One size no longer fits all: the application of Andreasen's six social marketing benchmarks in Australian antismoking programs.

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by

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CERTIFICATE OF AUTHORSHIP/ORIGINALITY

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis. This project complies with Ethics Committee requirements.

Signature of Candidate

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Dedication and Acknowledgements

I dedicate this thesis to my wife, Wendy. She had provided the encouragement, support and help that made the whole project possible. I would not have persevered and completed it without her unwavering support.

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One size no longer fits all: the application of Andreasen's six social marketing benchmarks in Australian antismoking programs.

Abstract

This thesis investigates changes in smoking behaviour in the Australian community during a period when the community was exposed to increasingly graphic messages aimed at lowering smoking prevalence in the community. Tobacco smoking is one of the greatest causes of avoidable morbidity and premature mortality in most countries, including Australia. The damage it inflicts is enormous and warrants the application of the most effective social marketing programs (together with complementary legislative and economic programs) to counteract it.

Andreasen identified six benchmarks that identify a social marketing program. Examination of the current strategy indicates that these benchmarks have not been consistently met. In particular, analysis of data from four large scale surveys conducted across Australia in the last fifteen years indicates the existence of different segments in the target audience. It also indicates that changes in smoking behaviour in different segments have been significantly different during the period covered by the surveys.

It is recommended that the developers of antismoking programs reconsider their strategy along the lines recommended by Andreasen:

1. Behavior change is the benchmark used to design and evaluate interventions: Establish objectives not just for smoking cessation but also for declines in smoking initiation for specific target segments.
2. Projects consistently use audience research: Research is needed to monitor changes in each segment, to test alternatives to the medical, fear-appeal strategy.
3. There is careful segmentation of target audiences. Several demographic and behavioural segmentation bases are suggested in this thesis.
4. The central element of any influence strategy is creating attractive and motivational exchanges: Benefits of not smoking that are relevant and persuasive must be communicated to each segment.
5. The strategy attempts to use all four Ps of the traditional marketing mix: A greater understanding is needed of the benefits of not smoking, the costs of not smoking as perceived by the audience.
6. Careful attention is paid to the competition faced by the desired behavior: Recognised risk factors associated with initiating and continuing to smoke must be addressed in antismoking programs.

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Chapter 1: Introduction

1.1 Objective

This thesis aims to examine the application of social marketing principles to one of the most important and widespread threats to the community's welfare – tobacco smoking. Tobacco is so addictive and tobacco smoking causes so much damage to the community, it warrants the most effective initiatives be launched against it. This includes legal and economic measures and as it is human behaviour, social marketing programs.

Australia has a history of relatively successfully reducing smoking prevalence in the community. Prevalence has reduced steadily since the Second World War. Examination of NHS data indicates that this success may be waning. This thesis confirms this slowing down in the rate at which smoking prevalence is declining in Australia and explores possible reasons for this change. Andreasen's six social marketing benchmarks provide the framework for this examination and one in particular is examined more closely, careful segmentation of target audiences. To paraphrase the aphorism, one size does not fit all. Social marketing programs must be tailored to the needs of each particular target market. The data examined here identifies distinct market segments and shows that their smoking behaviour has changed in quite different ways during a period in which all segments have been exposed to the same social marketing programs.

1.2 Background

Tobacco smoking has been identified as the single most important cause of avoidable mortality and morbidity in most countries, especially developed countries, for four decades. It has been linked with a wide range of fatal medical conditions and is responsible for the premature deaths of millions of people. Various approaches have been taken to estimate the cost to the community. They arrive at different costs but all

agree that cost in needless death and disability is extremely large. The research reviewed in this thesis confirms the scale of the problem and also confirms that it is not just a problem in the U.S. (it was the U.S. Surgeon General who identified tobacco as the single most important cause of avoidable morbidity and mortality in the U.S. in the mid 1960s and regularly since then(USDHHS, 1989)) but in most countries including Australia. Governments and groups intent on improving the welfare of the community have adopted a number of different strategies including legislation (restricting access to tobacco products and limiting the occasions and situations in which they can be consumed), economic measures (including increasing the price of tobacco products by levying increased taxes on the sale of tobacco products) and the investment of large amounts of money in social marketing campaigns aimed at reducing the prevalence of tobacco smoking in the community. This thesis examines the application of social marketing principles to the smoking problem in Australia, especially market segmentation and tailoring of strategies for different segments in the target market.

1.3 Social marketing

Wiebe (1951/2) is credited with providing the impetus to harness marketing methods and expertise in pursuit of worthwhile community goals rather than the increasing profit of large commercial organisations. In the middle of last century, he issued the challenge, "Why can't you sell brotherhood and rational thinking like you sell soap?" The next chapter this thesis, a review of the literature in the area, shows how Kotler, working with other marketers, took up the challenge and coined the term *Social Marketing* to describe the new discipline they developed (Kotler and Andreasen, 1995). This discipline uses the methods and techniques developed by commercial marketers to influence people to behave in a way that maintains or enhances the community's welfare. Lefebvre (C. Lefebvre, 1992; C. Lefebvre and Flora, 1988) identified the particular marketing concepts that are applicable to community problems and developed a list of important components in a social marketing programme. Andreasen continued to refine social marketing theory and identify the key marketing concepts important to social marketers. He identified the essential "benchmarks" that distinguish social marketing from other strategies to bring

about changes in peoples' behaviour that will benefit the whole community, not just the marketer and the "customer." These developments are traced in the review of applicable literature.

The next section of the literature review briefly explains these key marketing concepts, the basis on which they were developed and their applicability to social marketing problems. Andreasen points out that the "bottom line" for all social marketing programs is behaviour change, specifically, influencing a target group of people to change their behaviour in a way that will benefit the community's welfare. Data from the four latest National Health Surveys are analyzed in this thesis to attempt to identify how peoples' smoking behaviour has changed in the fifteen years covered by the surveys. Kotler, Lefebvre and Andreasen identify this focus on the person whose behaviour is to be influenced rather than on profits as a key distinguishing characteristic of social marketing. This focus is an adoption of commercial marketing's "customer focus" and the review of marketing literature briefly explains how the concept evolved. The implications of these concepts for marketers are then explained. A focus on the customer implies a detailed knowledge of the customer and how different groups of customers will respond to the same persuasive message strategy. Once these differences are understood, separate message strategies can be tailored to be effective in each segment. This is called market segmentation and is an important theme in this thesis – social marketers developing antismoking strategies have not paid sufficient attention to the need to tailor different strategies to influence the behaviour of different groups in the community. The strategy has been to direct a standard, health-related fear appeal campaign to all segments of the community in an attempt to persuade smokers to quit and to persuade young people not to take up smoking in the first place.

1.4 Using audience research

Andreasen's next benchmark states that social marketing programs "consistently use audience research." In contrast with the legislative and economic approaches mentioned above, both commercial and social marketing rely on persuasion to influence peoples' voluntary behaviour. Two things are essential in the development of a successful program to influence people's behaviour: a model of the factors that influence behaviour, and a clear identification of the person whose behaviour is to be influenced and their particular characteristics that will affect that change. Marketing practice is underpinned by a number of theories of human behaviour that have been developed and validated through extensive research. The models typically show the different stages in the behaviour process and the impact of various personal characteristics and environmental factors influencing behaviour. There are also models examining particular influential factors such as persuasive communication and learning models which guide the marketer in the development of marketing programs. Social marketing and the allied disciplines of health promotion and health education have adapted these models to the social marketing and health context. Once the model is selected, audience research is used to identify important audience characteristics that will determine their progress through the stages of the model.

Once a campaign has been developed and executed in the market, audience research is used to measure the campaign's impact and to evaluate its effectiveness. This information is used in the management of the ongoing campaign and in the development of future programs. As explained above, this analysis will show that despite being subjected to the same antismoking message strategy, different segments have behaved in different ways. This is of crucial importance as the analysis of NHS data indicates that one of the segments, young people who have not yet begun to smoke, is not responding to the strategy in the way intended by the social marketers and their response may well prolong smoking prevalence and the consequent damage in the Australian community.

1.5 Careful segmentation of target audiences

Analysis of the data in four NHS reveals several distinct segments in the smoking population. Segments are divided along behavioural grounds (their smoking status) and on other demographic and social characteristics. Smoking prevalence varies between segments and over the period covered by these surveys, it has also changed in different ways within segments. The derivation of market segmentation methods and their applicability in social marketing programs are described in this thesis before a discussion of their use in antismoking programs.

1.6 Creation of attractive and motivational exchanges

Marketing developed in a free-enterprise environment. Customers are not coerced or manipulated into behaving a particular way as they might be in a planned or directed economy. They have to be persuaded to voluntarily behave in a particular way. Andreasen's fourth benchmark states that social marketing programs aim to persuade the audience to behave in a particular way by convincing them that the consequences of the proposed action are attractive and motivating. Marketing theory and practice aims to persuade the audience that behaving in a particular way promotes their own self-interest as the benefits the person will receive from the recommended behaviour outweigh the costs and this approach is also applicable in social marketing situations.(Bryant, 2000) In marketing terms, a proposed course of action is attractive and motivating if it is perceived by the audience as offering "value", that is, the perceived benefits exceed the perceived costs.

There is a very important difference between an exchange in a commercial marketing situation and a social marketing exchange. In the commercial marketing situation, there are two readily identifiable parties involved, the marketer and the customer, and the exchange consists of a flow of something of value in both directions. The product (a bundle of benefits) flows from the marketer to the customer, and the price flows in the opposite direction. In this way, both parties part with something and receive something

in a successful marketing exchange: the customer has the product they need and the marketer has the revenue they need. In the social marketing exchange there are usually more than two parties. The social marketer is one party and the audience (the current or potential smoker) is another. There is however, a third party affected by the exchange, the community. While the smoker who ceases or the potential smoker who does not take it up benefit as they avoid the harmful effects of smoking, the community also benefits from the reduction in smoking-related costs without changing their behaviour. Another crucial difference is the location of the exchange. In a commercial marketing transaction, the exchange is external to both parties. An observer can verify that the exchange has taken place; that the customer received the benefits and marketer received the price. In the social marketing situation, the critical exchange happens inside the target audience's head. They part with something (usually a relatively immediate gratification such as the nicotine "rush" or acceptance in one's peer group) in exchange for, usually, a longer-term benefit (improved health or quality of life). The "product" the customer receives was not made or supplied by the marketer, so the analogy of the product flowing from the marketer to customer does not apply and there is usually no flow of price from customer to marketer. Furthermore, the other beneficiaries (the community) do not part with any "price" in the transaction – they have not forgone any nicotine rush. It is also hard for the observer to evaluate the benefit received by the customer as it cannot be certain that the smoker would have suffered the medical consequences depicted in the advertisement that motivated them to participate in the exchange.

The concept of exchange is discussed in this thesis as it is crucial to an understanding of the social marketing process and it brings together a number of other key marketing concepts. For a start, it focuses on the "customer" and necessitates a clear understanding of their perceptions, how they evaluate the benefits and costs of a proposed course of action, and the other factors that influence their behaviour in this situation. It also necessitates a clear understanding of the processes of motivation and of persuasive communication so that the marketer can influence behaviour in the desired direction. These concepts and their applicability in the social marketing situation are all explained in more detail in this thesis.

1.7 Marketing's 4P

Andreasen's fifth benchmark states that a genuine social marketing approach to solving a community problem "attempts to use all four Ps of the traditional marketing mix."(2002). The 4Ps is a marketing concept attributed to McCarthy (1960) and used to describe the elements that a marketer manipulates to make an attractive, motivating offer to the target audience. They consist of the *Product* that flows from marketer to customer. In marketing analysis, this is usually the particular benefits that the customer is buying. The second P is *Price*. This is the assets that the customer parts with in exchange for the product. At least some of the price flows to the marketer so that both parties are satisfied by the exchange. The third P covers the process by which the customer gains access to the product. This P covers the gap between the time, place and form when the product is produced and the time, place and form in which it is consumed. It is often labeled *Distribution* but to fit in with the 4Ps concept it is called *Physical Distribution* or *Place*, when matching the other single word Ps. The remaining P covers the process by which the other elements of the mix are communicated to the audience in a way that will persuade them to engage in the exchange. It is often labeled *Communication*, or *Promotion* to fit the single word 4P framework.

The difficulties associated with identifying the product in the social marketing situation were referred to above but it is essential to understand the audience's perception of the product and the price before the social marketer can begin creating an attractive and motivating exchange. An important marketing concept related to Product is the Product Life Cycle (PLC). Levitt's (1965) model of a product being launched, growing, maturing and declining shows great similarities with the Lopez *et al.* (1994) description of the trajectory of smoking prevalence. The PLC model is discussed in this thesis and its implications for antismoking campaigns are identified. The most important lesson is to understand the determinants of the shape of the PLC or smoking trajectory curve in order to properly interpret its shape so far and to forecast likely future trends. It was noted above that the tendency for young people, especially young women, to continue to take

up smoking has the potential to arrest the recent decline in smoking prevalence and possibly to drive a return to increasing smoking prevalence.

Price, in the marketing context, is best regarded as the economists' concept of something forgone to receive the benefits of possessing the product. Once again, it is the customer's perspective that influences their evaluation of the exchange and their behaviour. The actual dollar amount of the price is often an important factor but it is virtually never the only one considered when evaluating an exchange. An important element might be the customer's time and effort. They might be prepared to pay extra money for an exchange that is more convenient or saves their time. For customers who enjoy the shopping experience, it is one of the benefits in the exchange. For those who do not enjoy it, it is one of the costs. Research discussed in the next chapter includes evidence that increases in the dollar price of cigarettes is associated with a decrease in demand and this supports the use of increasing tax charges on tobacco sales to inhibit demand. When developing an antismoking program though, it is important to include the non-monetary costs of not smoking. For the smoker, these include the foregone benefits of the satisfactions afforded by smoking and the real costs of the symptoms associated with withdrawal from nicotine. For the young person contemplating taking up smoking, the benefits foregone are likely to be quite different and include such things as peer acceptance. The antismoking campaigns discussed in this thesis do not address these different true cost elements in different segments in the audience and therefore, do not help the audiences evaluate the proposed exchange.

As there is no obvious product flowing from the marketer to the customer in the social marketing exchange, there is no obvious equivalent of the Place element. Possible treatments include regarding this process as the distribution of the message to the target audience. In this thesis, this is an issue that is addressed with other communication issues under the fourth P, promotion. Distribution, in the sense of facilitating access to the product, might be regarded as the process of removing barriers between the product and the audience. In this thesis, barriers are treated under Andreasen's sixth benchmark, competition.

The remaining P, promotion, or in this case, promotion strategy, is the central focus of this thesis. Models of the communication process and in particular, persuasive communication are discussed. The antismoking strategy discussed in this thesis relies primarily on a particular form of persuasive communication, the fear appeal. The limitations of a fear appeal strategy are discussed below. The analysis suggests that reliance on this one strategy is not associated with continued success in encouraging desirable smoking behaviour changes across all segments of the target audience.

1.8 Paying attention to competition

Andreasen's last benchmark of a genuine social marketing approach to a community problem states that "careful attention is paid to the competition faced by the desired behaviour." A key marketing concept developed in commercial marketing and adopted by social marketing is consideration of the environment in which the marketing activity will take place. The environment contains two sorts of factors: opportunities are factors that will assist in the achievement of the marketer's objectives. Threats are factors which will impede the achievement of the marketer's objectives. The nature of these environmental factors is discussed in the next chapter of this thesis. Competitors are usually regarded as a threat (although a competitor's weakness presents an opportunity for the marketer). A competitor is defined as anything that the customer regards as an alternative way of satisfying the needs addressed by the marketer's product. For example, a person buying a car might only be choosing between brands of cars after they have decided against relying on public transport. Their principal need is for transport and public transport is currently too expensive and unreliable from this customer's perspective. The car company must monitor developments in public transport as well as among the other car makers since a change in prices and service levels there will just as effectively thwart achievement of the car maker's sales targets as a special offer from one of the other car makers. Once again, there is the need for research to focus on the audience to understand their perspective and identify the real needs being met by smoking. Once these factors are correctly understood, a truly competitive social marketing program can be developed.

In the antismoking case, competition consists not just of the efforts of the tobacco companies but also the benefits that the audience perceive to be associated with smoking – either taking it up or continuing to smoke, depending on which segment the strategy is targeting – as these are the factors that will work against the achievement of reduced smoking prevalence in the long run. It will be shown in this thesis that only one of the competitors (the powerfully addictive nature of nicotine) is identified and is only relevant for one segment of the audience – smokers.

1.9 Hypotheses

Data analysis tests the proposition that the current antismoking campaigns have been associated with a continuing decline in smoking prevalence in Australia and smoking prevalence is likely to continue to follow the trajectory proposed by Lopez *et al.* and others and continue to decline. The analysis then seeks to identify separate segments in the Australian population based on smoking status and several demographic and social characteristics. The third aspect of the analysis identifies important differences in the patterns of change in smoking behaviour between these segments. In social marketing terms, the segments have shown different responses during a period when they were all exposed to the same message strategy. These propositions are expressed and tested in the form of the following three null hypotheses:

> H_{01}: Smoking prevalence has remained unchanged in Australia between 1990 and 2005.
>
> H_{02}: There is no difference in the pattern of smoking status in different segments of the Australian population.
>
> H_{03}: There is no difference in the patterns of change in smoking status in different segments of the Australian population between 1990 and 2005.

