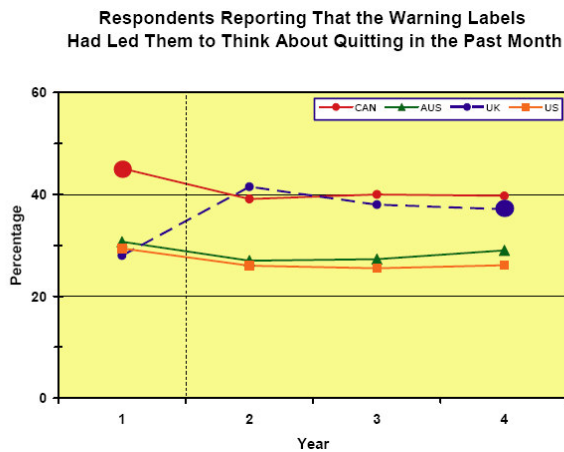


Figure 4.3: Warning labels prompting thinking about quitting across the four countries



Given these results it is now important to investigate if any SES differences are apparent. Specifically, the research questions for this section are:

1. Does the level of noticing warning labels differ by SES?
2. Does the level of reading warning labels differ by SES?
3. Does the impact of labels in terms of making you think about quitting smoking differ by SES?

4.1.1 Measures Used

Table 4.1 provides details of the questionnaire items relating to warning labels used within the analyses. These items were captured the same way at each of the waves.

Table 4.1: Measured used for warning label analyses

| Question | Response scale |
|---|--|
| How often, if at all, have you noticed the warning labels on cigarette packages? | 01 – Never 02 – Rarely 03 – Sometimes 04 – Often 05 – Very often |
| In the last month, how often, if at all, have you read or looked closely at the warning labels on cigarette packages? | 01 – Never 02 – Rarely 03 – Sometimes 04 – Often 05 – Very often |
| In the past 6 months, have each of the following things led you to think about quitting, not at all, somewhat, or very much: Warning labels on cigarette packages? | 01 – Not at all 02 – Somewhat 03 – Very much |

4.1.2 GLM Analyses

Since both education level and household income were used as measures of SES, all analyses were undertaken using these SES indicators separately. This can potentially lead to some degree of inconsistency in the findings therefore both mean plots are provided in order for differences and similarities to be observed. Overall both figures (**Figures 4.4 and 4.5**) clearly show the sharp increase in noticing warning labels after the policy change. The general pattern of the within-subjects trend (that is, the trend across the four waves for each respondent) is similar across all SES groups though a small but statistically significant wave*education interaction was found ($p < 0.05$). Looking closely at **Figure 4.4** it can be seen that those in the high education category (group 3) have a slightly different trend from the other two groups. In addition the full output contained in **Appendix 3** shows that for both education level and income a wave*SES*age interaction effect is also found. This is consistent with the earlier observation in Section 3.5 where we noted that lower income respondents tend to be older. Furthermore, previous research (Argo and Main 2004) has indicated that older respondents may be less able to process warning label information and thus giving plausible explanation to this interactive effect. In terms of between-subjects effects, that is, differences across the groups ignoring wave effects, no significant results were found for the first variable (noticing warning labels).

In regard to the second research question exploring the effect of reading or looking closely at warning labels, the wave effect is again present (see **Figures 4.6 and 4.7**). Neither SES

measure showed a within-subjects wave*SES effect, however a wave*income*age interaction effect was found, again highlighting both the significance of age and its association with income. For the between-subjects effects, one interaction term was significant ($p < 0.05$) that of SES*HSI. This indicates that, depending on income level and education level, the impact of HSI on how much respondents read warning labels varies.

Turing to the third research question, the effect of warning labels on thinking about quitting, a significant wave effect is found for both SES measures ($p < 0.05$). In addition, for education level, a significant ($p < 0.05$) nonlinear wave*education*gender interaction was found. From both **Figures 4.8 and 4.9** it can be seen that the mean level of thinking about quitting because of the warning labels rises after the new warning labels have been introduced. For both SES measures a between-subjects interaction is found for SES*HSI ($p < 0.001$) and additionally for income a between-subjects income*age interaction is present ($p < 0.05$). The consistent effect for SES*HSI is that those of lower income levels and those who smoke more are less likely to be influenced by warning labels to think about quitting.