1.10 Data and methodology

The data used in this analysis consist of the confidentialised unit record files (CURF) of the NHS carried out in 1989/90, 1995, 2000/01 and 2005. These are all large surveys conducted by the Australian Bureau of Statistics (ABS) across Australia to assess the reported state of the population's health, their experience of medical products and services, and aspects of their lifestyle that are likely to have an impact on their health. The CURFs contain a complete record of each response with any identifying material removed and some responses (largely those from small groups) amalgamated with others so that no response can be linked to any respondent either accidentally or by manipulating the data. Changes in questions and recording of answers in successive surveys mean that responses had to be regrouped and recoded into a standard format so that meaningful comparisons could be made across surveys. The treatment of non-responses to selected questions was also checked to ensure that this data could be included in the analysis without introducing bias or errors. After the data preparation was completed, estimates of selected population profiles calculated from the NHS were compared with the corresponding Estimates of Resident Population calculated by the ABS using national census data. This comparison confirmed that the NHS sampling and weighting methodology generates population estimates very close to those based on the census and that findings based on the NHS samples can be generalized to the relevant national populations.

1.11 Data analysis, stage 1.

The first stage of the data analysis looks at changes in smoking prevalence in the whole population and changes in the percentage of people who are in the each of the three smoking status categories (current smoker, ex-smoker or never-smoked) over the period covered by the four surveys. The data is then segmented into different groups based on gender, age, county of birth, occupation and income, and the relationships between membership of any of these groups and smoking status are explored. Percentages are not appropriate for this analysis as it is not the size of the groups that is of interest but the likelihood of a person in one of the groups being a current, ex- or never smoker. Therefore the analysis focuses on the changes in the odds of belonging to each of these smoking status categories associated with membership of the different demographic and social groups and how these odds change over time. This analysis provides initial answers to the questions posed in the three hypotheses above, as it shows a marked decline in the rate at which smoking prevalence is reducing in Australia over the ten years between the last three surveys. It also demonstrates the different trends in the changes of smoking status in some segments compared with others. As well as looking at changes in groups over time, this section of the analysis also includes an approximate cohort analysis. While it is not possible to identify and track individual respondents, the data is grouped into five-year age groups and the surveys were conducted approximately five years apart, so it is possible to compare the responses a group gave in one survey with those the group gave in the next oldest age group in the next survey. Comparison of odds in this fashion is limited to treating all the time, behavioural, demographic and social factors a small number at a time. It rapidly becomes unmanageable to show the effect of more than three or four factors at one time.

1.12 Data analysis, stage 2.

Exploring the impact of the variables a couple at a time is rarely satisfactory as the variables are often connected and may have a different impact when considered together rather than in isolation. To assess the impact of the factors when combined, it is

necessary to conduct a regression analysis and, because the outcome or dependent variable (membership of one of the smoking status groups) is categorical not continuous, logistic regression is appropriate. Three additive binary logistic regression models are fitted showing the impact of the independent or indicator factors on the odds of belonging to one of the smoking status groups compared with not belonging in that group. Binary logistic regression is appropriate where the dependent or outcome variable has only two possible values (in this case, membership of the group or non-membership). Research in health and related areas is typically of this binary sort. The outcome has only two values, for example, pregnant or not, dead or alive, presence or absence of a disease. The simple additive model provided a benchmark for comparison with more developed models that include interactions between factors. The interactions were grouped into those between the immutable, "Demographic" factors, that is gender, age group and country of birth, and those between the changeable, "Social" factors, occupation and income. The models were rerun with these interactions treated as main effect factors. The binary comparisons are:

- Current smokers compared with non-smokers, that is, with ex- and never-smokers.
- Ex-smokers compared with people who have never quit smoking, that is, with current smokers and those who have never smoked.
- Never smokers compared with those who have smoked at some stage, that is, with current and ex-smokers.

These models highlight the effects of different characteristics on the odds of belonging to one group or another. There are significant differences in odds between different groups and obvious gradients as changes in the values of some variables are associated with significant changes in odds.

1.13 Data analysis, stage 3.

Just as treating the factors a couple at a time is not sufficient for an analysis such as this, comparing the odds of membership of one smoking status category with non-membership as was done in the binary logistic regression analysis above is not sufficient either. The comparison is with a composite group that consists of the members of two other groups who might have quite different characteristics. To check whether the make-up of the reference groups might have obscured differences or otherwise generated inaccurate findings, the data was re-analysed using multinomial logistic regression. Multinomial logistic regression can accommodate more than two values in a categorical dependent variable by setting one of the values as the reference group and comparing odds in each of the outcome categories with that reference group. In this analysis, the comparisons are:

- Current smokers compared with those who have never smoked
- Ex-smokers compared with current smokers

The process was the same as for the binomial analysis, purely additive main effect models were developed first and then models incorporating the demographic and social interactions included were developed.

1.14 Findings

The analysis found that there was a significant decline in smoking prevalence between the first two surveys and no significant decline in overall smoking prevalence in the period between the last three surveys. The preliminary analysis indicates that, overall, there is a significant decline in smoking prevalence between the 1990 and 2005 surveys, so null hypothesis H_{01} Smoking prevalence has remained unchanged in Australia between 1990 and 2005, is rejected at the 95 percent level. This finding is deceptive though, as it obscures the fact that there are two quite different trends observed in this period. If H_{01} had been divided into two or more hypotheses, then a clearer picture of the changes in smoking prevalence would appear. For example, H_{01} can be divided into two hypotheses:

H_{011} Smoking prevalence remained unchanged in Australia between 1990 and 1995

H_{012} Smoking prevalence remained unchanged in Australia between 1995 and 2005

Then, H_{011} would be rejected but H_{012} would not and this would be a more accurate representation of the key finding that after a period of sustained decline in Australia, overall smoking prevalence remained unchanged for the last ten years of the period covered by the NHS. The logistic regression confirms the lack of any change in the last three surveys but indicates that the changes between the 1990 and 1995 surveys and between the 1995 and 2000 surveys to some extent cancelled each other out with the result that the change from 1990 to 2005 is even smaller than indicated in the preliminary analysis. The odds ratio, while significant, is very close to 1.0. This plateauing in smoking prevalence has serious implications for the social marketers addressing the problem of smoking-related damage to the community. Among the most important implications is the evidence that smoking prevalence in Australia might not continue to follow the trajectory proposed by Lopez *et al.* and others. The evidence suggests that smoking prevalence might follow one of Levitt's hypothetical product life cycles which include repeated stages of growth and maturity before eventually reaching a terminal decline some time long into the future, well beyond the 2010 – 2015 time-scale described in the literature review. In terms of communication strategy, the data suggests the repeated exposure to increasingly graphic and confrontational fear-arousing messages may not be associated with continued effectiveness in reducing smoking prevalence.

1.15 Segmentation

H_{02}: There is no difference in the pattern of smoking status in different segments of the Australian population.

The preliminary analysis found and the logistic regression analysis confirmed the presence of different segments in the population with regard to smoking status. The prevalence of current, ex- and never-smokers among males is different from the prevalence of these groups among females. There are significant age, occupation and income group gradients clearly visible among the different smoking status groups. These factors generally provided good predictors of smoking status in some categories. H_{02} is rejected at the 95 percent level.

> H_{03}: There is no difference in the patterns of change in smoking status in different segments of the Australian population between 1990 and 2005.

Again, the preliminary analysis found and the logistic regression confirmed that trends in smoking status were not the same across groups. Significant differences were found between the rates at which males and females were taking up and subsequently quitting or continuing to smoke. Age, country of birth, occupation and income group factors all proved to be good predictors of changes in smoking status for some groups. H_{03} is rejected at the 95 level. Changes in smoking status have been different in different segments. An important finding is that the current strategy is associated with continued high levels of smoking cessation but this success has been uneven across segments with females more likely to quit than males. On the other hand, the strategy is not associated with success in helping young women avoid taking up smoking in the first place – they are less likely to remain never-smokers. This trend for young people to continue to take up smoking means that the success in getting smokers to quit is being undone as new smokers replace those who quit. There is a need to recognise these different segments in the market so that appropriately tailored programs can be developed to achieve the same level of success in prevention that has been achieved in cessation programs.

1.16 Conclusion and recommendations

The data indicates that proper attention is not being paid to Andreasen's social marketing benchmarks when developing current antismoking programs. Measured against the benchmark of behaviour change, maintaining the current, fear-based strategy does not appear to be associated with a continued reduction in smoking prevalence in Australia. The strategy is associated with success in helping smokers to quit the habit; there is a general increase in the prevalence of ex-smokers and in many segments, the odds of being an ex-smoker have increased during the period of these four surveys. Increasing the prevalence of ex-smokers is only one half of the behaviour challenge that must be met if tobacco smoking's trajectory is to follow a simple product life cycle and decline to insignificant levels. If each smoker who quits is replaced by a new smoker taking up the habit, smoking's trajectory will level off and smoking will continue to cause damage to the community. If the rate at which young people take up smoking exceeds the rate at which smokers are quitting, then smoking prevalence will increase and smoking's cycle will resemble one of Levitt's hypothetical cycles with repeated stages of growth and maturity, needlessly increasing and prolonging the damage done to the community.

Attention should now be paid to bringing the level of success in reducing smoking initiation up to that sustained in smoking cessation.

Both social and commercial marketers have amassed a considerable body of research into audience behaviour. Most models of consumer or audience behaviour are hierarchical and involve the person progressing through several stages culminating in a particular behaviour. The current intrusive strategy seems well suited to the task of encouraging a smoker who is well down the path to cessation to take the last, hardest step of quitting. It does not address the situation of a teenager contemplating taking up smoking. There is also a body of research examining the effectiveness of fear appeals. The current, increasingly intrusive and graphic fear appeal either does not recognise any of the research indicating an "inverted U" relationship where, beyond a certain point, inducing greater fear becomes less effective, or is based on the assumption that this turning point has not been reached yet. The leveling off in the smoking prevalence suggests that this

assumption must be re-examined. Many models of health behaviour and the mechanisms by which fear appeals influence behaviour emphasize the link between perceived vulnerability to the threat, capacity to do something to avoid it and motivation to behave as directed in the communication program. Further research is needed, especially among committed, heavy smokers to determine the credibility of the threats; do these smokers accept that the horrible medical consequences depicted in ads and on packs will actually happen to them? Does their perception of their own health and that of their fellow smokers support the threats? Further research is also needed to determine the impact of these threats on a teenager contemplating taking up smoking.

Andreasen recommends careful attention be paid to audience segmentation. The research described above confirms the existence of quite distinct behavioural, demographic and social segments in the community with regard to smoking behaviour. It is recommended that once distinct segments in the audience are identified, appropriately tailored programs are directed at the segments to ensure greater relevance, impact and success.

Andreasen's fourth benchmark recommends the creation of attractive and motivational exchanges. The current strategy does not recognise the true costs in the change of behaviour being recommended. The benefits offered in the exchange include the avoidance of the very undesirable future medical consequences of continuing to smoke. Further research is needed to determine the smokers' evaluation of these benefits (this is related to the credibility of the threat mentioned above) and also the evaluation of the costs of quitting; that is, the benefits of smoking that are foregone. This is particularly important in the case of young people contemplating taking up smoking. The two aspects of the exchange need to be better understood. It is possible the benefits of not smoking are too remote and of low value compared with the immediate benefits to be had from taking it up. More research is needed to properly identify and evaluate the benefits foregone when a young person does not take up smoking. It is quite possible that there are important, very different segments in both current and potential smokers who will evaluate these benefits and costs, and therefore the proposed exchange, quite differently.

It will be shown in the next chapter that the direct application of the traditional marketing mix, the 4Ps, in the social marketing context is problematic. It is recommended that further research is devoted to gaining a better understanding of an antismoking program's *product*. That is, what particular bundle of *benefits* is the customer *purchasing* and how does the customer evaluate it? Further development of tobacco smoking's product life cycle (as discussed above) will also assist in the development of appropriate antismoking programs. Similarly, as pointed out above, a better understanding of the things of value foregone, the *price*, as perceived by the audience is necessary. These two key pieces of information are crucial if motivating exchanges are to be created. Again, it is likely that there are important segments in the audience who evaluate these things differently. Applicability of the *place* element is problematic in this context and *promotion*, the fourth element, is receiving attention already.

The last of Andreasen's benchmarks recommends that attention be paid to the competition faced by the desired behaviour. Marketers need to be aware of the environment in which the program will be operating and in which the proposed behaviour will take place. There are two sorts of factors in this environment; *opportunities* which are factors that will assist in the achievement of the program's aims, and *threats* which are factors that will hinder the achievement of these aims. Chief among the threats is the competition. Competition in this context does not just include the tobacco companies, it includes all the factors that encourage a person to take up and continue to smoke. This relates to the perceived benefits of smoking and audience segmentation, as discussed above. More research is recommended to better identify the competitors to antismoking programs so that they can be addressed in these campaigns.

It is recommended that attention be paid to these guidelines now because the current strategy is only partially successful and the area where it is less successful (prevention) has the potential to undermine the whole project and to perpetuate the current level of smoking-related damage being experienced by the Australian community. As Australia is among the countries at the forefront of the attack on cigarette smoking, failure here will have serious implications throughout the world.

Chapter 2: Literature Review

2.1 Introduction

Wiebe (1951/2) is credited with providing the impetus that led to the development of social marketing. Kotler (Kotler and Andreasen, 1995; Kotler and Levy, 1969, 1971a; Kotler and Roberto, 1989) and others continued its development. Andreasen (Andreasen, 1994, 1997, 2002, 2006; Andreasen and Kotler, 2003) was also important in this development. He identified social marketing as the application of marketing techniques and methods to influence peoples' behaviour in a way that is beneficial for the welfare of the community. He suggested that three characteristics identify a social marketing program:

1. It holds behavior change as its "bottom line,"
2. therefore [it] is fanatically customer-driven, and
3. [it] emphasizes creating attractive exchanges that encourage behavior (2002)

Tobacco smoking is an example of behaviour which attacks the welfare of the community. It has been labelled the single biggest cause of avoidable mortality and morbidity in the world. It is therefore an important example of behaviour that needs to be changed. Such a complex and severe community health problem needs a multi-faceted approach including a social marketing program. The attack on smoking will be most effective when all facets, including the social marketing program, are properly developed and executed. Andreasen expanded the three characteristics into six benchmarks by which a social marketing program can be identified and assessed:

1. Behavior change is the benchmark used to design and evaluate interventions.
2. Projects consistently use audience research. The research has three roles: formative (when developing the intervention), pretesting of an intervention, and monitoring the intervention's impact.

3. There is careful segmentation of target audiences.
4. The central element of any influence strategy is creating attractive and motivational exchanges.
5. The strategy attempts to use all four Ps of the traditional marketing mix.
6. Careful attention is paid to the competition faced by the desired behavior. (Andreasen, 2002)

This thesis examines current mass media antismoking programs in Australia against these benchmarks to identify ways in which their effectiveness might be further improved.

2.2 Background to Andreasen's benchmarks

The benchmarks are underpinned by knowledge of the identity of the target whose behaviour is to be influenced, their perspective and a model of how their behaviour can be influenced. This focus on the customer's perspective is central to marketing theory (Bartels, 1962; Cravens, 1997; Gabbot, 2004; Jones and Shaw, 2006; Kotler, Adam, Brown, and Armstrong, 2006; Perreault and McCarthy, 2000; Pride *et al.*, 2006). Many cite Adam Smith's "invisible hand" of market forces (A. Smith, 1776) rather than government legislation or other coercion. This "invisible hand" regulates markets when each participant acts in their own (enlightened or informed) self-interest as they perceive it to be.

For Smith, markets grew out of man's innate capacity to trade. ". . . a certain propensity in human nature . . . the propensity to truck, barter, and exchange one thing for another;" a capacity that sets man aside from all other animals. Smith held that markets by their nature tend towards equilibrium and the efficient allocation of resources, capital and the division of labour. Smith proposed that a person who works in their own, intelligent self-interest will actually contribute to the benefit of the whole society – the maximising of its wealth – even though this was not their primary or even conscious intention.

The intelligent exercise of a person's self-interest requires only that they have the necessary information to make a proper decision and the liberty to act in the absence of any distortions due to deception, manipulation or coercion. This belief underpins current behaviour models discussed below and is at the heart of notions of exchange and perceived value also discussed below.

Marketing relies on persuading a customer to change their voluntary behaviour as it has no legislative or other coercive power to bring about behaviour change(Rothschild, 1999c). Adam Smith explained the central role of the customer this way:

> Consumption is the sole end and purpose of all production; and the interest of the producer ought to be attended to, only so far as it may necessary for promoting that of the consumer. (A. Smith, 1776)

This contrasts with approaches that emphasise the interests of the manufacturers who sort to make products available in sufficient quantities and at a price low enough that people could afford them (called Production focus) or attempt "to dispose of all the products we make at a favourable price (a Selling focus (Keith, 1960) The work of a pioneer of the selling approach (Strong, 1925) is discussed below. His interest in the customer was limited to identifying states of mind which could be manipulated to persuade people to buy things.

The customer is at the centre of contemporary descriptions of marketing (and according to Andreasen, social marketing):

> . . . a *customer orientation* backed by *integrated marketing* aimed at generating *customer satisfaction* as the key to satisfying organizational goals. (Kotler, 1972) (italics in original).

> . . . the management of the innovative and imitative processes that firms use to identify and satisfy customers while being more cost-effective than their rivals.(Dickson, 1997).

The Chartered Institute of Marketing in the United Kingdom now puts the customer at the centre of their definition of marketing:

> Marketing is the management process responsible for identifying, anticipating and satisfying customer requirements profitably. (CIM web reference)

The word "profitably" in this definition might imply that marketing only applies in the for-profit sector. The CIM definition applies in the social marketing context if it is understood that marketing is different from charity. Marketing involves an exchange where both parties receive something of value. It will be seen in 2.6.1 that marketing exchanges are driven by an understanding of the customer's perception of their own self-interest.

2.3 Behaviour change

As marketing's focus evolved from production and distribution of products to a focus on influencing peoples' behaviour, the relevance of marketing methods and insights to the wider community increased. Credit for raising awareness of this relevance is often given to Weibe. In 1951-52, he observed that "American businessmen have invested hundreds of millions of dollars in radio and television advertising" and raised the possibility that this investment might have application in areas of greater importance than merely "motivating them to buy commodities." The question he asked was:

> Why can't you sell brotherhood and rational thinking like you sell soap? (Wiebe, 1951/2)

As Kotler and Roberto point out, campaigns to bring about social change "have been waged from time immemorial." (Kotler and Roberto, 1989). Weibe's contribution was to bring to the task, methods and insights developed in the commercial sector. At the time, the commercial sector was often depicted as at best, irrelevant to the community or social

sector. At worst, it was regarded as the cause of the social ills that were to be addressed by the social change agents. Writers such as Vance Packard (Packard, 1959) and others believed that marketers had become so skilled at manipulation that they could sell anything. It will be seen later that the promotional activities of tobacco companies are regarded by some as important causes of current levels of smoking prevalence and this is the rationale for banning these promotion activities. (see (Anderson, Hastings, and MacFadyen, 2002) below.) Weibe proposed that, while this is an overstatement of marketing's power, it is a valuable pointer to where marketing expertise can make a contribution to the community.

During the following two decades, the social aspects of marketing were emerging as it evolved from a study of production and distribution to focus on people; in Bartel's words, from "economic behaviour to social behaviour" (Bartels, 1974). Kotler and Levy (1969) spoke of "broadening the scope of marketing" from a profit-oriented, commercial discipline to one that contributed to the betterment of the community but did not use the term "social marketing" to cover these non-commercial activities. Roberto also recommended the application of marketing techniques (he used the term a "marketing model") to *public sector* issues rather than social marketing.(Roberto, 1991) At the same time, awareness of the social responsibilities of marketing and commerce in general to the wider community began to emerge. Bartels reports a 1974 study that found that ninety-five percent of a sample of 73 U.S. marketing professors "felt that the scope of marketing should be broadened to include non-business organizations, and 93% believed that marketing is not solely concerned with economic goods and services." (Bartels, 1974)

But initially, the broadening only extended to promoting an idea not influencing behaviour:

> Social marketing is the design, implementation, and control of programs calculated to influence the *acceptability of social ideas* and involving considerations of product planning, pricing, communication, distribution, and marketing research. (Kotler and Zaltman, 1971b) (Italics added)

Tom Carroll describes social marketing as playing a key role in the Australian National Campaign Against Drug Abuse and subsequent campaigns and lists its successes as, "reaching significant numbers of their respective target audiences and communicating effectively in line with designated communication objectives" and achieving "cognition and belief change." (Carroll, 1996)

Some authors questioned whether the objective is to *educate* the target audience to the dangers or the benefits of some particular behaviour or to *persuade* them to change their behaviour in the desired direction.(Manoff, 1985) Andreasen is adamant that social marketing's contribution is behaviour change, not the promotion of an idea. He regards the latter as health promotion or simply health advertising.(Andreasen, 1995, 1997, 2002). As was shown above, promotion or advertising is only one of the element or the marketing mix.

> Social marketers, both scholars and practitioners, have come to accept that the fundamental objective of social marketing is not promoting ideas (as Kotler and Zaltman [1971] suggest) but influencing behavior (Andreasen, 1994). It is also recognized that, though products are often involved in behavior change processes, social marketing can also apply to such purely behavioral challenges as keeping girls in school in developing countries (Andreasen, 2002)

Others support this position and assert that one of the crucial elements in the development of a successful social marketing strategy is "attention to the science of behaviour change." (Lichtenstein *et al.*, 1990)

Gerard Hastings and Rob Donovan also call for a "broadening of social marketing." They point out that social marketing needs to focus not just on individual behaviour but also on the social and physical factors that determine the behaviour. "Social marketers should be addressing structural change to lessen inequalities that are related to health and well-being."(Hastings and Donovan, 2002) This approach broadens the social marketer's role from that of change agent to one of manager of a coalition of practitioners in the

"sister disciplines" of health promotion and media advocacy, legislators and law enforcers, educators, welfare services and the like. Butler states that health education in the 1970s and 1980s emphasised "altering individual's behaviour. In the 1990s, health education expanded to encompass social action." (Butler, 2001). This thesis attempts to measure changes in smoking behaviour that has been associated with a sustained social marketing program. For a discussion of a multi-disciplinary approach, see Bauer, Johnson, Hopkins, and Brooks' 2000 assessment of a comprehensive antismoking program aimed at youth in the state of Florida.

2.3.1 Alternatives to social marketing

There are numerous alternative strategies to bring about positive behaviour change in the community and very often, the alternatives are not exclusive. In fact, many evaluations of social marketing campaigns have indicated that they are more effective when they are part of an integrated, multi-faceted approach.(Flynn *et al.*, 1994; Price *et al.*, 1998). Hastings and Donovan's proposal above, suggests that these alternatives should all be employed as well as social marketing programs, as they are complementary and more likely to be effective as they contribute to a comprehensive attack on the problem and the environmental factors that encourage it.

This section uses as its starting point, the structure suggested by (Rothschild, 1999a) that there are three categories of behaviour change strategies: education, marketing and the law. Kotler and Roberto also include technology and economics as important categories. (Kotler and Roberto, 1989) As was noted above, one of the features that distinguishes marketing from other behavioural change strategies is its focus on the individual consumer. The legal, economic and technological approaches take the focus off the individual and aim to create a set of circumstances that will change the behaviour of large groups of consumers *en masse*. These alternatives to the marketing approach seek to undermine the consumer's autonomy. Rather than aim to influence the consumer's voluntary behaviour by persuasion, they attempt to influence behaviour through manipulation or coercion. One such strategy is the use of government legislation to

change behaviour; the *law* approach in Rothschild's terms. Once legislation has been introduced, the task changes from one of influencing behaviour through persuasion to principally one of enforcement.

A search of New South Wales, Australian legislation web site (NSW Gov.) using the words "tobacco" and "smoking" generates a list of 39 Acts and Regulations related to tobacco smoking in this state. The legislation acts in two directions. It aims to reduce the demand for tobacco products by restricting the occasions on which a person can smoke. The Smoke-free Environment Act 2000 No. 69 sets out the increasing list of areas where tobacco smoking is prohibited and the various responsibilities of the owners and managers of these spaces with regard to enforcing the law, signage and other requirements. This legislation also interacts with other legislation such as the Occupational Health and Safety Regulation 2001, as exposure to environmental tobacco smoke or "second hand smoke" is regarded as a health risk. On the supply side, Part 6 of the Public Health Act 1991 No. 10 relates entirely to "Tobacco and other smoking products." This section deals with restrictions on the sale of these products, the display of warning signs, the advertising of tobacco products and has a separate part addressing *Juvenile smoking* listing the steps taken to restrict juvenile exposure and access to cigarettes. There is also a separate Public Health (Tobacco) Regulation 1999 which examines operational issues involved in applying the provisions of the Act and interacts with other legislation including federal legislation such as the Trade Practices Act 1974.

There is a similar list of legislation at state and federal levels addressing other social ills such as unsafe driving practices (including speeding and driving under the influence of alcohol), alcohol and other drug abuse, even addressing unsafe, antisocial or environmentally unfriendly behaviours in recreational boating and fishing. The legislative strategies in antismoking, road safety and other areas are often accompanied by community education and advertising campaigns to explain and to support the legislation. Researchers have compared the impact of drug education and drug law-enforcement on youth drug behaviour and concluded that education can be as effective as law-enforcement but that there is less consistency in the education strategies' results. (Midford, 2000)

While legislation and law enforcement do not fall within the control of social marketers and therefore are not part of social marketing's mix of elements, they can have a complementary role with social marketing in a multi-faceted approach to a particular problem. Social marketing's target in this situation is to influence the behaviour of the law-makers and law-enforcers through the use of marketing communication techniques, especially public relations.

Many authors take an economist stance and show that increases in taxation on tobacco products results in an increase in price and, at least in the short-term, a reduction in consumption by as much as seven percent. (Flewelling *et al.*, 1992) In the longer-term, the effect is not as clear. Often too, these changes have unintended consequences. For example, Geis, Cartwright, and Houston (2003) describe how increases in taxation on tobacco sales in Australia led to the growth of a significant black market in tobacco. Others have found that restricting access to tobacco products, for example by prohibiting sales to minors, can have a significant effect on adolescent smoking. (Forster *et al.*, 1998) Several authors examined the combined impact of price increases and by-laws restricting smoking in public places in Canada. Stephens *et al.* found that the two measures together had a significant impact on smoking prevalence, as measured in national health surveys and that the presence of either measure alone was less effective than employing both together. (Stephens *et al.*, 1997) As mentioned above, the impact of these other, non-social marketing initiatives might be to create an environment that is more conducive to the success of marketing campaigns. Simon Chapman and others identified the decline in cigarette consumption in Australia and the U.S. associated with the establishment of smoke-free workplaces and projected that, if workplaces became universally smoke-free, it would result in a reduction of more than one billion in the number of cigarettes consumed in Australia. (Chapman *et al.*, 1999)

2.3.2 Health promotion and health education

According to Manoff, there have been three "eras" of health education, beginning with the realisation of the role of "environmental sanitation" in the health of the community (1840 – 1890), the "war on germs (1890 – 1910)", to the initially "primitive" attempts at disease prevention (1910 to date). (Manoff, 1985) The difference between health promotion and health education is not consistently described in the literature. Glanz, Lewis, Rimer, eds, (1997) report that "the terms . . . are often used interchangeably. To Butler, *health promotion* is the encompassing term that includes health education, health protection and disease prevention (Butler, 2001). A common definition of health promotion is:

> A planned combination of educational, political, regulatory, and organizational supports for actions and conditions of living conducive to the health of individuals, groups or communities.(Green and Kreuter, 1999)

Social marketing is listed as one of many "health promotion strategies and methods" by many authors (Egger, Spark, and Lawson, 1992). Other types of strategies include "community approaches" and "environmental approaches" aimed at forming partnerships and mobilising communities to bring about behaviour change, or bringing about changes in the organisational, policy and technological environment to achieve these changes.

Many of these approaches differ from a social marketing approach because they are not "fanatically consumer-focused," focusing rather, on the community or the environment. Many do not apply all four Ps of the traditional marketing mix, focusing instead on the advertising communication aspects of the *Promotion* P. Development of the communication campaigns is usually either explicitly or implicitly based on one of the usually, hierarchical and very often, cognitive models discussed below. In this context, a highly affective (rather than cognitive) message element will be incorporated to induce fear or shock in the audience as a method of generating and maintaining attention while an essentially cognitive (e.g., health consequences) message is communicated to the target audience.

2.3.3 Models of behaviour change

Reliance on models and theory flows from a belief that there must be some basis for believing that a planned intervention will have the desired outcome. "One of the fundamental characteristics of a true profession is that it has a theoretical base underlying its practice." (Shirreffs, 1984). E. K. Strong proposed that if a person is to be persuaded to purchase a product they must be directed through a series of states of mind in relation to the product. The sequence is set out in the familiar AIDA model (Strong, 1925):

Awareness > Interest > Desire > Action

There is strong face validity to this model. It recognises that a person will not buy a product if they are not aware of its existence and its functions but that awareness is not enough to prompt purchase. A person needs to become interested in the product and find out more about it. They will still not purchase the product however, if they do not want it, and want it enough to pay its price. In the smoking context, a person is unlikely to quit smoking if they are not aware of the true cost of smoking. Conversely, they are unlikely to take up smoking unless they perceive some benefits in smoking. This hierarchical structure still underpins a large number of the models used when developing antismoking strategies. An important feature of models such as this is that the target audience is regarded as a passive player who is being manipulated by a marketer who knows what is best for them.

Other approaches to understanding consumer behaviour and the factors that influence it include statistical approaches such as that of Massy, Frank, and Lodahl (1968) who used factor analyses to quantify relationships between purchase behaviour and personality and socio-economic variables. Others have used techniques such as Markov processes and learning models to predict behaviour (McDonald, 2004). This provided a foundation for a statistical approach to market segmentation, as discussed below. There are many difficulties associated with these mathematical approaches, difficulties addressed with

varying success by academics exploring structural equation modelling and dynamic causal models (McDonald, 2004); (Golob, 2003); (Reinecke, 2002); (Hanssens, Parsons, and Schultz, 1989) and *learning models* (Haines, 1969).

Kotler suggests that buyer behaviour is so complex that "theory develops in connection with particular aspects of it." and individual researchers are pursuing their own areas of interest "in the hope that someday someone will put them all together."(Kotler, 1973) John A. Howard developed one of the first integrated models (Howard, 1963). Since then, many others continue to develop behaviour models that marketers can use when developing programs to influence the audience's behaviour. (Howard and Sheth, 1969; Nicosia, 1966; Engel, Kollat, and Blackwell, 1973; Loudon and Della Bitta, 1993) A typical, integrated model is that developed by Engel, Blackwell, and Miniard in 1990 and shown in Figure 2.1.

The model shows the interaction of the stimuli (included those controlled by the marketer) and other variables including characteristics of the person and external influences in forming behaviour. It will be shown below that these models have been adapted to be directly applicable in the social marketing and health-related contexts. In each case, the model guides the marketer in preparing a program to influence specific behaviour in a desired direction. Many of these behaviour models have been adapted to the social marketing and health education situation and a sample is discussed in sections 2.3.4 and 2.3.5, below.