Figure 4.4: Means of noticing warning labels across education groups

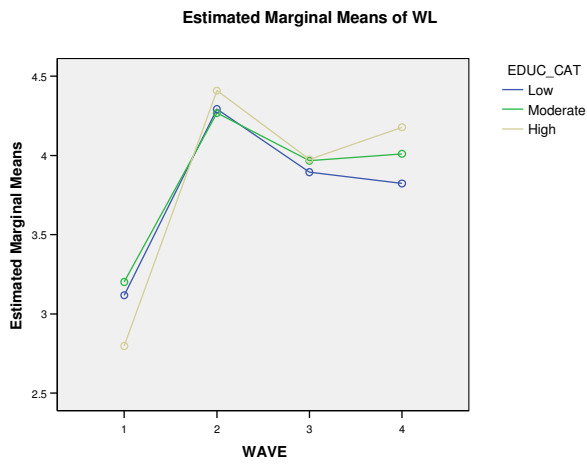


Figure 4.5: Means of noticing warning labels across income groups

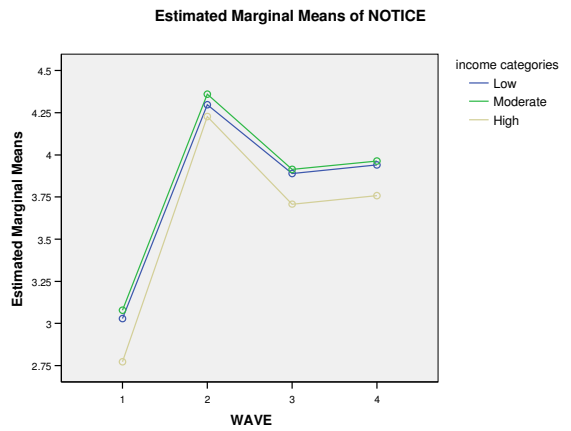


Figure 4.6: Means of reading warning labels across education groups

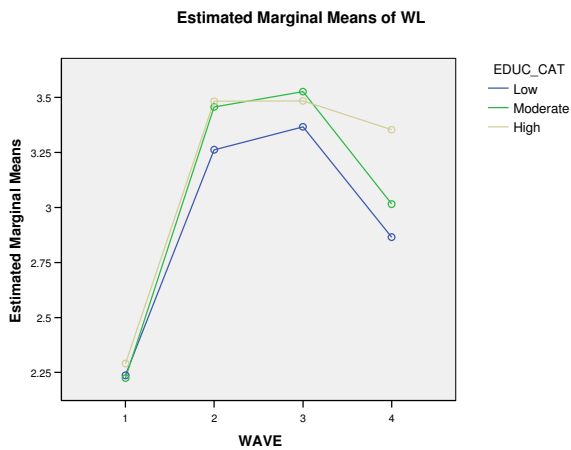


Figure 4.7: Means of reading warning labels across income groups

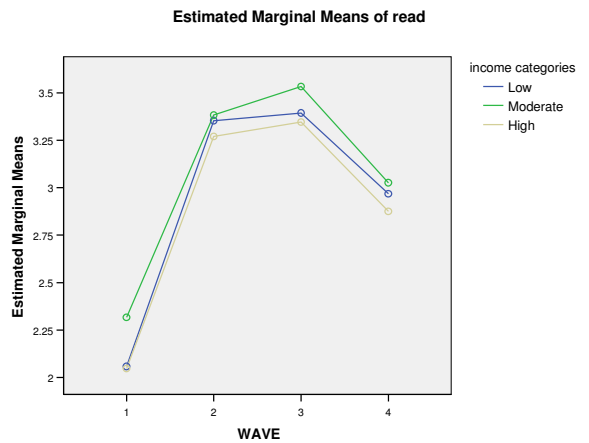


Figure 4.8: Means of thinking about quitting across education groups

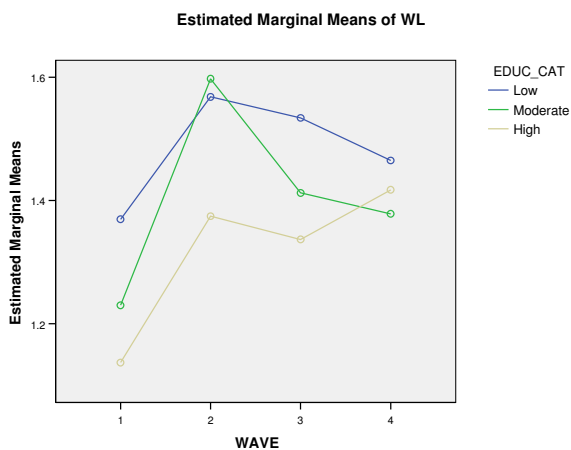
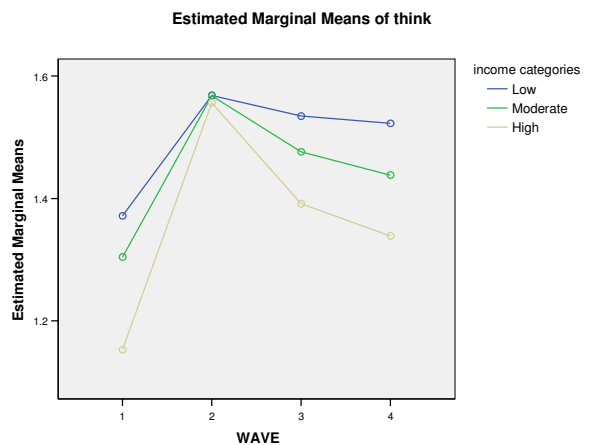


Figure 4.9: Means of thinking about quitting across income groups



4.1.3 LGCM Analyses

The extent to which respondents have read warning labels was examined using LGCM. Results of this analysis are given in **Appendix 3.1**. Mixed results are found in that income does not cause differences in the initial level (intercept) or rate of change of the curve (slope), however, education level accounts for some changes in the slope of the curve. The mean initial value is 2.37 with an average increase in slope of 0.44. The intercept and slope are strongly correlated ($r = 0.69$) indicating that a higher initial level of reading warning labels leads to a slow increase (slope) over the four waves, with a lower initial level yielding a higher rate of change and vice versa. The fit of both models is satisfactory and this result suggests that, in line with the previous findings of an interactive effect between wave and education, some differences in the change in reading warning labels are due to educational differences. This result also indicates the ‘success’ of the warning label policy in improving the level of reading of the Wave 2 messages by smokers, particularly for those who did not pay much attention before.

4.1.4 Limitations

One limitation that applies to all GLM analyses is the limited interpretation of 3-way interactions. It is very difficult to represent these interactions pictorially and many researchers do not report 3-way interactions due to their complexity. We have chosen to report these effects and try where possible to provide some interpretation or reasoning.

It was not possible to analyse data in response to the question “Have the labels stopped you from smoking?” as too few positive responses were obtained and therefore no meaningful analysis could be undertaken.