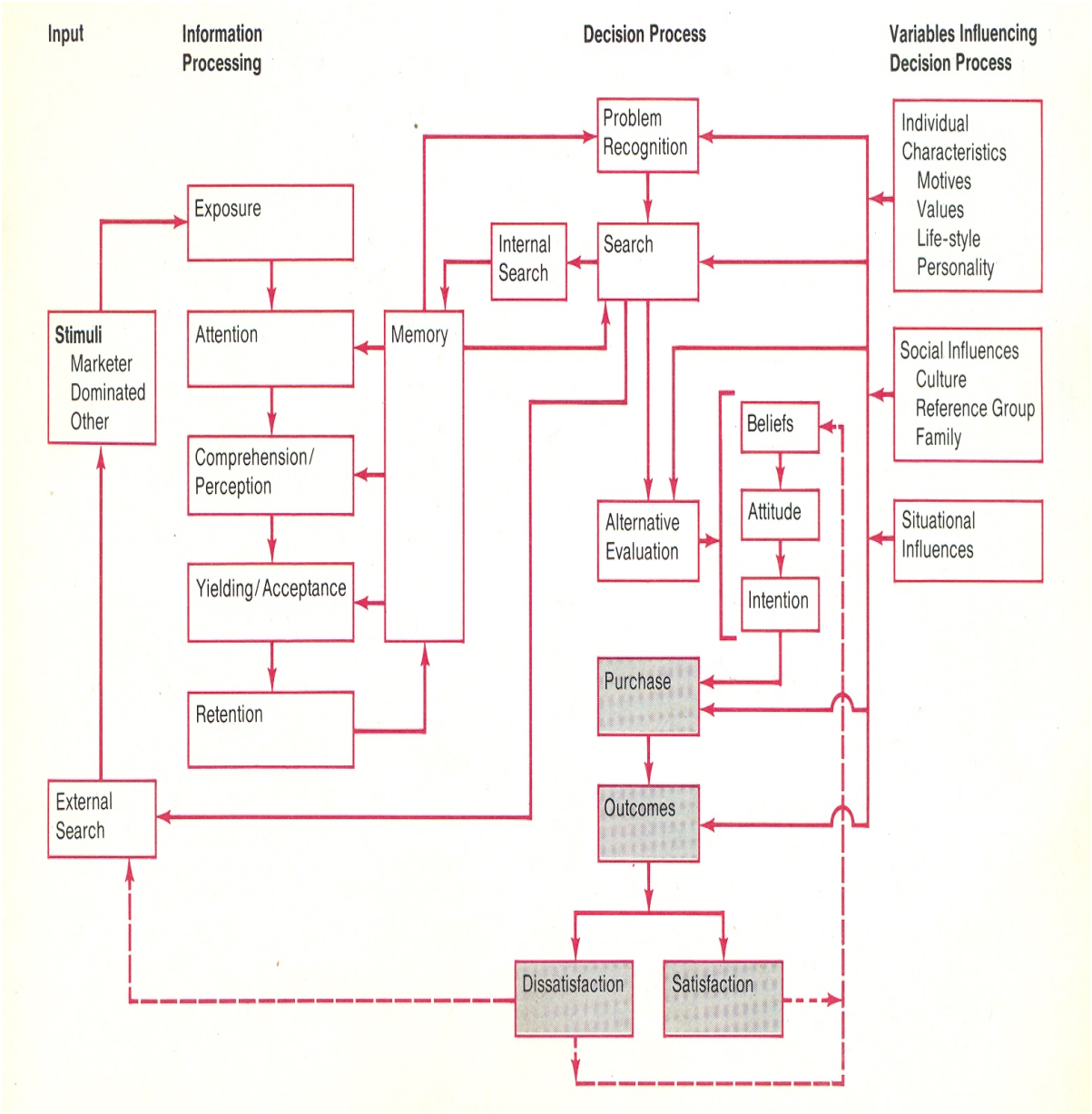


Figure 2.1. The Decision Process Model (Engel *et al.*, 1990)

2.3.4 The Stages of Change or Transtheoretical Model

A popular model in health education and health promotion literature is James Prochaska's *Stages of Change* or *Transtheoretical* model (TTM)(J. O. Prochaska and DiClementi, 1983, 1984; J. O. Prochaska, Redding, and Evers, 1997). A search of the EBSCO database using the key terms "Prochaska" or "Stages of Change" generates over 600 articles either re-examining the Prochaska model or applying it in contexts as widely separated as substance use (C. A. McDonald, Roberts, and Descheemaeker, 2000), "handwashing compliance", smoking cessation, health and safety practices in manufacturing organisations, child welfare, gambling and adolescent offenders, treatment of traumatic stress disorder (Rooney *et al.*, 2005), and conversion to the Jewish faith (Bockian, Glenwick, and Bernstein, 2005). Andreasen and Kotler show how a simplified, four stage version of Prochaska's model can be integrated into the development of a social marketing campaign. It is included in most social marketing, health education and health promotion textbooks (Andreasen and Kotler, 2003; Butler, 2001; Egger *et al.*, 1992; Glanz *et al.*, 1997; Goldberg, Fishbein, and Middlestadt, 1997)

The model depicts the process as a logical progression through a series of five stages in relation to the change. It underwent extensive refinement and discussion to reach the fully developed form shown in Table 2.1. (See (J. O. Prochaska, 2005; J. O. Prochaska *et al.*, 1992; J. O. Prochaska and DiClementi, 1983, 1984; J. O. Prochaska *et al.*, 1997; J. O. Prochaska *et al.*, 1991; Velicer and Prochaska, 1997). The actual time spent in any of the stages is determined by the individual's motivation to move to the next stage. The process is not always one way. A person might drop out of the sequence after completing one or two stages and then re-enter the cycle some time later. (Butler, 2001) Prochaska states that the stages are both stable and subject to change. Stable, in that the characteristics of the stage and the processes necessary to progress through them remain the same. Subject to change as "chronic behavioral risk factors" are subject to change.

Table 2.1. Transtheoretical model constructs

Stage	Description
Precontemplation	Has no intention to take action within the next 6 months
Contemplation	Intends to take action within the next 6 months
Preparation	Intends to take action within the next 30 days and has taken some behavioral steps in this direction
Action	Has changed overt behaviour for less than 6 months
Maintenance	Has changed overt behavior for more than 6 months

Source: (J. O. Prochaska *et al.*, 1997)

Other key elements in the model include ten *processes of change*, the *pros and cons of changing*, and *self-efficacy* and *temptation* which influence progress through the stages. Prochaska describes the *processes of change*, the cognitive and affective interventions appropriate to people in this stage that assist in the transition from one state to the next. A real benefit of the Transtheoretical model is that it provides a practical guide to segmenting the target market so that appropriate strategies can be developed to match the segment's needs at that stage. Butler (2001) describes the communication strategies that are appropriate at each stage in the model. The *processes* do not include all the marketing mix elements or a consideration of the *exchange* the person is evaluating when deciding whether to proceed from one stage to the next but they make a real contribution to the development of this aspect of a social marketing campaign. (Burke *et al.*, 2000) tested the stages of change "algorithm" in relation to improving healthy behaviours such as exercise and diet. They found that the algorithm is relevant and recommend that "stage-matched" programs be developed when dealing with adolescents.

2.3.5 The Health Belief Model

The Health Belief Model (Rosenstock, 1990; Strecher and Rosenstock, 1997) takes a more cognitive approach, emphasising the communication of information about the impact on a person's health of particular behaviours. The heart of the model is the belief that "individuals will take action to ward off, to screen for, or to control and ill-health condition" if the following conditions are met:

The individual must believe:

1. that they are susceptible to the condition
2. the condition will have potentially serious consequences
3. that a course of action available to them would be beneficial in reducing either their susceptibility to or the severity of the condition, and
4. that the anticipated barriers (or costs of) taking the action are outweighed by its benefits.

The key concepts and their communications implications (application) are shown in Table 2.2.

The model appears in over 300 articles revealed by a search in EBSCO database. Minor modifications to the model are recommended in a limited number of articles (see for example Roden, 2004). The Health Belief Model is also considered with other models ((Dutta-Bergman, 2005; Lajunen and Rasanen, 2004) and specifically with such models as TTM (Juniper *et al.*, 2004) and the Theory of Planned Behavior and Locus of Control models (Lajunen and Rasanen, 2004). Direct applications of the model range from diabetes (several articles including Gillibrand and Stevenson, 2006; Shiaw-Ling *et al.*, 2006), bicycle helmet wearing (Lajunen and Rasanen, 2004), nurses' health promotion practices (Roden, 2004), attacks on various forms of cancer such as colorectal cancer (Beverly, 2006), and hepatitis B (Wai *et al.*., 2005).

Table 2.2. Key concepts of the Health Belief Model and their application

Concept	Definition	Application
Perceived susceptibility	One's opinion of chances of getting a condition	Define population(s) at risk, risk levels. Personalize risk based on a person's characteristics or behaviour. Make perceived susceptibility more consistent with individual's actual risk.
Perceived severity	One's opinion of how serious a condition and its sequelae are.	Specify consequences of the risk and the condition
Perceived benefits	One's opinion of the efficacy of the advised action to reduce risk or seriousness of impact.	Define action to take: how, where, when; clarify the positive effects to be expected.
Perceived barriers	One's opinion of the tangible and psychological costs of the advised action.	Identify and reduce perceived barriers through reassurance, correction of misinformation, incentives, assistance.
Cues to action	Strategies to activate one's "readiness."	Provide how-to information, promote awareness, employ reminder systems.
Self-efficacy	One's confidence in one's ability to take action.	Provide training, guidance in performing action. Use progressive goal setting. Give verbal reinforcement. Demonstrate desired behaviours. Reduce anxiety.

Source: (Strecher and Rosenstock, 1997)

The model also appears in most social marketing guides (Goldberg *et al.*, 1997) and papers (Andreasen, 2002), and in health promotion and health education textbooks (Butler, 2001; Egger *et al.*, 1992; Glanz *et al.*, 1997). Exploring a related concept, Dijkstra and De Vries (2000) found a relationship between different sorts of self-efficacy and subsequent tobacco smoking behaviour including progressing to regular smoking status or cessation.

The Health Belief Model follows the cognitive approach; knowledge → attitude → intention → behaviour, of Fishbein, Ajzen and others discussed above. Like the TTM, the Health Belief Model lacks several of Andreasen's benchmarks necessary for a project to be regarded as social marketing. The Health Belief Model's contribution to social marketing is to provide specific communication objectives for the Promotion *P* of the marketing mix.

2.3.6 Other models of behaviour change

Albert Bandura's Social Learning Theory (Bandura, 1997, 1997a) introduced the concept of *self-efficacy* which was taken up by Rogers in his *Protection Motivation* model, discussed above. An individual's behaviour is a function of their expectations and their beliefs. The model links individual perception of connections and consequences in the environment (which environmental factors lead to specific outcomes), consequences of the individual's actions and the individual's competency to execute the behaviours that will lead to desirable outcomes. This is another cognitive, Fishbein-type approach that focuses on the barriers to change that might inhibit the success of a behaviour-change campaign. This approach is common in community-level campaigns, especially those directed at *community building* and *community mobilisation* and has application when considering the sixth of Andreasen's benchmarks; *Careful attention is paid to the competition faced by the desired behavior*. Competition in this context means any barriers or alternative behaviours that might take precedence over the desired behaviour. It is a valuable addition to the list of considerations social marketer and health promoter

need to consider when developing a social marketing campaign. It is treated in this way in most social marketing and health promotion guidelines. (Andreasen, 2002; Egger *et al.*, 1992; Glanz *et al.*, 1997).

Behavioural reinforcement theories (see for example Bickel and Vuchinich, 2000) apply an essentially Pavlovian strategy, focusing on rewards and punishments associated with different behaviours. This is only partially considering the nature of the desired exchange being proposed by the social marketer and is directed more at manipulation than persuasion.

Collins and Ellickson tested a model that integrated many elements from those discussed above and others such as Social Learning Theory and Problem Behaviour theories. They concluded that the effectiveness of this integrated model was superior to any of the individual "theory-based" models. (R. L. Collins and Ellickson, 2004) Others proposed a model much like a simplified persuasive communication model of the type discussed above. They suggest that advertising influences the agenda considered by the target audience. This in turn, influences intentions and intentions influence behaviour (which they labelled "outcomes.") (Wakefield *et al.*, 2003a, 2003b) This last step was further reinforced in Wakefield *et al.* (2004) which found a strong relationship between reported smoking intentions and subsequent outcomes among Australian youth. (Nezami, Sussman, and Pentz (2003) propose four conceptions of "motivation" (including the concept included in the TTM discussed above) that can be applied in the development of smoking cessation campaigns. Cable *et al.* (1999) identified five categories of factors that have an impact on life-style change related to health. These categories include motivations, barriers and empowerment factors that will either inhibit or encourage behaviour change. More recently, Sussman *et al.* (2004) point out that the community problems that social marketers are attempting to address are usually complex in nature and origins and that a "transdisciplinary" approach is needed, bringing together social marketing expertise and assistance from psychology and the other disciplines that inform social marketing theory (see the section Borrowing from other disciplines, above.) and this also includes legislators and policy-makers, economists and community groups.

2.3.7 Summary of models of behaviour change

Assael lists four limitations that restrict the application of models of consumer behaviour that are also applicable to social marketers:

1. The components of a model may not be equally important for all product categories.
2. The components of a model may not be equally important for all usage situations.
3. A model may vary among individuals in the same market.
4. All purchase decisions are not equally complex. (Assael, 1995)

Bearing Assael's limitations in mind, there are many models of behaviour available for all marketers including social marketer campaigns to use when developing a social marketing program. Achievement of Andreasen's first benchmark, behaviour change, necessitates the application of an appropriate model to underpin the development of the social marketing program.

2.4 Projects consistently use audience research

The models described above are based on extensive research. Development of an effective social marketing program using these models needs reliable research on variables such as the individual's characteristics and other influences. It also needs data on the state of internal factors such as beliefs, attitudes and intentions. The analysis discussed in this thesis examines data on the characteristics of people with different smoking status to illustrate how research is to be used in the development of a program. The analysis discussed below, together with other smoking-related research, also provides an assessment tool to evaluate the impact of the social marketing program.

2.5 Careful segmentation of target audiences

Andreasen places a lot of emphasis on segmentation as a crucial element in the success of a social marketing program:

> "I have told many audiences that, too often, behavior change initiatives do not adequately exploit the power of segmentation approaches. Sometimes programs do not segment their target audiences at all, perhaps arguing (especially if they are a government agency) that they must cover everyone. Others, when they do segment, tend to use the most accessible and seemingly obvious segmentation measures - gender, ethnicity, location - even though they may not be predictive of appropriate interventions." (Andreasen, 2006)

As was shown above, the overall objective of marketing is to influence the voluntary behaviour of consumers, persuading them to engage in exchanges with the marketer. It was also shown above that the process of influencing consumers' behaviour is moderated by subjective, psychological factors such as perception and interpretation. The response to a particular stimulus might be quite different for different individuals and in different situations. Potentially then, to ensure maximum effectiveness, the marketer should craft individually tailored marketing strategies for each of the individuals in the target audience, taking into account their different characteristics and situations. This would preclude the use of efficient, large-scale mass production facilities producing large quantities of low cost, standard products, bulk distribution networks, standard pricing, and communication of a standard message through low cost mass media. An optimum position must be found between complete standardisation and complete individual customisation. This intermediate position is *market segmentation*.

Market segmentation is defined by McDonald and Dunbar as;

> Market segmentation is the process of splitting customers, or potential customers, within a market into different groups, or segments, within which customers have

> the same, or similar requirements satisfied by a distinct marketing mix. (M. McDonald and Dunbar, 1998)

Note that the process is defined in terms of the *customers*, not the *products* sold in the market. This is another illustration of the application of a customer focus to the marketing process.

The pioneer of market segmentation was Wendell Smith. He observed a lack of homogeneity in the products offered for sale by individual suppliers. He speculated that this lack of homogeneity was not the result of a deliberate strategy on the part of the marketers as much as a reflection of "diversity of supply" which was due in part to one or more of a range of causes including;

- variations in production equipment and methods
- specialised or superior resources
- unequal progress . . . in design . . . of products
- inability of manufacturers . . . to eliminate product variations (despite quality control)
- variation in producers' estimates of the nature of market demand (W. R. Smith, 1956)

Diversity in demand originated from "different customs, desire for variety, or desire for exclusiveness or . . . from basic differences in user needs." (W. R. Smith, 1956). Some variation in demand may have also be due to differences in motivation and capability that lead to "shopping errors" made by the consumer because

> Not all consumers have the desire or the ability to shop in a sufficiently efficient or rational manner as to bring about selection of the most needed or most wanted goods or services. (W. R. Smith, 1956)

Smith proposed two strategies to deal with these differences in demand; convergence and divergence. A *convergence* strategy effectively ignores the differences in demand and "by means of effective use of appealing product claims designed to make a satisfactory demand converge upon the product or product line being promoted." (W. R. Smith,1956). A *divergence* strategy, recognises the differences among consumers and "implies the ability to merchandise to a heterogeneous market by emphasising the precision with which a firm's products can satisfy the requirements of one or more distinguishable market segments." (W. R. Smith,1956)

A segment of a market is a relatively homogeneous group of consumers within the larger, more heterogeneous market. The key factor linking the members of the segment is a commonality of needs that is expressed as a common response to a particular stimulus.
The linking of the ability to recognise differences in consumer segments into the development of marketing strategies can be illustrated by comparing three different definitions of a market segment:

1. Customer groups with different characteristics, needs or behaviour (Kotler *et al.*, 2006)
2. Individuals, groups or organisations with one or more similar characteristics that cause them to have similar product needs (Pride *et al.*, 2006)
3. A relatively homogeneous group of customers who are likely to respond to a marketing mix in a similar way (Quester *et al.*, 2001)

The first definition focuses on the identification of the differences and using these differences to group potential or current customers. The second definition applies this knowledge to the development of a product strategy. The third definition applies the knowledge of the target segment's characteristics to the development of appropriate product, price, distribution and communication strategies.

This raises the problem introduced above; what is the right amount of customisation? In other words, how finely should the marketer differentiate between consumers, how many segments should the marketer identify in a market? McDonald and Dunbar list five *Rules*

for segmentation and most authors provide similar lists, designed to help the marketer recognise the optimum segmentation strategy. These or similar "rules" appear in most marketing guides. (see for example Cravens, 1997; M. McDonald and Dunbar, 1998; Perreault and McCarthy, 2000; Quester *et al.*, 2001)

In essence, a segmentation strategy is an effective strategy if it generates segments with the following characteristics:

1. Homogeneous: all the members of the segment share a particular, identified characteristic which is not present or is different in all people not in the segment.
2. Substantial: there are sufficient people in the segment to warrant development of a unique marketing mix for them.
3. Operational: the identified characteristics should be able to be used as a guide to generate a marketing mix that will appeal to the members of the segment more effectively than it will appeal to those not in the segment.

Other characteristics that are sometimes mentioned are of a purely practical nature such as, the need for the members of the segment to be accessible both in the sense that the marketer can communicate the value proposition to them and that the segment members have practical access to the product. In the absence of such accessibility, a marketing exchange cannot take place.

Marketing literature contains many discussions of lists of possible segmentation bases including customer characteristics such as demographic differences, behavioural differences such as the type of product purchased, or psychological differences such as attitude and belief differences. (Grunig, 1989) Dawson (1994) segmented the health care market, mainly on the basis of demographic data. Moufakkir (2006) looked at different gaming behaviour among different age segments. John and Miaoulis (1994) describe a method of segmenting the market for preventative health care that is based on the health benefits that are most relevant to the target audience. The list of benefits was largely based on the Health Beliefs Model (see 2.3.5 above.)