4.1.5 Interpretation of the Findings

The most important finding of the research is that the enlargement of warning labels has a positive effect across all SES groups in that all groups reported noticing and reading warning labels more and additionally the new warning labels prompted smokers to think about stopping smoking. The importance of age is consistent across the analyses, and consistent with previous research indicating that cognitive decline associated with age affects an individual’s ability to process warning label information (Richards et al. 2003). The HSI index also interacts with SES. This supports previous research findings that lower SES smokers tend to smoke more. It must be noted that differences across and between the groups are small in magnitude, as can be seen from **Figures 4.4 to 4.9**: the differences in the curves are small and each group follows approximately the same curve. A summary of the statistically significant GLM interaction results and LGCM results relating to SES can be found in **Table 4.2**. However, overall these effects although statistically significant, they do not indicate a disparity across SES groups.

Table 4.2: Summary of SES results

| Variable | GLM | LGCM |
|----------|---|------------------|
| Noticing | Wave*educ_cat, Wave*income*age, Wave*educ_cat*age, | |
| Reading | Wave*income*age, Income*HSI, Educ_cat*HSI | Educ_cat → slope |
| Quitting | Wave*educ_cat*gender, Income*HSI, Educ_cat*HSI, Income*age | |

Note: LGCM was only undertaken for the reading variable.

The next section explores the light and mild descriptors ban.

4.2 Light and Mild Descriptors Ban

Several different types of measures have been used to determine the effectiveness of the light/mild descriptors ban. These include exploring changes in beliefs about light and mild cigarettes, and exploring views about determining if a product is light or mild (introduced in Wave 4). At Wave 1, just over 40% of smokers smoked light cigarettes. Further investigations of behaviour by SES revealed no differences across SES groups. Some previous research undertaken by the ITC research team has shown significant changes in beliefs, however this work is at an early stage^{xiv}. The figure overleaf (**Figure 5.1**) shows a significant change (decrease over the four waves) in the belief that light cigarettes are less harmful than regular cigarettes among those who agree with this statement. The next figure (**Figure 5.2**), shows that a similar percentage of smokers agree with the belief that smoking light cigarettes help quitting at Wave 1 and 4, although Wave 3 revealed a minor decrease. This would indicate that the ban (which came into force in September 2003 between Waves 2 and 3) may have had an initial effect which has not been maintained. Overall in comparing the UK against the other countries, the UK consistently yielded the highest percentages of agreement across both trends, despite the ban, with Australia slightly higher in Wave 3 in terms of the belief that smoking light cigarettes help quitting. This indicates further policies such as generic packaging (ie. no branding or colour coding) may be needed along with educational campaigns highlighting the danger of “light” cigarettes.

Two research questions are posed in this chapter

1. Do beliefs about light/mild cigarettes differ by SES?
2. Can smokers identify new terms used in place of light/mild? Further, does this differ by SES?

Figure 5.1: Beliefs about light cigarettes across the four countries

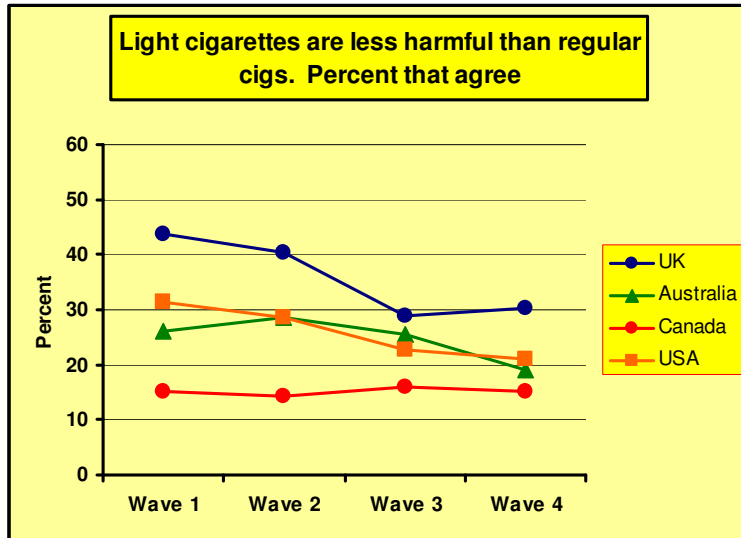
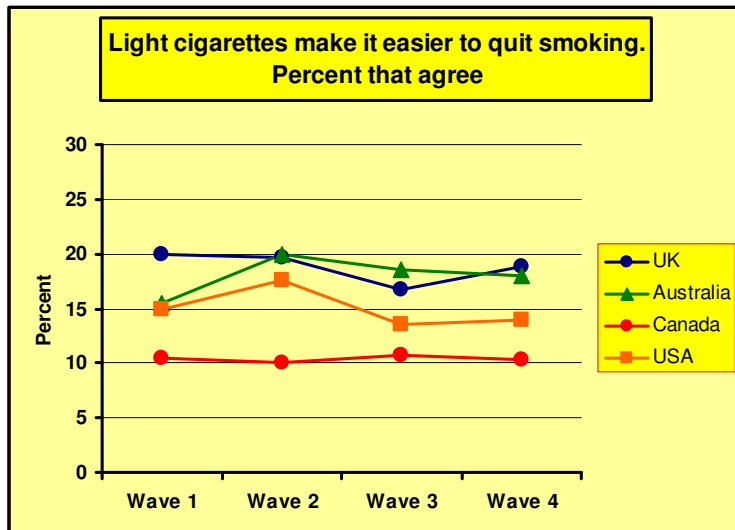


Figure 5.2: Beliefs about light cigarettes across the four countries



4.2.1 Measures

Table 5.1 details the measures used for the analysis produced for this chapter.

Table 5.1: Measures used for light/mild analyses

| Question | Response scale |
|--|---|
| Please tell me if you strongly agree, agree, neither agree nor disagree, disagree or strongly disagree with each of the following statements about light cigarettes. a. Light cigarettes make it easier to quit smoking b. Light cigarettes are less harmful than regular cigarettes c. Light cigarettes are smoother on your throat and chest than regular cigarettes. d. Smokers of light cigarettes take in less tar than smokers of regular cigarettes | 01 – Strongly agree 02 – Agree 03 – Neither agree nor disagree 04 – Disagree 05 – Strongly disagree |
| Can you tell me if any of the following terms mean light? Smooth Fine Refined Generous Ultra | 01 – Yes 02 – No |
| Is it easy or difficult to tell if cigarettes are regular strength or light? | 01 – Very difficult 02 – Fairly difficult 03 – Fairly easy 04 – Very easy |

4.2.2 GLM Analyses

In order to assess the beliefs (**Table 5.1** first question with parts a, b, c and d) as a single construct, an average belief score was computed. Prior to this, tests of unidimensionality in the form of Cronbach alpha were conducted. These results are provided in **Appendix 4** and show that the items form a single concept at each wave ($\alpha > 0.7$). It can be seen from the descriptive statistics in **Appendix 4** that the means of the light/mild belief construct are centred around 3. This means that on average respondents neither agree nor disagree with the statements a, b, c and d above. This may indicate that they are uncertain as to the harms of light cigarettes. The GLM analysis reveals that no within-subjects effects are present for either SES measure, therefore the ban has not led to a change in beliefs over time.

One between-subjects interaction effect is significant for both SES measures ($p < 0.001$) that of SES*HSI. For the low income or low education group, those who smoke more have a more ‘favourable’ view of light cigarettes.

These results are not surprising given that, at Wave 4, over 80% of respondents say that it is easy to identify light/mild cigarettes. Many (45%) can also identify various terms such as ultra which are used in the United States to mean light or mild.

4.2.3 LGCM Analyses

An identical analysis plan to that used for the warning labels model was employed to further explore possible changes in beliefs. The results of the analysis can be found in **Appendix 4.2**. For both income and education level, significant decreasing curves were found ($p < 0.001$). This differs from the GLM analysis above. The rate of change is positive indicating that beliefs are becoming more negative over time (0.385 for educ_cat and 0.268 for income). In

both models there is weak association between the intercept (initial level) and the slope (curve). Only education level significantly impacts the change in the slope with higher educated respondents exhibiting less change (decrease) over the four waves. Lower educated respondents have a greater rate of decrease in their beliefs about light/mild cigarettes, representing a significant and positive outcome for influencing smokers with lower educational attainments.

4.2.4 Limitations

Given the mixed nature of these results it is hard to identify which technique is more accurate in identifying the trend. Overall, we would suggest the LGCM model is more robust as this technique can accommodate more complex data structures as well as allowing the specification of trend effects.

4.2.5 Interpretation of the Findings

Some evidence provided here suggests that education level affects the trend in the change of beliefs about light/mild cigarettes. Overall these results provide mixed messages about the effectiveness of the ban on the light/mild descriptors. However, it is clear that a significant number of smokers in the UK still agree with false claims about light/mild cigarettes. This coupled with the fact that over 80% state that it is easy to identify light/mild cigarettes, highlights the need for further research on a more effective means to protect smokers from such misconceptions.

The next section will explore the advertising and promotions ban.

4.3 Advertising and Promotions Ban

To date, research published by the ITC team (Harris et al. 2006) shows the overall effectiveness of the UK advertising and promotions ban in terms of revealing significantly less awareness after the ban and the comprehensive nature of the ban making it very difficult for the tobacco industry to move to other forms of advertising and promotions. Recent findings presented at the 2006 World Tobacco or Health Conference^{xv} show that awareness of billboard adverts in the UK was highest of all countries before the ban but reduced significantly after the ban was introduced. Noticing adverts in newspapers or magazines has also significantly dropped, as has awareness of price promotions and sponsorship (see **Figures 6.1, 6.2, 6.3 and 6.4**). As both Canada and Australia have comprehensive bans, awareness of marketing is low in both countries. Note that in Canada price promotions are still allowed and during the second and third wave of the research awareness of price promotions increased. This highlights that if loopholes exist, the tobacco industry can switch focus and exploit these areas. These figures highlight the success of the ban for the total sample of respondents. This chapter will seek to address the following research questions:

1. Does awareness of tobacco advertising differ by SES?
2. Does awareness of price promotions differ by SES?
3. Does awareness of sponsorship differ by SES?

This section analyses and reports results in three parts, reflecting the staged introduction of the advertising and promotion ban over an 18 month timetable as outlined in Section 1.3.2. Additionally this allows each separate area of the ban to be assessed.