Application of segmentation strategies extends well outside the social marketing realm. For example, the marketing of tourist destinations is heavily influenced by demographic segmentation strategies (G. Miller, 2001; Zografos and Allcroft, 2007). However, the list is almost endless. It is hard to imagine a category of goods or services that does not have different variants of the product available to appeal to different "sorts of people." Everything from food and footwear to cars, houses and hairdressers are available in forms that appeal to one segment of the market and not to others.

It will be shown below that although many authors (including Andreasen, 2002; Grunig, 1989; John and Miaoulis, 1994; Roberto, 1991) have emphasised the need to segment target markets, some social marketing (and especially, antismoking) campaigns have not recognised important differences between segments and have used one marketing strategy in an attempt to achieve different goals with different segments. The analysis discussed in Chapters 5 and 6 identifies clearly different segments in the target audiences for antismoking campaigns and demonstrates how the same strategy has been associated with quite different behaviour changes in the different segments.

2.6 The creation of attractive and motivational exchanges

There are two different but equally important marketing concepts included in this benchmark: attraction and motivation, and exchanges. The next section discusses marketing exchanges.

2.6.1 Exchange

Earlier marketers focused on the transfer of goods from the time and place in which they were made to the time and place that they were consumed. Brown described marketing as "the process of transferring goods through commercial channels from producer to consumer."(Brown, 1925). Marketing was viewed as a management function, responsible for the distribution of products and the achievement of the firm's objectives, quite the

opposite of the Adam Smith proposition. By the middle of the twentieth century, the perspective had altered to include the needs of both the firm and the consumer. The Kotler and McCarthy quotes above illustrate this duality, both the organization and the consumer have their needs met by the single transaction. The objective for the marketer is to encourage a mutually satisfying exchange. A typical diagram of the marketing exchange is shown in Figure 2.2.

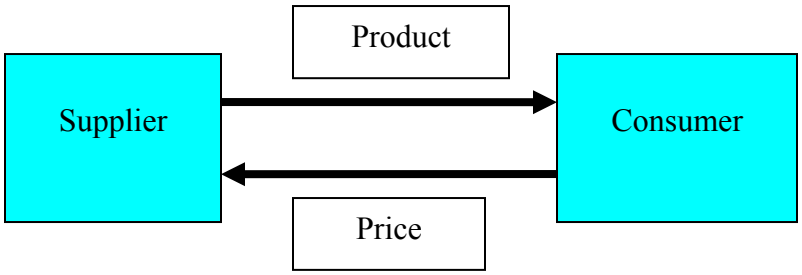


Figure 2.2. A mutually satisfying marketing exchange.

The Supplier supplies the Product to the Consumer. A Product is anything that can be made available for the satisfaction of the consumer's needs. The Consumer supplies money to the Supplier, satisfying the Supplier's need for funds to continue in business and continue to meet the Consumer's need. This figure greatly simplifies the situation; there are other important flows such as the supply of information which each party uses to make their purchase or supply decisions but more importantly, it is not a closed system. There are important leakages both into and out of the system. For example, not all of the Supplier's output goes to the Consumer. There are outputs such as pollution or reduced quality of life (e.g., among labour employed in "sweat shop" conditions) that impact on other non-consumers, not shown in the figure. From the Consumer perspective, not all of the cost of acquiring the product flows to the Supplier. For example, the cost to the Consumer of buying a car includes significant expenditure (on registration, petrol, repairs and insurance, for example) that does not flow to the Supplier of the car but to other parties, again not shown in this simplified figure. Awareness of these leakages led to the growth of a societal perspective in marketing in which the exchange is shown

occurring in an environment that includes the rest of society. Leakages from the system become more important in the discussion of social marketing, below.

Bagozzi and other authors have identified weaknesses in this over-simplified model, pointing out that, in reality, the final form of the exchange is often distorted by "uneven distribution of resources and access to information" and other factors both endogenous and exogenous to the exchange. (Bagozzi, 1975) These other factors include social norms, legal restrictions, and "situational contingencies." The impact of Bagozzi's recommendations is largely to make the model more precise but to leave the underlying mechanism unchanged. Houston and Gassenheimer (1987) also helped in this refinement, discussing the application of exchange theory developed by economists. The mechanisms that bring about these exchanges are discussed in the next section.

2.6.2 Customer perceived value

Marketing assumes a rational customer who is free from coercion, manipulation or deception when choosing whether or not to purchase a product. Whether the consumer chooses to enter into a particular exchange or not is determined by their perception of the value of the proposed exchange. *Value* is the balance between the benefits they will receive from the exchange and the costs that they will incur. This is expressed in a simplified way as:

$$\text{Value} = \text{Benefits} - \text{Costs}$$

The consumer attaches a subjective worth to the bundle of benefits they expect to gain from the transaction and deducts what they perceive to be the costs associated with acquiring those benefits. The residual is the consumer's perceived value. (Gabbot, 2004; Kotler *et al.*, 2006; Pride *et al.*, 2006; Solomon, Marshall, and Stuart, 2006). The consumer makes a rational choice to pursue the behaviour that yields the greatest perceived value. This applies equally to the choice between alternative ways of meeting the same need, that is, competing products A or B or between competing behaviours such

as purchasing a product or doing nothing. The role of the marketer is to communicate the necessary information in the most persuasive fashion, so as to influence the consumer's behaviour in the direction preferred by the marketer and away from any competing option. Consumers learn from their experiences and depending on their satisfaction with the exchange, repeat the choice, modify it or make an entirely different choice in future. This "feedback" is built into most models of consumer perceived value. (Pride *et al.*, 2006; Kotler *et al.*, 2006)

In the social marketing situation, the exchange is more difficult to depict. As will be explained below under Product in the section on Marketing Mix, there is no obvious product flowing from marketer to customer and it is not clear who the customer is. The audience consists of the people whose smoking behaviour is to be influenced but they do not "pay" any price to the marketer in return for a product and the community reaps benefits from the exchange in the form of lowered smoking-related costs but they have not changed their behaviour. Furthermore, in the social marketing situation, the exchange takes place inside the audience member. It is this person who must be persuaded that the benefits to them of not smoking outweigh the benefits that they would have received from smoking. Rothschild (1999b) and the analysis in this thesis indicate that social marketing programs rarely address the exchanges that they are asking the audience to make.

2.6.3 Attraction and motivation

The discussion of behaviour models above introduced the idea that behaviour is motivated by the achievement of certain objectives or reactions to certain stimuli. This section looks more closely at the mechanisms by which perceptions and stimuli drive behaviour.

In an attempt to develop programs that are as persuasive as possible, marketers borrow heavily from other disciplines. Economic concepts of exchange and value have been mentioned above. Marketers also make use of the concept of *price elasticity* to attempt to

understand changes in consumer behaviour in response to changes in the price asked for a product and competition theory to understand the behaviour of markets in certain conditions – monopoly, perfect competition and various states in between.

Sociology provided concepts such as *self-image* and *social class*. For example, Chapter 5 of Engel, Kollat and Blackwell's *Consumer Behaviour* (Engel *et al.*, 1973) is devoted to understanding the role of *Social Stratification* in influencing human behaviour. Other authors examine the application of sociological concepts in a discipline related to marketing – health education (Bunton, Nettleton, and Burrows, 1996). Anthropology contributed insights into the impact culture has on behaviour, especially the impact of values, norms and roles on a person's behaviour in a particular situation.

Marketing also draws heavily from psychology. Discussion of peoples' needs is usually anchored in Maslow's *Hierarchy of Needs* (Maslow, 1948). Understanding how these needs in turn influence behaviour also draws on Maslow (1971) and motivationists such as Herzburg (1966) and others including Mitchell (1983). Herzberg suggested that different factors have different effects. Some factors motivate people to behave in certain way while others are not necessarily motivators, their absence can be demotivating ("hygiene factors"). Mitchell brought together Maslow's theories and work by Reisman (Reisman, 2004) who suggested that some people are more influenced by other people (*outer-directed*), while others are more influenced by factors within themselves (*inner-directed*). According to Reisman, all people start off from the lower levels of the Maslow hierarchy but, as resources increase, people's behaviour varies in two directions depending on the extent to which they are inner- or outer-directed. Mitchell was able to identify nine different groups of people dependent on their *values and lifestyles* (VALS). As values have been identified as changing with culture, the VALS model is modified to suit its particular cultural environment. Modification of the model to suit the Australian environment was carried out by the Roy Morgan organisation, working with Colin Benjamin and is available as the *Roy Morgan Values Segments* model. See Figure 2.3. (Roy Morgan web reference).

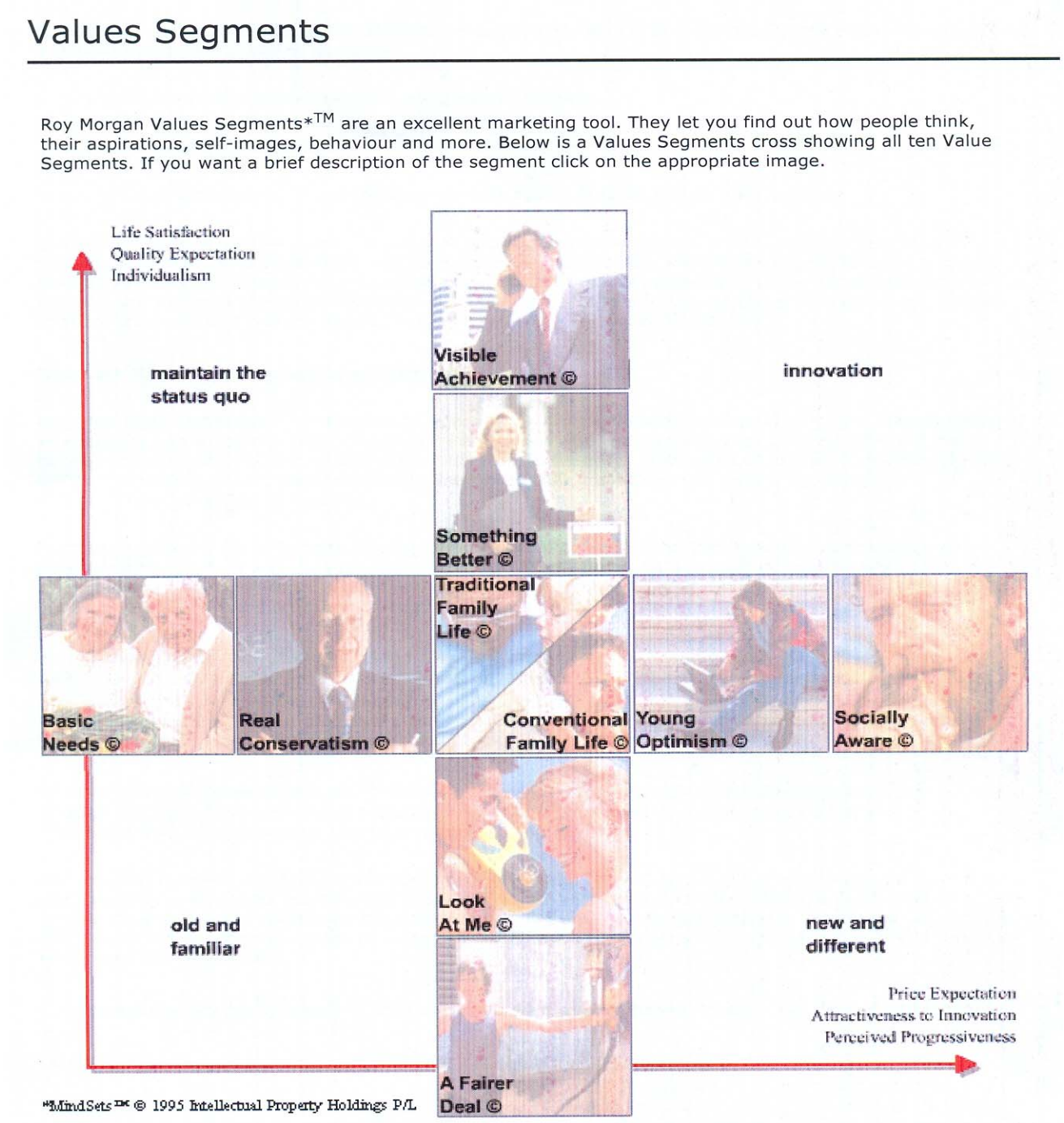


Figure 2.3. Roy Morgan Values Segments (Source: Roy Morgan web reference)

A marketer can theoretically use this information to generate products and marketing communication messages that will resonate with these values and influence the target audience's behaviour in the desired direction.

In a large number of models, the consumer's behaviour is assumed to be driven by their perception of the situation and the benefits and costs associated with the various options available to them, neuroscientists such as (E. P. Gardner and Martin, 2000; Kandel, 2000) provide some insights into the "science" of perception but psychology provides a marketers with more practical insights into the perception process. The interaction of attitudes, beliefs and other psychological factors in directing human behaviour, as described in the model developed by Fishbein and Ajzen in 1975 and subsequently refined in several publications, has been actively used by marketers when developing marketing strategies to influence the behaviour of particular target markets.

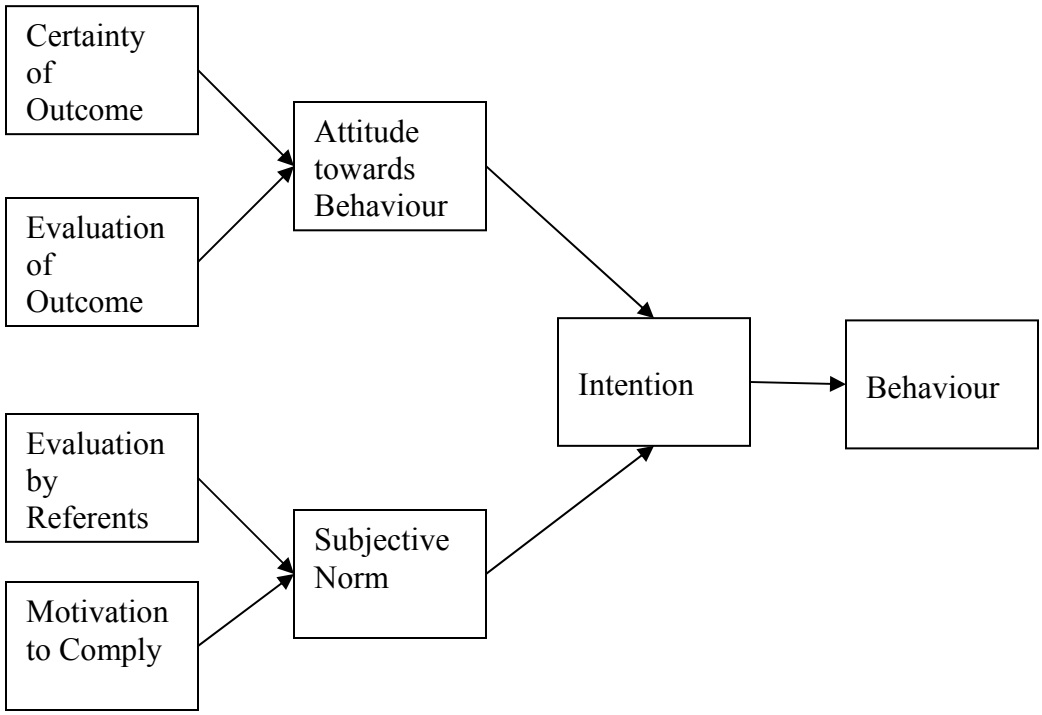


Figure 2.4. Attitudes and Beliefs model (Fishbein and Ajzen, 1975)

Their model, shown in Figure 2.4, suggests that in rational people, behaviour is largely determined by intentions and the intentions are, in turn, largely driven by the person's perceptions of the consequences of the behaviour, their attitude toward those consequences and reference group reactions. In their words,

> "We do not subscribe to the view that human social behavior is controlled by unconscious motives or overpowering desires, nor do we believe that it can be characterised as capricious or thoughtless . . . people consider the implications of their actions before they decide to engage or not engage in a given behaviour." (Ajzen and Fishbein, 1980)

The model can also be expressed mathematically as:

$$B \sim BI = W_1(AB) + W_2(SN)$$

Where B = the behaviour in question

BI = the behavioural intention

AB = the attitude towards the behaviour itself

SN = the Subjective Norm (

W_1 and W_2 = weights representing the relative impact of the factors.

The attitude towards the behaviour is influenced by the certainty with which the person believes that a particular outcome will follow from the behaviour and how they evaluate that outcome. The strength of the connection between behaviour and outcome influences the strength of the attitude and the evaluation of the outcome influences whether the attitude towards the behaviour is positive or negative. The Subjective Norm is a function of how the person believes important other people will view the behaviour and the person's inclination to comply with the views of those other people. The importance of this reference group or person determines the strength of the SN and the motivation to comply or not with the views of the reference group determines whether the SN influences the person towards or away from the behaviour.