Figure 6.1: Noticing billboard adverts across the four countries

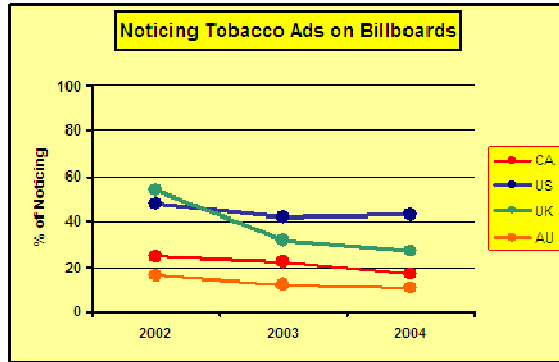


Figure 6.2: Noticing newspaper/magazine adverts across the four countries

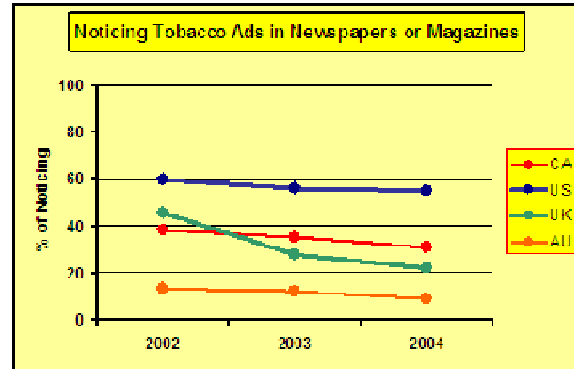


Figure 6.3: Noticing special price offers across the four countries

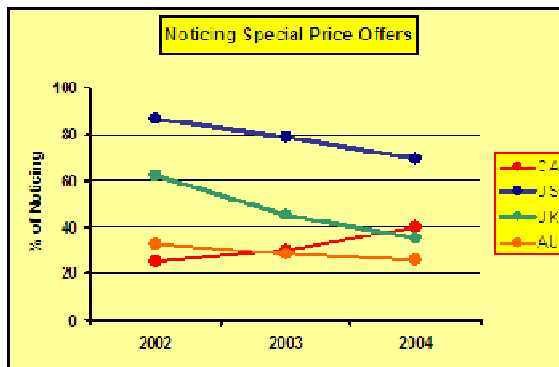
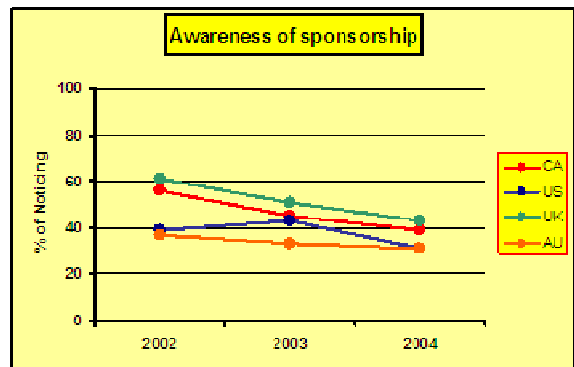


Figure 6.4: Awareness of sponsorship across the four countries



4.3.1 Measures

Table 6.1 provides details of the questionnaire items used in the analyses for this chapter. For questions requiring yes or no answers on a number of items, the number of 'yes' answers within each question were counted to provide an overall score of awareness of each type of advertising. One score was computed for the main advertising ban (counting yes responses in regard to awareness of radio, billboard and newspaper/magazine advertising). Similarly, overall scores were computed for awareness of sponsorship ('yes' responses to items a to d below) and awareness of price promotions (count of 'yes' responses in regard to noticing free cigarettes, special offers and free gifts as detailed below).

Table 6.1: Measures used for advertising and promotions ban analyses

| Question | Response scale |
|---|--|
| Now I want to ask you about tobacco advertising. In the last 6 months, have you noticed cigarettes or tobacco products being advertised in any of the following places: ... on radio ... on posters or billboards ... in newspapers or magazines | 01 – Yes 02 – No |
| Thinking about everything that happens around you. In the last 6 months– since [6M Anchor], how often have you noticed things that promote smoking? Would that be: | 01 – Never 02 – Rarely 03 – Sometimes 04 – Often 05 – Very often |
| a) Still thinking about the last six months, that is, since [6M Anchor], have you seen or heard about any sport or sporting event that is sponsored by or connected with BRANDS of cigarettes? b) In the last six months have you seen or heard about any sport or sporting event that is sponsored by or connected with tobacco COMPANIES? c) In the last six months, have you seen or heard about any music, theatre, art, or fashion events, that are sponsored by or connected with BRANDS of cigarettes? d) In the last six months, have you seen or heard about any music, theatre, art, or fashion events, that are sponsored by or connected with tobacco COMPANIES? | 01 – Yes 02 – No |
| In the last 6 months– that is, since [6M Anchor], have you noticed any of the following types of tobacco promotion: a. Free samples of cigarettes b. Special price offers for cigarettes c. Free gifts or special discount offers on other products when buying cigarettes? | 01 – Yes 02 – No |

4.3.2 GLM Analyses

GLM output for the analyses reported on in this chapter is provided in **Appendix 5**.

Figures 6.5 and 6.6 show the decrease in awareness of tobacco advertising across all groups (note that Wave 2 is post ban). The within-subjects wave effect is significant ($p < 0.001$) for both analyses. In addition, a wave*education*age linear effect was found. In terms of between-subjects effects both SES measures had interactive effects with gender ($p < 0.05$) and additionally for income with HSI. Overall it can be concluded that in terms of the main advertising ban, awareness has decreased significantly for all groups, with no significant deviations in the trend for any SES group.

Overall salience (the second question in **Table 6.1**) of tobacco advertising has also been assessed. **Figures 6.7 and 6.8** show the results of the GLM analysis. Again a strong and significant ($p < 0.05$) wave effect is present for both SES measures. In addition a within-subjects interaction effect for education and wave is also significant ($p < 0.05$). As can be seen from **Figure 6.7**, the trend for the high education group is slightly different from the others in that awareness drops more sharply after the ban. The same effect is not found for income as shown in **Figure 6.8**. Again gender has a significant between-subjects effect for both SES indicators with an additional effect of income*HSI as found before.

The next two charts (**Figures 6.9 and 6.10**) show the trends for awareness of sponsorship. Again a significant wave effect is present for both SES indicators ($p < 0.001$). In addition both trends have an interaction between wave and SES ($p < 0.05$). The trend for the lower educated group is different from that of the other groups. It can be seen from **Figure 6.9** that the shape of the curve for the lower educated group is more linear while the other two groups have a flattening (or increase) in awareness between Wave 2 and 3. The trend is different for the income groups as the high income group differs from the others. Both graphs show a steep

reduction in awareness when the complete sponsorship ban came into force (world sports: for example snooker and motor racing in July 2005, prior to Wave 4). The importance of gender is again highlighted in that a within-subjects interaction between wave*education*gender and between-subjects SES*gender interactions are present. Further significant 3-way interaction effects are also present for wave*income*age and wave*income*HSI.

Figures 6.11 and 6.12 show significant wave effects for awareness of price promotions. These show sharp declines in awareness at each post ban wave (that is from after Wave 1). No within-subjects interactions are present for either SES indicator. Only one between-subjects interaction effect is significant; this being for education level and age ($p < 0.05$).

Figure 6.5: Means of awareness of tobacco advertising across education groups

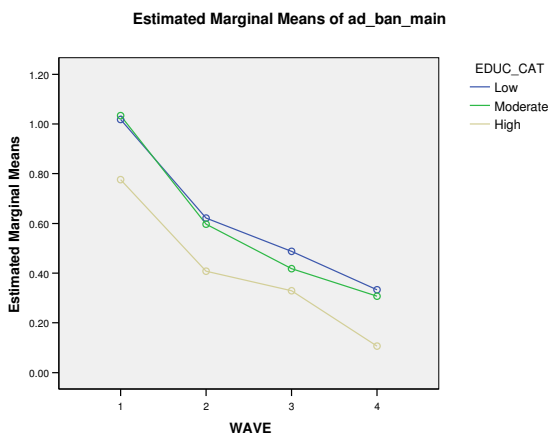


Figure 6.6: Means of awareness of tobacco advertising across income groups

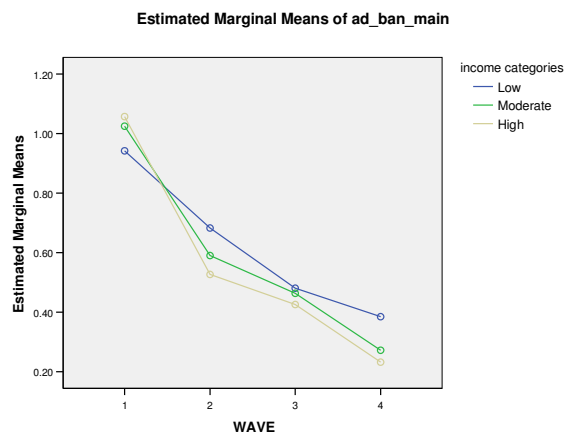


Figure 6.7: Means of general salience of tobacco advertising across education groups

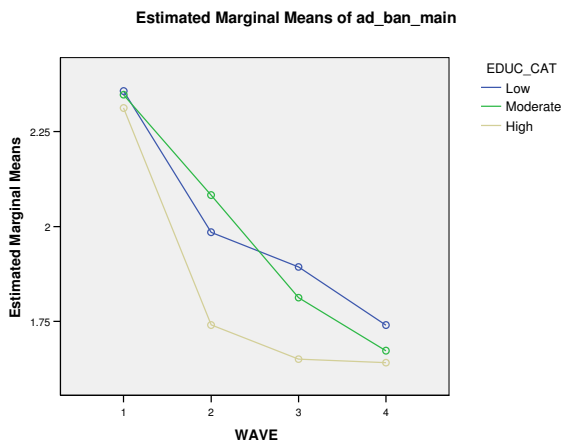


Figure 6.8: Means of general salience of tobacco advertising across income groups