Note that the person's attitude towards the behaviour and their beliefs about how important other people view the behaviour do not directly influence the behaviour in question. They influence the intention to behave in a particular way and the intention influences the behaviour. These principles are evident in some of the behaviour models discussed above, especially the Health Beliefs Model. In the communication section of

the Marketing Mix below, there is a discussion of communication's role in influencing these perceptions that in turn, influence behaviour. (See also Wakefield, 2004)

2.7 Use of all four Ps of the marketing mix

E. Jerome McCarthy borrowed the term *marketing mix* from an idea by Borden to describe the four 'ingredients' of the marketing management role that must be combined to produce a proper marketing strategy. (McCarthy, 1960) He listed the ingredients alliteratively as the 4P's: the correct *Product* to satisfy the consumer's needs, at the correct *Price*, to be offered to the consumer in the correct *Place* to ensure that the consumer can purchase the product, supported by the correct *Promotion* (shorthand for all the communication strategies) to communicate the elements of the mix to the consumer in the most persuasive way. The settings of each element in the mix are developed using models of consumer behaviour and consumer research to understand the audience's particular needs, their current state of mind, alternative options available to satisfy their needs, and many of the other variables discussed above.

Direct application of the mix elements from the commercial to the social marketing situation presents some problems however. For example, consider the *product*. Kotler (1989) uses cigarettes to illustrate a social marketing issue. He identifies the cigarette as the *product* that the target market *buys*. There are problems with this analysis for the social marketer. Firstly, it is not the social marketer who directly controls the cigarette product, it is not part of the social marketer's marketing mix and it is outside the social marketing exchange. There is a deeper problem related to the nature of a social marketer's *product* however. Many authors, including Fine, had previously defined a product as "anything having the ability to satisfy human needs or wants." (S. H. Fine, 1981) While this addresses the key characteristic of a marketing product – the satisfaction of a consumer's need – it does not reflect a marketing exchange. A product is therefore now defined as something "made available to the consumer to satisfy their needs." Satisfaction of a particular need or bundle of needs is the definition of a *benefit*, in marketing terminology. It is reasonable to suggest that the *benefit* the smoker is

seeking is not the ownership of some dried leaves wrapped in paper. They are more likely to be buying peer group acceptance, avoidance of withdrawal cravings or whatever their main motivation is for smoking. The *benefit* or product in an antismoking campaign is the reduction in the unnecessary morbidity and mortality that flows from reducing cigarette smoking. In this regard to the cigarette, the benefit of a social marketing program is an *anti-product*, since the objective is to reduce not encourage consumption. Furthermore, after a commercial marketing exchange, the consumer has the ownership of a product as lasting evidence of the transaction. After a successful social marketing exchange, the target market has not such evidence of the transaction. After a successful campaign to persuade a target group to use condoms when having sex, to avoid the spread of disease, it could be argued that the consumer has the condom as evidence of the transaction. (Cohen *et al.*, 1999; Van Rossem and Meekers, 2000) The actual social marketing success was in changing the sexual behaviour. The condom is evidence of a separate commercial exchange that flows from the successful behaviour change campaign.

A third problem relates to the fact that the target market for a social marketing campaign does not actually *buy* anything from the marketer. The marketer succeeds or "makes a sale", when the target individual changes their behaviour – either quits smoking or does not take it up, or adopts "safe" sex practices but the *product* does not flow from the marketer to the consumer in the manner shown in the diagram above. The change in behaviour on the part of the consumer generates a flow of benefits to themselves and to the community at large. There is a "leakage" from the two-party model into the community of people who are not party to the exchange in the sense that they have not changed their behaviour but benefit from the change in the targets' behaviour. A social marketing campaign intends to deliver a benefit to the community without them necessarily taking an active part in the exchange. If an audience is going to be persuaded to engage in an exchange, that is change their behaviour, the benefits they will receive from the change must outweigh the costs (see below) from their perspective, not the perspective of the rest of the community nor that of someone else (such as a doctor) whose behaviour is not being changed. A commercial marketing concept that is directly applicable to the tobacco smoking problem is the Product Life Cycle.

2.7.1 Product Life Cycle

A product was defined above as "anything that can be made available to the customer for the satisfaction of their needs."(Kotler *et al.*, 2006). As customer needs evolve, the products available to satisfy those needs also evolve. Theodore Levitt proposed that products experience a *life cycle* like those of most living things (Levitt, 1965). A typical product passes through a four-stage life cycle (Figure 2.5)

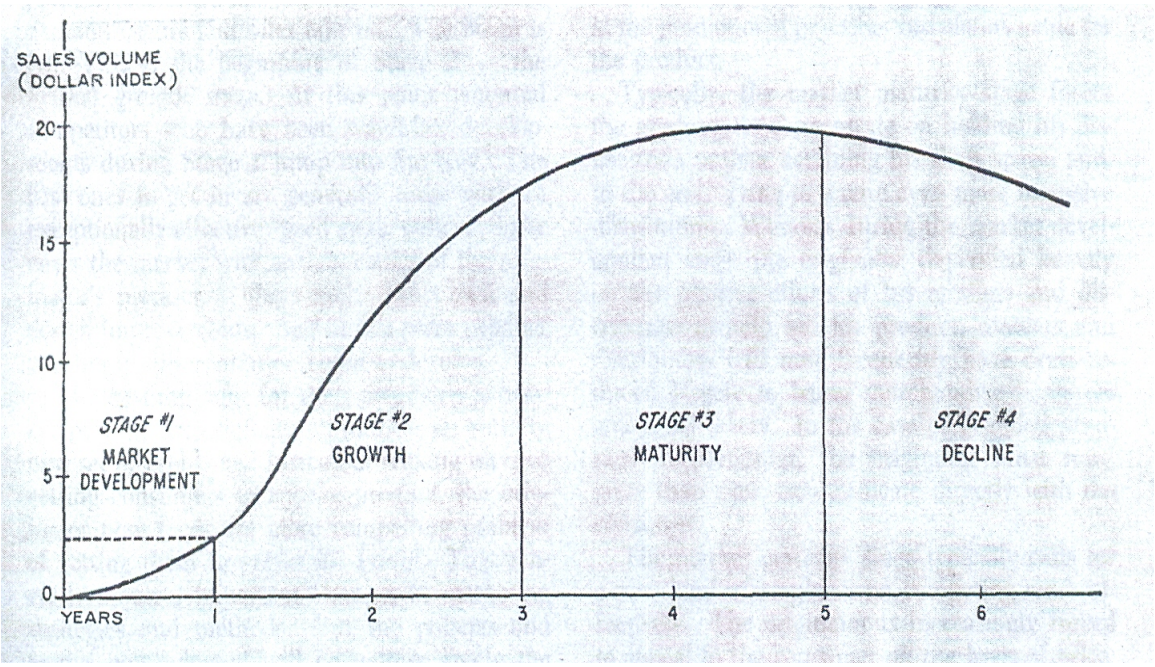


Figure 2.5. The original Product Life Cycle diagram (Source: Levitt, 1965)

The initial, Development, stage is the phase when the new product is first launched onto the market. Demand is low as very new products only appeal to a small proportion of the population. Rogers' model of the spread of an innovation through a community is discussed below, he claimed that the first people in a community to adopt a new product, the *Innovators*, only account for 2.5 percent of the overall market (Pride *et al.*, 2006; E. M. Rogers, 1962). As word of the innovators' successful experience with the product spreads through the market distribution becomes properly established and the

communication message begins to be more salient and effective with a wider range of people, demand begins to accelerate as new customers enter the market. Levitt called this the "Takeoff Stage" or Market Growth (Levitt, 1965). Demand continues to expand until all those customers who are going to enter the market have done so. As the number of new customers entering the market approaches its peak, the growth in sales begins to taper off and the product enters the Maturity stage. In the maturity stage, there are no new customers entering the market, so the rate of sales drops to replacement only and the growth rate drops. From then on, it is all down hill as demand declines. No new customers enter the market and existing customers begin leaving to purchase newer, alternative products or have just become sick of this particular product. At the end of the Decline stage, sales and demand are zero, the product is taken out of the market.

The Product Life Cycle model is a key marketing concept (Kerin, Hartley, and Rubelius, 2004; Kotler *et al.*, 2006; Pride *et al.*, 2006; Quester *et al.*, 2001). It will be seen below that (Lopez, Collishaw, and Piha, 1994) proposed a very similar model for the *life cycle* or "trajectory" of the "product" tobacco smoking.

The shape of the product life cycle shown in Figure 2.5 is the simplest form of the model. Levitt also added another diagram to show the pattern of profits during the life cycle and this is usually incorporated into the life cycle diagram in its more recent forms (see the later references listed above). A more important variation though, is the recognition that unlike for living things who, in the absence of reincarnation, only have one life cycle, products may have a range of different shaped "lives." For example, a highly seasonal product will experience a series of growth, maturity and decline stages on an annual basis on their journey between *development* and *decline*. There are also other types of products that have a longer but just as pronounced, inherent regular oscillations throughout their life. For example, a tourist destination may experience growth in the number of visitors until all the "opinion leaders" have been there. Once they have been there, these opinion leaders look for another destination to experience and the first destination suffers a decline in visitors until its "turn" comes around again, years later. Levitt also showed how the marketers a product can achieve a form of immortality for their product (see Figure 2.6).

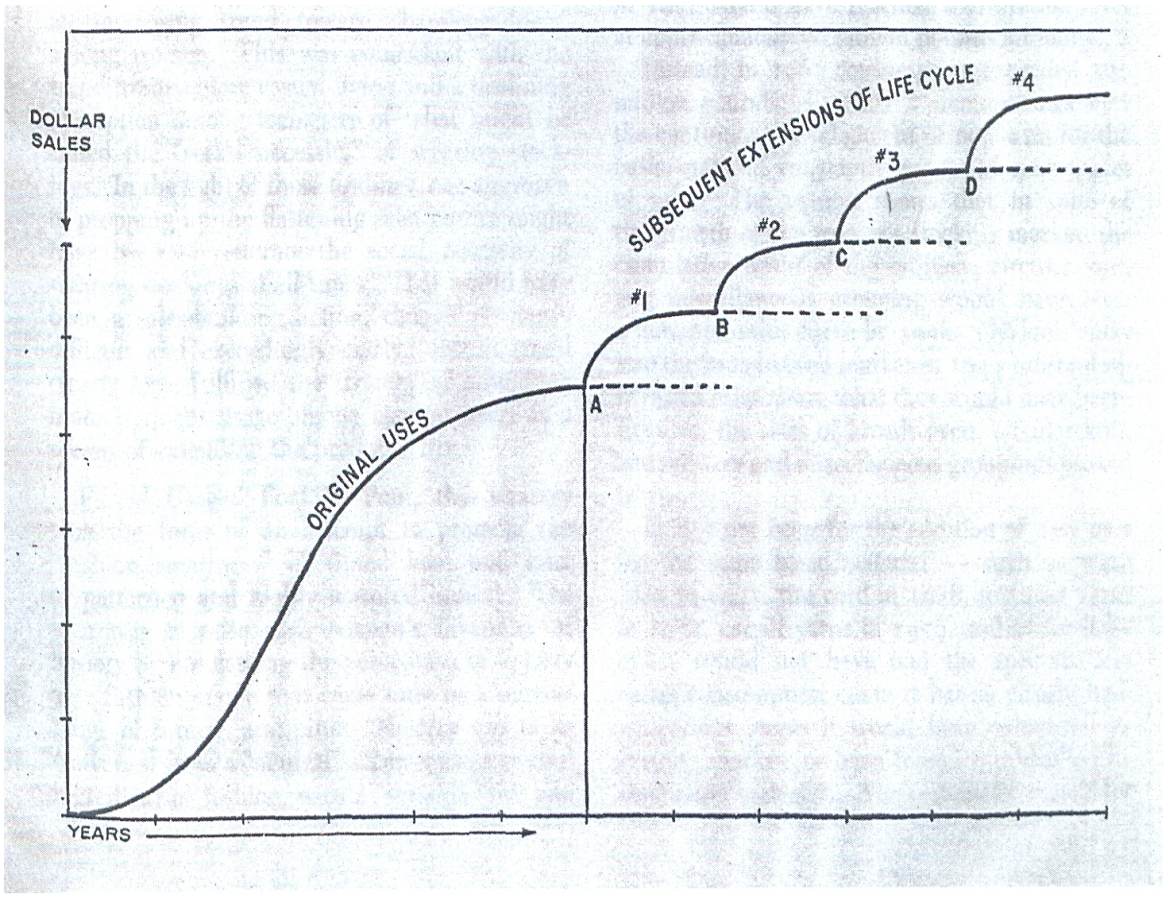


Figure 2.6. A hypothetical life cycle – nylon (Source: (Levitt, 1965a))

The product, nylon, was originally used in military applications. As this market entered maturity, DuPont launched into the hosiery market, then into other markets. Each time, a new stage of growth was added to the life cycle. Commercial marketers attempt to achieve the same result by "relaunching" their product at regular intervals, finding some excuse to bring to the market a "new" version of the product. It will be shown later that, rather than a single, unidirectional life cycle, tobacco smoking may be demonstrating a long term cycle. Rather than continuing the *decline* stage to the point where there is no longer a market for tobacco products, demand may level off and even return to growth.

2.7.2 Diffusion and adoption of innovations

The product life cycle begins with the launch of a new product and the strategic "relaunches" described above also involve a new product entering the market. Rogers (1962) showed that people who are the first to purchase new products have important characteristics that separate them from other, more cautious buyers who wait until a product is "proven" in the market place before they risk buying it. Rogers showed that an innovation spreads through a community in much the same way that a disease spreads through a community. He grouped consumers into five categories based on the time after the product is first that they make their first purchase (see Figure 2.7).

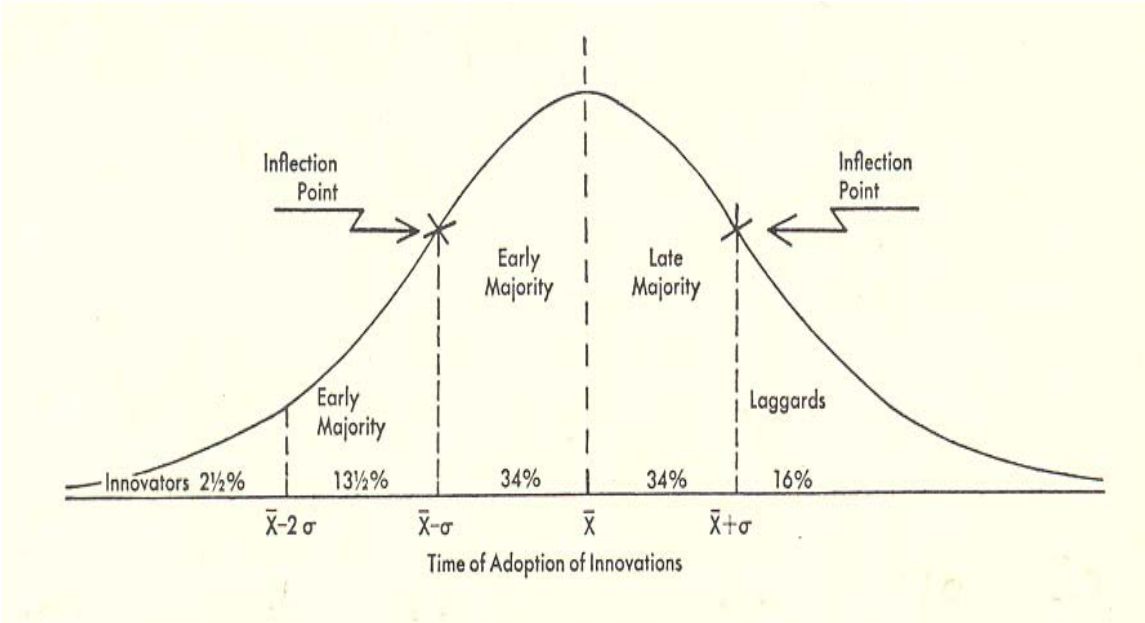


Figure 2.7. Categorization of adopters on the basis of relative time of adoption of innovations. (Source: E. M. Rogers, 1962)

The time dimension is continuous but there are important differences between earlier and later adopters. In general, earlier adopters (for example, *innovators*) tend to be younger, connected to better information sources (they are aware of innovations before others), more affluent (new products are often more expensive) and above all, greater risk-takers. "Venturesomeness is almost an obsession with innovators." (E. M. Rogers, 1962). Innovators are not deterred by the fact that the new, unproven product may turn out to be

defective, under developed, rapidly superseded or suffer any of the other problems of a new product. The problem for the marketer is that the very product characteristic that attracts the innovator, repels a later adopter and vice-versa. The innovator wants to be the "first one to own the latest gadget" while the later adopter needs to be reassured that "ten thousand satisfied customers cannot be wrong." As the time dimension is continuous and later adopters will not buy the product until after the innovators have adopted it, the marketer has to manage a smooth transition in the message strategy from one attracting innovators to one attracting later adopters. This issue is one of segmentation of message across different target markets and across different time periods. Managing this segmentation and transition becomes doubly difficult in the case of a relaunch because the marketer will be attempting to attract innovators to the "new" product without alienating loyal customers to the existing product. When the "innovation" being promoted is a change in public or social behaviour of the type that is at the heart of many social marketing campaigns, this can be a major obstacle. It will be seen below, that a lack of understanding of this process, specifically, "an underestimation of diffusion and adoption barriers" is a potential inhibiter of social marketing campaign success (Kok, 1993). For example, peer pressure on a person to smoke will be the greatest when smoking is in its late growth phase (Stage II in the trajectory) as that is when smokers are more prevalent (in marketing terms, market penetration increases). In the maturity phase, market penetration reaches its maximum and no new customers enter the market and, as the product enters decline (Stage IV) there is a steady loss of customers. This is because the innovators and others likely to change their behaviour have already changed and those remaining are "laggards" who are extremely reluctant to adopt a new product or behaviour. This suggests a "hard core" of smokers who need to be specially targeted if they are to be persuaded to quit smoking. This model does not explain an increase in the rate at which young women are taking up smoking this late in smoking's trajectory.