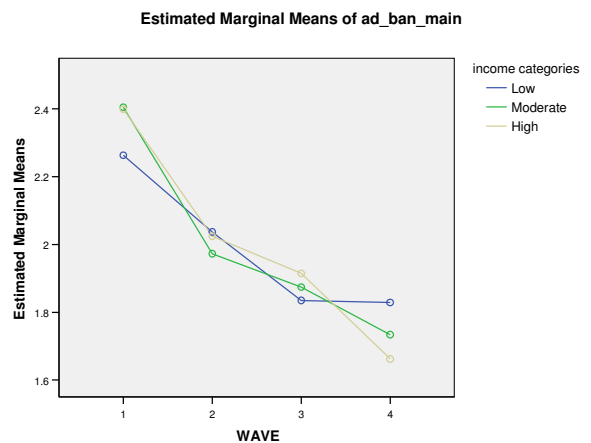


Figure 6.9: Means of sponsorship awareness across education groups

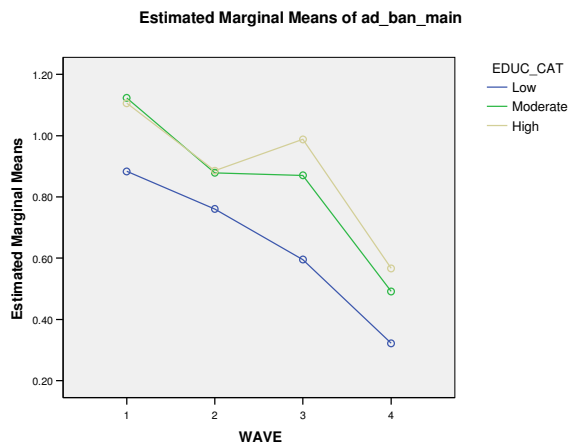


Figure 6.10: Means of sponsorship awareness across income groups

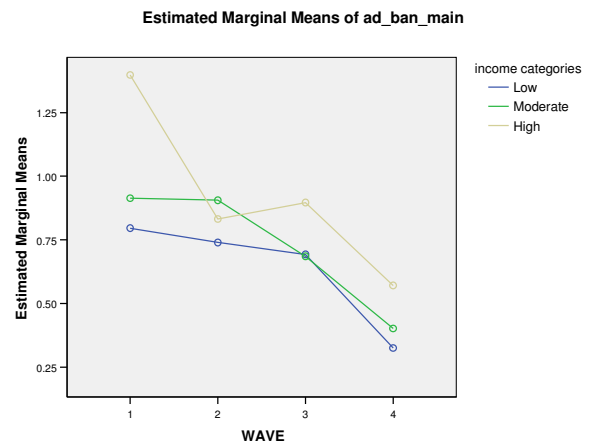


Figure 6.11: Means of price promotion across education groups

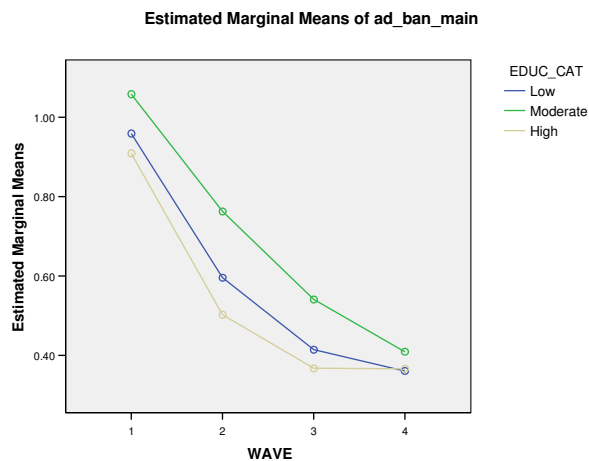
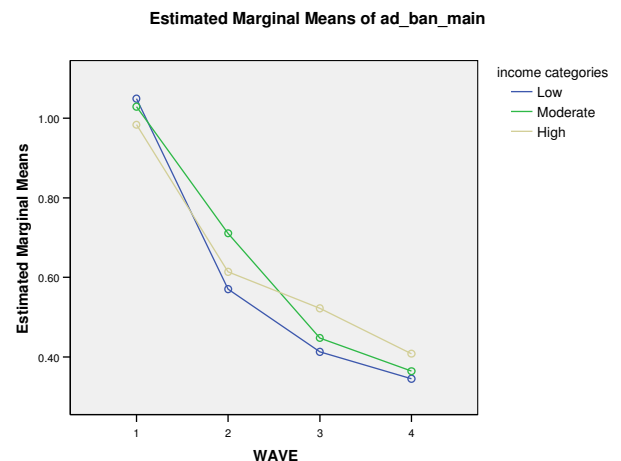


Figure 6.12: Means of price promotion across income groups



4.3.3 LGCM Analyses

The outputs from the LGCM analyses for this chapter are provided in **Appendix 5.1**. Findings from LGCM analyses for the main tobacco advertising ban reveal that changes in the slope (curve) and intercept (initial level) are present, showing a decreasing trend. (The slope decreasing on average by -0.65 per wave.) Exploring SES reveals some inconsistent results, where education level does not affect either the slope or the intercept. For income, both the intercept and slope vary ($p < 0.05$). Both models have adequate fit according to standard conventions. For both models the correlation between the slope and intercept is strong. In terms of the models for sponsorship awareness, a decreasing trend is also found (with a rate of change of -0.57), results are consistent in terms of SES in that for both SES measures the intercept is found to differ but not the slope. The correlation between the intercept and slope is also strong and the fit of both models is good. For the final model relating to promotional activities, neither SES measure adds to understanding the initial value or rate of change, however an overall decreasing trend with rate of change -0.63 is found.

These results are consistent with those of the GLM analysis as wave differences that did not vary by SES were apparent in both analyses for price promotions.

4.3.4 Interpretation of the Findings

Overall the advertising and promotions ban in the UK has led to decreased awareness of all forms of tobacco marketing. The comprehensive nature of the legislation has meant that tobacco manufacturers have not been able to exploit any loopholes. In terms of SES differences, **Table 6.2** provides a summary of the interactions found. Across each of the variables some SES differences have been found. Although the general shape of each trend graph is similar, noticeable differences are found in **Figure 6.7** where the high income group shows general salience of tobacco marketing to reduce at a greater rate than the other two groups. In terms of other interactive effects, gender has been found to be a prominent factor interacting with both SES indicators. Given that interest in particular sports such as snooker and Formula 1 motor racing are biased towards males it is not unexpected to find that gender has an influence. The results of the LGCM suggest that the initial awareness of the forms of marketing activity is connected to the income or education level, although the change in awareness is not strongly related to SES. However despite these findings, it can be concluded that the advertising and promotions ban has been effective in substantially reducing awareness of tobacco marketing across all SES groups with very limited differences across the groups.

Table 6.2: Summary of SES results

| Variable | GLM | LGCM |
|------------------|--|--|
| Awareness | Wave*educ_cat*age, Educ_cat*gender, Income*gender, Income*HSI | Income → slope Income → intercept |
| General salience | Wave*educ_cat, Educ_cat*gender, Income*gender, Income*HSI | |
| Sponsorship | Wave*educ_cat, Wave*income, Wave*educ_cat*gender, Educ_cat*gender, Income*gender, Wave*income*age, Wave*income*HSI | Educ_cat → intercept Income → intercept |
| Price promotions | Educ_cat*age | |

5.0 CONTRIBUTION TO THE CONSORTIUM THEMES

This study contributes to the three Consortium themes: it increases our understanding of regulation in a key area of public health risk and analyses this from an inequalities perspective. In the process it has shown that two UK tobacco control policies – enhancing health warnings and prohibiting marketing advertising and promotions – have had a positive public health impact across the social scale.

Even when limited policy effects were found in the case of the elimination on light/mild descriptors, this was again consistent across SES, so at least inequalities were not increased.

6.0 CONCLUSIONS AND CONSIDERATIONS

In line with previous research (Hammond et al. 2006), our results show that the European Union's enlargement of warning labels has led to increased awareness and processing of warning messages by smokers. The decision to move from text based warning label messages to picture warning labels is also supported by the research; evidence from the Canadian sample shows that picture warning labels result in higher levels of consumer awareness, recall and processing which are sustained over several years.

Similarly, the advertising and promotions ban has led to substantial reductions in tobacco marketing awareness by smokers. On the other hand, the elimination of light/mild descriptors seems to have been less successful. It has had little perceptible influence on smokers' beliefs about light/mild cigarettes, and the findings show that smokers continue to use other cues – such as the colouring of packets – as surrogates for light/mild labelling to determine the type of cigarettes they are purchasing.

More importantly for this study the analyses show that these effects remain constant across SES as measured by household income and educational level. Although minor variations were apparent, and some of these even reached statistical significance, no consistent or important differences emerged. There is little evidence of the differential social impact that bedevils so many public health interventions.

The research does, however, raise some concerns about two elements of tobacco promotion that remain after the ban: liveried packaging and cross border advertising. The continued presence of branding cues (name, colour and design) on the pack probably explains the ineffectiveness of the light/mild descriptor prohibition. Despite the legislation, these insignia continue to communicate consistent values and imagery to the consumer. More broadly, branding remains a strong influence on smoking behaviour and, in the absence of mass media advertising, the pack is the principal remaining platform for it (Grant et al. Forthcoming).

Cross border advertising and the use of “old” pictures in magazines did generate some awareness. However this is not a major concern, as tobacco promotion as a whole has decreased so substantially and cross boarder advertising will continue to do so as other countries fully implement the recommendations of the FCTC.

6.1 Limitations

Several limitations of the study are noted. Firstly, the repeated use of the same data in statistical testing can result in a higher probability of significant findings. As a result, marginally significant results ($p < 0.05$) should be accepted with caution. Secondly, the literature on SES is inconclusive regarding the definitive measures to be taken. The use of household income and education is acceptable, however other measures may yield different results. Further, the banding within the SES measure of income could be considered crude and may not accurately reflect true levels of wealth or poverty in terms of, say, disposable income. Thirdly, the use of two analysis methods (GLM and LGCM) though recommendable in terms of triangulation to assess the robustness of the results, nevertheless leads to potential inconsistencies in results and findings obtained. Fourthly, technical interpretations of 3-way interaction effects from GLM analyses are difficult to portray and make meaningful in context. This is the nature of such complex interactions where graphical presentation of

results is not feasible. Finally, the sample size was too small to allow the data to be analysed by age.

6.2 Further Research

We encourage researchers to explore further potential differences across SES for tobacco control policies. Particularly exploring reactions to the aesthetic quality of the cigarette package given the new labelling restrictions.

7.0 DISSEMINATION / OUTPUTS

To date, work associated with this project has resulted in the following two outputs.

How do smokers engage with anti-smoking messages? An ITC Collaboration study on understanding the roles of thoughts and worry. Louise Hassan, Anne Marie MacKintosh and Gerard Hastings, *35th European Marketing Academy Conference, Athens, Greece, 23-26 May 2006*

Effectiveness of health warnings after implementation of the FCTC minimal standard in the UK. Findings from the ITC four country survey. David Hammond, Louise Hassan, Gerard Hastings, Pete Driezen and Geoffrey T Fong, *13th World Conference on Tobacco or Health, Washington DC, 12-15 July 2006.*

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ⁱⁱ http://www.cdc.gov/tobacco/research_data/economics/mm5425_highlights.htm

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^{ix} United States of America, Canada, Australia, United Kingdom, Ireland, Thailand, Malaysia, China, France, New Zealand, India, Sudan, South Korea, Mexico and Uruguay

^x Evaluation of the FCTC: results from the International Tobacco Control Policy Evaluation Project (the ITC Project). *Tobacco Control* 2006, **15**(Suppl 3): 1-94.

^{xi} <http://www.ash.org.uk/>

^{xii} Evaluation of the FCTC: results from the International Tobacco Control Policy Evaluation Project (the ITC Project). *Tobacco Control* 2006, **15**(Suppl 3): 1-94.

^{xiii} These charts in **Figures 4.1 to 4.3** have been taken from a presentation made at the World Tobacco or Health Conference, 2006 covering the period 2002 to 2005.

^{xiv} Figure 5.1 and 5.2 are adapted from a presentation made at the World Tobacco or Health Conference, 2006 covering the period 2002 to 2005 by Hua-Hie Yong.

^{xv} These charts in **Figures 6.1 to 6.4** have been taken from a presentation made at the World Tobacco or Health Conference, 2006 covering the period 2002 to 2004.