2.7.3 Other marketing mix elements

Turning to the *price* element in the marketing mix, similar problems occur when transferring to social marketing. In an early discussion of social marketing, Kotler suggests that price refers to the retail price of the cigarette and that consumption can be reduced by increasing the price of cigarettes through the application of taxes. (Kotler and Levy, 1971a) Once again, the price of the cigarette is not controlled by the social marketer in the way that a commercial marketer controls the price of their product. No part of the price of the cigarette goes directly to the social marketer in the manner shown in figure 2. The price control mechanism, the level of taxes, is also not within the direct control of the social marketer. It is outside the marketing mix and represents an entirely different strategy for behaviour change. (See *Alternatives to social marketing* 2.3.1.)

Secondly, the target market does not exchange the price of a cigarette for *not* smoking – in fact, the reduced expenditure is one of the benefits. What the target parts with in the exchange is the benefits foregone (for example, the peer acceptance or, if they are quitting, the discomfort of withdrawal symptoms). These benefits foregone or the unpleasant symptoms represent the *price* paid by the consumer and they are certainly not paid to the tobacco marketer nor are they paid to the social marketer. The consumer is engaging in an exchange – they are modifying their behaviour at some cost to themselves and the social marketer has to understand the estimation of the *value* the consumer is expecting from this exchange.

There is also the difficulty of *distribution* in the marketing mix. If social marketing's *product* is an idea, then it is difficult to differentiate distribution of the idea from the communication element of the marketing mix. Kotler and Roberto combine the two elements. When discussing "Distributing an intangible product" they discuss the various media by which "values" and "practices" can be delivered to the target populations. (Kotler and Roberto, 1989) These media include the familiar mass media but also professionals and volunteers. When a campaign is limited to the communication of an idea or knowledge, for example about the consequences of smoking or irresponsible sex, it is usual to use the term *health promotion* or *health education* to differentiate it from a

social marketing campaign. Railton Hill analysed reports of the application of *the marketing concept* to *health promotion* over the period 1982 to 1996 and concluded,

> social marketing is making a significant contribution to health promotion practice. Nevertheless, a more robust, contemporary and (especially) integrated approach may make a greater contribution. Specifically, perceptions of social marketing as predominantly a promotion (communication) activity, or even more narrowly as an advertising activity, are clearly evident. These misconceptions are a major limitation on the creativity and effectiveness of many campaigns. (R. Hill, 2001)

Bryant uses Andreasen's term "marketing technology" (Andreasen, 1995) to describe the knowledge, methods and insights marketers can bring to a social problem. He illustrates the application of marketing technologies in the following terms:

> Marketing's conceptual framework includes five key concepts involved in the exchange process: the product (the health behavior being promoted) and its competition (the risk behavior currently practiced); and the price (social, emotional and monetary costs exchanged for the product's benefits); place (where the exchange takes place and/or the target behavior is practiced); and promotion (activities used to facilitate the exchange). (Bryant, 2000)

The remaining element in the mix, marketing communication, is discussed separately below.

2.8 Communication

Since marketing achieves its objectives by persuasive communication rather than by coercion, communication theory and its impact on behaviour is of central importance to the marketer. The role of communication in influencing behaviour can be seen from the discussion of the behaviour and especially, health behaviour models above. Research on communication continues and there is a large body of conflicting evidence. In 1992,

Simon Broadbent of advertising agency Leo Burnett in London collected *456 Views of How Advertising Works* (Broadbent, 1992) to help advertisers avoid the extremes of over-simplifying and over-complicating their marketing communication strategies. While there might be 456 views on how the process works, most marketing communication is based on the model originally developed by Claude E. Shannon and Warren Weaver in a paper in Scientific American, July 1949 (Shannon and Weaver, 1949). Their *communications system* or linear model (according to Fill, 2006), included the elements of a *message* that originates with an *information source*. The message is transformed into a *signal* that is dispatched via a *communication channel* by a *transmitter* to a *receiver* who changes the *signal* back into a *message* to be passed on to the *destination*. In the *channel*, *noise* might interfere with the accurate relaying of the *signal*.

Wilbur Schramm (Schramm, 1948, 1955) took these elements and developed the model that appears most often in discussions of contemporary marketing and marketing communications theory and practice. (The model is either reproduced with acknowledgement to Schramm, (as in Blythe, 2006a) or, more usually, without acknowledgement, (as in Assael, 1995; Belch and Belch, 2001; Engel *et al.*, 1973; Kotler *et al.*, 2006; Pride *et al.*, 2006)). The key elements of the model are set out in Figure 2.8. There are two parties to the process; the source or sender who originates the message and the receiver.

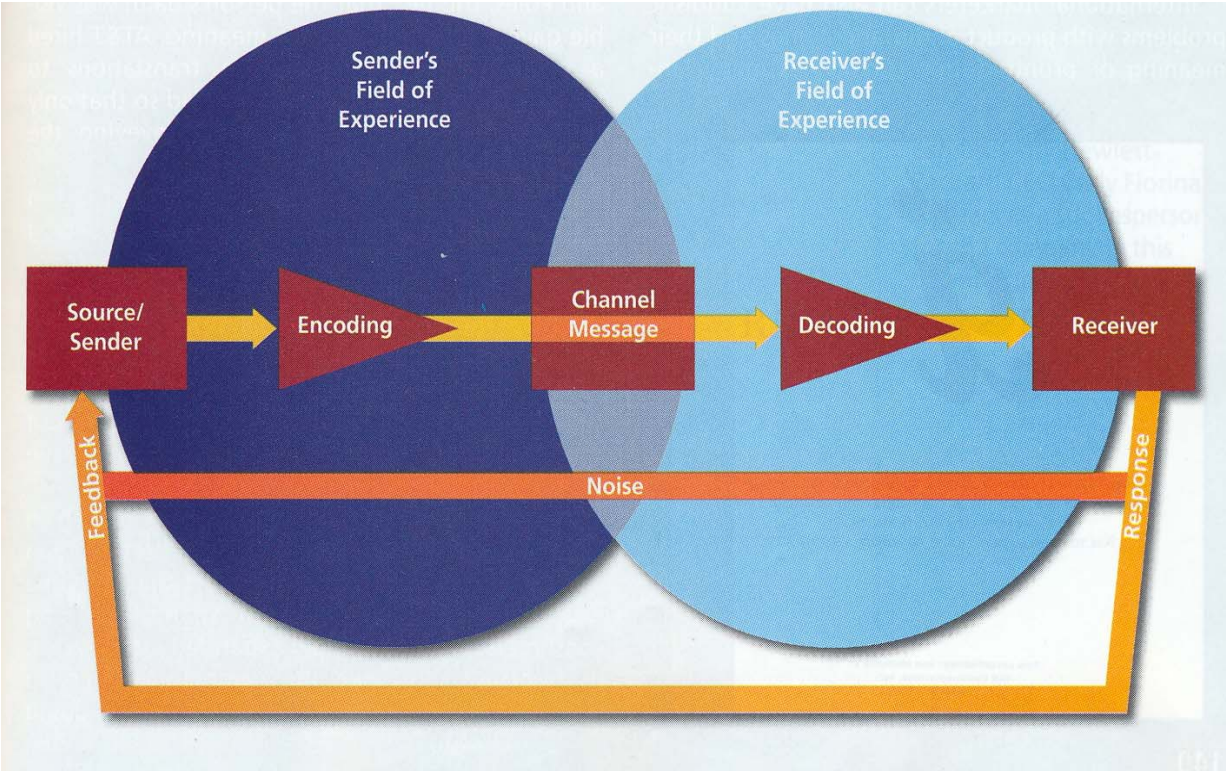


Figure 2.8. Key components of Schramm's communication model (Source: Belch and Belch, 2001)

Using their *frame of experience* (the store of knowledge, attitudes, beliefs which they bring to this task), a *source* or *sender* (the marketer) *encodes* (converts into signals) an intangible concept or idea into a *message* which is inserted into a *channel* and transferred to the receiver's *frame of experience*, where it is *decoded* (given meaning) using the receiver's *frame of experience*. The receiver's behaviour on receipt of the decoded message is identified as their *response*. The sender interprets this response and uses it as *feedback* to evaluate the communication and take whatever further steps are appropriate.

There are several points at which the communication process can break down and each one has implications for the marketer developing an effective marketing communications strategy to influence a target market's behaviour. At the very first step, the process is dependent on the sender's frame of experience. Depending on how articulate, experienced, motivated and knowledgeable the sender is, the intangible concept might not be encoded into a meaningful message at all. The process of giving and taking

meaning from symbols (semiotics) is complex and rarely directly addressed in marketing literature. (For an analysis of semiotics in marketing communication strategies, see Belch and Belch, 2001; Mick, 1986; Pedersen, 2002; Peppin and Carty, 2001).

Another serious potential problem has to do with the overlap between the frames of experience used to encode and decode the message. It is unlikely that the receiver's frame of experience will be identical with that of the sender. Unless the sender is aware of this and takes appropriate action, the sender and the receiver will be encoding and decoding the message using different "code books." This suggests a need for the marketer to expand their frame of experience through research, to extend the overlap with the target audience's frame.

Selection of the channel to communicate the message to the target audience also involves the marketer's frame of experience or, more specifically, their expertise at channel selection – their ability to select the channel that will most effectively and efficiently reach the target audience. Within the channel, there is often interference, called *noise* in Schram's model, which distorts the message. The result of noise is that the message being experienced by the receiver is not the same message that was despatched by the sender. The marketer must be aware of the characteristics of the channel and take steps to avoid it distorting the message as it is unlikely that a distorted message will have the same influence on the receiver's behaviour as the original, carefully developed message. (Belch and Belch, 2001).

Criticisms of the Schramm model tend to apply more to person-to-person communication and focus on the treatment of the receiver as a passive participant in the process. (Deetz, 1992; Mantovani, 1996). The Schramm model suggests that communication between people is a sequential process, like the exchange of letters, which is driven by an active sender and a passive receiver. Alternative models reflect the fact that conversations do not follow this sequential pattern, people often talk at the same time, swapping sender and receiver roles repeatedly back and forth. They often do not pay complete attention to what the other person is saying. Alternative models portray the process as one where two

participants share a "pool of knowledge" (R. Varey, 2000; 2002), each making a contribution to the pool and each drawing from it.

Another weakness in the Schramm model concerns the treatment of response and feedback. The model shows this communication occurring direct between the two parties, bypassing the channel entirely when, in fact, this is not the case. The receiver's response must be conveyed somehow to the sender so that the sender can interpret (i.e., decode) it and feed it back into the communication process.

Despite these criticisms, the Schramm model provides a useful description of the communication process and highlights the need for research to identify key segments in the audience and tailor message strategies based on a sound understanding of their frame of reference and their media habits.

2.8.1 Models of persuasive communication

As persuasive communication is at the heart of the marketing process, attention has been given to modelling the way communication influences behaviour (Hovland, Janis, and Kelley, 1968). Models of the communication process – the process of transmitting a message from sender to receiver – were discussed above. The focus of this discussion is on what happens next, attempting to understand the link between communication and a response on the part of the audience. Traditional response models are usually based on a hierarchy of responses and also use Strong's AIDA model as their blueprint. The focus has mainly been on advertising and rarely includes other forms of marketing communication. One approach, proposed by Nedungadi, describes a *framework for understanding the effects of advertising on choice* which proposes that a study of the impact of advertising on behaviour must have the following four essential "aspects:"

1. It must incorporate the use of previously obtained information.
2. It must allow for the use of memory.
3. It must be dynamic.

4. It must take account of contextual factors. (Nedungadi *et al.*, 1993)

"Choice" in this context, refers primarily to choice between competing brands and not to the wider issues of, for example, whether to buy the product category at all or whether to behave in some particular way. Furthermore, the discussion that follows this list does not clearly distinguish between aspects 1 and 2 but it adds the useful reminder that consumer behaviour is influenced by a dynamic combination of external stimuli being experienced at the time of the behaviour and factors learned and stored in memory.

Vakratsas and Ambler provide a useful taxonomy of advertising models, shown in Table 2.3.

Table 2.3 A Taxonomy of Advertising Models

Model	Notation	Sequence of Effects
Market response	(-)	No intermediate advertising effects considered
Cognitive information	C	"Think"
Pure affect	A	"Feel"
Persuasive hierarchy	CA	"Think"→"Feel"→"Do"
Low-involvement hierarchy	CEA	"Think"→"Do"→"Feel"
Integrative	(C)(A)(E)	Hierarchy not fixed, depends on product, involvement
Hierarchy-type	NH	No particular hierarchy of effects is proposed

Source: (Vakratsas and Ambler, 1999)

Market response models do not contain intervening variables and seek to measure the impact of an independent variable such as price or advertising on a dependent variable such as purchasing behaviour. These studies typically apply the econometric and statistical techniques mentioned in connection with more general consumer behaviour to the specific task of measuring the impact of advertising on behaviour. The authors

discuss approximately 20 models that range from general effects of advertising to measuring phenomena like the period over which advertising effects dissipate and comparing the impact of first exposure to subsequent exposures.

Market response models have an obvious appeal to marketers because all of their marketing activity is ultimately justified by the results it achieves. In a commercial marketing context, this means profits generated and in the social marketing context, this means behaviour changed as a direct consequence of the marketing activities.

Vakratsas and Ambler were rather pessimistic about the direct impact of advertising on behaviour as calculated by these models. They reported that, "Advertising elasticities range from 0 to .20" (1999). This is far inferior to direct sales promotional activities (offering price discounts and the like) which had elasticities "up to 20 times higher than advertising elasticities." (1999). They also report that advertising elasticities "decrease during the product life cycle." (1999). *Product life cycles* are discussed above and tobacco smoking's "product life cycle" or "trajectory" is also discussed later in this thesis.

2.8.2 Cognitive effect models

Models with intermediary, intervening responses were developed not to suggest that a behavioural response is not the primary objective of marketing communication but rather, to better understand the "black box" located between stimulus and response. A better understanding of these processes will enable a better assessment of advertising's impact (Lavidge and Steiner, 1961). The first of the models with intervening steps are the *Cognitive information* models which assume "that consumer decisions are only rational." (Vakratsas and Ambler, 1999). In other words, advertising works by providing information which the consumer evaluates then makes their decision accordingly. Advertising may also provide "utility in reducing search costs." (1999). Many consumer behaviour models include an information gathering or search step and advertising can help the consumer in this step by providing the information the consumer is seeking.

Vakratsas and Ambler evaluated more than a dozen cognitive information models and failed to reach any strong conclusions. They found that sometimes two different researchers applying these models to the same aspect of consumer behaviour (e.g., price sensitivity when choosing a brand) reached opposite conclusions. For example, Comanor (Comanor and Wilson, 1974), and (Comanor and Thomas, 1979) found that for certain products, advertising reduced price sensitivity while Stigler (1961) and Tesler (1964), found quite the reverse, advertising increases price sensitivity. Dijkstra, De Vries, Kok, and Roijackers (1999) found strong relationships between cognitive factors and motivation to quit smoking among Swiss respondents.

Rosser Reeves (Reeves, 1961) proposed that a consumer cannot absorb multiple messages from an advertisement. To succeed therefore, the marketer must select the single, most important reason why the consumer should buy the marketer's product ahead of the competitor's and focus on that message alone, thereby influencing the consumer's behaviour. Reeves called this single, most important message the brands Unique Selling Proposition (USP) and it implies that the audience interprets and evaluates the message in a cognitive fashion.

Although it is often delivered in an emotional tone (see Fear Appeals, 2.8.4), many social marketing campaigns and those from the related discipline, health education, apply the USP approach and purport to be delivering "scientific" information to alert the target audience to a particular danger and persuade them to make the appropriate adjustments to their behaviour. Many of the health promotion and health education models discussed also imply this "rational" target audience.

Others such as Gengler and Reynolds took a cognitive approach and suggest that a consumer's behaviour will be influenced by the extent to which they find "products personally relevant." (1993). Their model helps identify factors that will make a product more relevant to the consumer (which they call the *brand affect*) but does not test the connection between relevance and behaviour. (Gengler and Reynolds, 1993)

Advertising pioneer, David Ogilvy has been associated with the cognitive or "rational" response approach to advertising effectiveness but he is often quoted pointing out the limitations of this approach. For example, in an address to the Advertising Association Conference in England in 1956 he said,

> I am astonished to find how many manufacturers, on both sides of the Atlantic, still believe that women can be persuaded by *logic* and *argument* to buy one brand in preference to another – even when the two brands are technically identical. (Raphaelson, 1986)

He suggested that brands with the most favourable image would succeed and that, as people are more likely to build a relationship with another person than with an inanimate object, a product with a "sharply defined *personality*, . . . will get the largest share of the market at the highest profit." (Raphaelson, 1986)

2.8.3 Affective effect models

An alternative to the pure cognitive approach is the *pure affect* model. This approach regards the emotional, affective response as more important than the cognitive one. Consumers are more influenced by emotions such as liking and emotions evoked by the advertisement. There are several difficulties with this group of models (Vakratsas and Ambler regard them as "rather improbable"(Vakratsas and Ambler, 1999)). The first difficulty has to do with the object of the emotion. Is the affection directed at the advertisement or the product? In an earlier study, Hollis (1995) points out that liking an advertisement does not necessarily translate into liking the product and is even less likely to translate into a behaviour change in favour of buying the product. du Plessis (1998) examines the nature of "liking" an advertisement and differentiates this from being amused by it. Spotts and others found a complicated relationship between humour and advertising effectiveness, concluding that the successful use of humour in advertising is dependent on a number of factors including but not limited to, the nature of the product, the audience's sense of humour, the communications medium used and the context. In

summary, they find " a certain mystery remains as to how, when and why humor may or may not work." (Spotts *et al.*, 1997)

These models also often lack a mechanism to explain how affection motivates action. Herr and Fazio express the problem in these terms:

> Advertising is typically concerned with the formation of positive attitudes toward the specific product – under the assumption that such information or change [of attitude] will prompt corresponding action. (Herr and Fazio,1993)

They emphasise that in their model, the interaction is influenced by the nature of the purchase and the product and the characteristics of the consumer. For example, they state that their process model focuses on:

> relatively "small purchases" of a routine nature, rather than on "big ticket" items, for which Ajzen and Fishbein's approach may be . . . more appropriate. (Herr and Fazio,1993)

Even with these limitations, they conclude:

> inducing positive attitudes is not in and of itself sufficient to have much influence on consumer behaviour. (Herr and Fazio,1993)

Others point out that the link between emotion or attitude and behaviour is far from clear and at times, contradictory or influenced to a much greater extent by some intervening, contextual factor. They point out for example, that "consumers may have positive attitudes toward expensive cars but have no intention whatsoever of purchasing one, due to financial restrictions." (Devine and Hirt, 1989). Vakratsas and Ambler (1999) report on several studies of these models and once again, find conflicting results. Where any influence is found, (for example, in Hall and Maclay (1991) and Staple (1987)) the influence is "not strong." Hafstadt, Aaro and Langmark (1996) on the other hand, report that "positive affective reactions was the overall most important predictor of positive

behavioural outcome" in a large-sample, longitudinal study of the impact of antismoking mass media campaigns on adolescents aged 14 and 15.

The major difficulty with these models however, is the extreme difficulty of measuring an affective response in the absence of any cognition. Asking a respondent to report on their feelings "brings cognitive processes into play and introduces cognitive bias." (Vakratsas and Ambler, 1999) Vakratsas and Ambler report on experimental designs which do not directly involve a cognitive element in the measurement of the responses – including EEG, Galvanic Skin Response and pupil dilation, but find that the principal benefit of these models is to alert researchers to the fact that there is an affective as well as a cognitive response to advertising.

2.8.4 Fear appeals

Social marketing campaigns have often used a particular affective strategy, the *fear appeal*. They use material that is intended to arouse fear in the audience to attract and hold attention and to be a motivator to act. For example, the Australian antismoking strategy discussed below has almost always relied on generating fear of the unpleasant medical consequences of tobacco smoking to motivate smokers to quit and to deter young people from taking it up. Research into the impact of fear appeals is a common topic in advertising and social marketing literature. Kotler and Andreasen concluded that, "the researchers may have been too pessimistic about persuasive approaches using fear in general." and that fear appeals could be effective (Kotler and Andreasen,1995). The debate sometimes became a little confused as the concept of *shock* was introduced and not clearly differentiated from fear. A problem with some analysis is confusion between *fear*, which is an emotional *response* and the type and level of level of potential harm portrayed, the *stimulus*. (Rotfeld, Terry, and Clark, 2000) This analysis of fear strategies was included in a later editorial entitled *Shock tactics and the myth of the inverted U* (Sutton, 1992) Acceptance of the recommended message is assumed to lead to adopting the recommended behaviour, in line with the hierarchical models described above.

Rogers proposed an early psychological model of how the process might work (R. W. Rogers, 1983). He proposed a "protection motivation" which is triggered by the fear-inducing message. The actual "coping behaviour" that the consumer selects is determined by the consumer's appraisal of the situation on four interactive criteria: the perceived severity of the threat, the perceived probability that the threat will occur, the perceived ability to cope with the threat (coping response efficacy), and perceived ability to execute the coping strategy (self-efficacy). Depending on the individual consumer's perceptions of these factors, fear may or may not influence behaviour. (See Egger *et al.*, 1992; Glanz *et al*., 1997)

Many models of the process are monotonic, more fear is a greater stimulus than less. While Rotfeld *et al.* concluded that the relationship between fear arousal and persuasion is not curved but monotonic, they point out that all fear arousal messages are not equally effective because of the idiosyncratic responses of people to the same threat, different people fear different things. (Rotfeld *et al.*, 2000):125 Sutton analysed 35 published reports covering various aspects of advertising and one of his conclusions was, "increases in fear [generated by an advertisement] are consistently associated with increases in acceptance of the recommended message." (Sutton, 1982) Most models though, reflected Janis' Inverted U-shaped response curve.(Janis, 1967) The inverted U model proposes that there is little response to messages that arouse little or no fear. The response rises as the level of fear increases but not without limit. There comes a point where increases in fear become counter-productive, the audience "turn off", stop elaborating on the message (mentally discussing it with themselves (Keller and Block 1996)), begin to deny it or avoid it, or otherwise disengage from the message. (Assael, 1995; Belch and Belch, 2001). Henthorne, LaTour and Rajan (1993) examined the relationship between fear arousal and energy. They found that below a certain threshold, fear arousal was not associated with an increase in energy. Increased arousal is associated with increased energy, again, to a certain point. Beyond this second threshold, increased fear arousal becomes associated with anxiety which diminishes energy. Keller and Block also found support for an *inverted U* response. They found that low-fear messages are processed differently from high-fear messages and that the response to the message differs

according to individual differences and these different processes. They concluded that both sorts of appeals can be effective, provided that the marketer understands the processing and emotional responses to the message in the target audience (Keller and Block, 1996). Others who explored the concept and sought to model the process were LaTour and Rotfeld (1997) and Schoenbachler and Whittler (1996). They proposed models along the lines of that of Keller and Block, with minor modifications to address the difficulties identified in earlier models.

McCoy added a further complication by proposing that there might be a second threshold beyond which, the effect might to reverse the response and repeat the inverted U. When discussing particularly shocking antismoking messages, he proposed, "Recidivists are made so anxious by these images they feel an insatiable urge to light up again to soothe their jangled nerves." (McCoy, 1999). The application of fear appeals in social marketing campaigns is discussed further below. Tanner, Hunt and Eppright (1991) recognise the debate about a "curvilinear" relationship between fear and effectiveness and the search for the optimum level of fear. They do not reach a conclusion about the shape of the relationship but they show that the effectiveness of fear appeals can be improved by presenting different types of information in a predetermined order. The order reflects a modification of R. W. Rogers' 1983 Protection Motivation model, suggesting that threatening information is processed through a series of cognitive and emotional states. Ruiter, Kok, Verplanken and van Eersel (2003) suggest that the effectiveness of fear appeals (in this case to adult Dutch women) might be enhanced by communicating the negative consequences of not performing the recommended action (having their breasts screened for cancer) rather than the positive benefits of the recommended action. LaTour and Pitts (1989) found that there is a multidimensional mechanism involving simply fear and cognition. There are intervening variables (energy, fatigue, tension and calmness) and it the authors propose that it is important to understand how a particular message strategy affects these variables and how they interact. They conclude by recommending that "a stronger fear-arousing ad" (along the lines of the Australian "Grim Reaper" campaign, which showed AIDS as Death slaughtering all it touches in the community) should be considered in the fight against AIDS.

With regard to the application of fear appeals in commercial marketing campaigns, Schiffman and Kanuk (1991) and Shimp (2003) recommend that they can be effective provided that the appropriate level of fear is employed; appropriate from the ethical perspective (is it ethically acceptable to scare a person into using a particular toothpaste to avoid halitosis?) and from the technical effectiveness perspective (see the *Inverted U*, above) (2003). Fill also finds that they can be effective but their use "need[s] to be constrained, if only to avoid being categorised as outrageous and socially unacceptable." (Fill, 2006). Hale and Dillard recommend that the threat in a fear appeal campaign must be real, the audience must be convinced that they are vulnerable to it and that the solutions recommended in the campaign are "both easy to perform and effective." They end by cautioning that "fear appeals do not work in every circumstance, so one should be mindful of the age of the target audience . . . when deciding whether to construct a fear appeal." (Hale and Dillard, 1995)

The application of fear appeals in the context of social marketing and specifically, antismoking campaigns is very common. Gerard Hastings and Lyn McFadyen probably express the underlying logic better than anyone,

> Anyone who doesn't believe that fear messages can change behaviour should try going into a crowded theatre and shouting "FIRE!"(G. Hastings and MacFadyen, 2002)

They then suggested limitations to the use of fear appeals and to point out that repeating the warning in ever more strident tones to an audience who is already aware of it, reduces the impact of the message to "the irritation of a malfunctioning alarm." Fischer *et al.* questioned the use of fear appeals across the board, noting that, for teenagers, the Surgeon General's warning is not an effective deterent from taking up smoking. This is despite the fact that a sustained decline in overall U.S. prevalence rates coincides with the release of the Surgeon General's message. This is important as it has been shown that smoking initiation happens in adolescence (see below) therefore, consideration must be given to how adolescents might process fear appeals. (Fischer *et al.*, 1989) Schoenbachler and Whittler (1996) found that adolescents (a) fear arousal is unnecessary

for persuasion and (b) social threats are more persuasive than physical threats. Lynch (1995) reports the "inevitable" failure of fear appeals directed at adolescents as they do not take account of other more important factors, including social and image constructs that affect the decision, rather than the potential medical consequences for the smoker. Hafstadt *et al.*, (1997) examined the impact of repeated exposure to "provocative" appeals (e.g., "Girls who smoke are stupid") among a large sample of Norwegian adolescents and found that it was associated with improvements in smoking statistics (a lower increase in smoking prevalence) among the test groups compared with control groups. They caution however, that "culture and context should be thoroughly considered when using such appeals" as interpretation and responses to the appeals varied across groups.

Duke *et al.* raised the issue of the ethics of deliberately arousing shock and fear particularly in vulnerable audiences such as children. Most current social marketing campaigns in Australia, especially those associated with tobacco smoking, road safety, and alcohol consumption, rely heavily on shock and fear to break through the audience's resistance to the message. Each successive campaign, including the "warning panels" on cigarette packets or television and poster advertisements, is more graphic and shocking than the last. Blatant fear appeals are less common in commercial marketing campaigns. (Duke *et al.*, 1993)

Goldman and Glantz (1998) found that alternative appeals, such as focusing on the unethical, manipulative practices of the tobacco industry could be effective in "denormalizing" smoking and reducing smoking prevalence among target groups. They found that this strategy worked on different target segments for different reasons. For adult smokers who were aware of the damage smoking was doing to them and who were frustrated by their addiction, revealing the manipulative practices of the companies enabled these people to "redirect their feelings of guilt over their own smoking toward anger at the tobacco industry and its desire to profit from a deadly product." Young people on the other hand, respond for different reasons: "Young people begin smoking to express independence by rebelling against their parents and other who admonish them not to smoke. . . They believe that they can make their own decisions, including the decision

to smoke. . . By making youth aware of the industry's calculated attempts to manipulate them, these advertisements tell young people that they are not acting independently. They also transform a low-interest topic, smoking, into an attention-getting, emotional issue and reconfigure the parent - rebellious child dynamic by giving both youth and adults a common enemy - the tobacco industry." (Goldman and Glantz 1998)

2.8.5 Integrative models

More recently, there have been challenges to the notion of a hierarchy of effects, especially the cognition → affection → behaviour models discussed above. Weilbacher (2001) challenges the extent to which the hierarchical models actually describe the effect of advertising and suggests that, in fact, the focus on hierarchical models is inhibiting the development of truly efficient, integrated marketing communications strategies. Several models have been proposed integrating cognition with other responses in an attempt by the audience to give meaning to the communication they are receiving. Hall proposed the integrated model shown in Figure 2.9

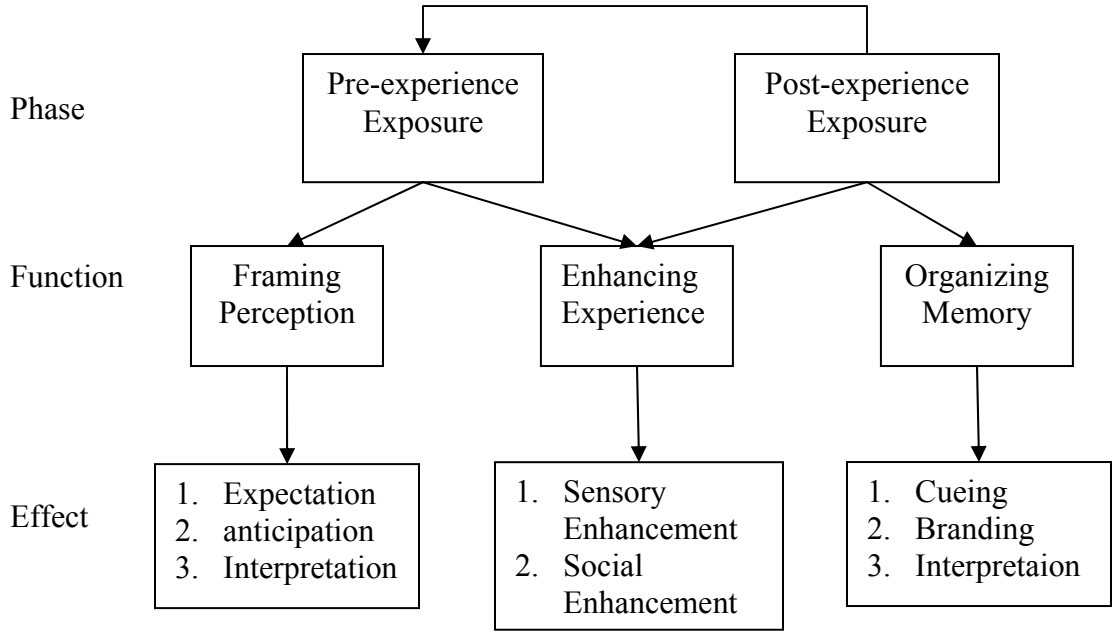


Figure 2.9 The three phases and flow of the P/E/M model (Hall 2002)

In this model, the role of communication (advertising) is different in the two *phases*; pre- and post-experience of the product. Prior to experiencing the product first hand, the role of communication is to "frame perception.". Key functions include prompting the audience to expect to encounter the product, creating anticipation of the experience of the product (and its benefits) and thirdly, to enhance the experience. Enhancing the experience relates to both a greater appreciation of the benefits of the product but (and this is a crucial Hall addition) also to the enhancing the social aspects of the experience. Hall proposes, "If the service provider creates a sense of trust and a relationship with the consumer, customer satisfaction will improve. Pre-experience advertising establishes a basis for that trust and that relationship."(2002:25). It will be seen later that most social marketing campaigns ignore this social, contextual aspect of the situation that they are attempting to address.

Communication received after experiencing the product helps the consumer order and interpret the experience. Ordering helps the consumer remember the experience. The communication also provides cues and sometimes a vocabulary, to interpret the experience. It "not only influences the consumer to feel that the sensory or social experience was a good one, but it also provides reasons to believe that it was." (2002:25). In other words, it reinforces the knowledge. A potential difficulty with many anti-smoking campaigns is that they do not provide this reinforcement. The situation depicted in the advertising or warning messages does not correspond with the audience's experience of smoking and may render the message irrelevant to the target audience.

2.9 Attention paid to the competition faced by the desired behaviour

Marketers recognise that the behaviour that they are trying to influence takes place in an environment in which marketing strategies are only one of several stimuli influencing the consumer's behaviour (Kerin *et al.*, 2004; Kotler, 1972; Kotler *et al.*, 2006; Pride *et al.*, 2006; Quester *et al.*, 2001). These factors are included in various forms, in the behaviour models discussed above. In the social marketing context, it is useful to distinguish

between the environment that is internal to the person (the *internal* environment) and factors that are external to the person. The external environment is usually further divided into a *micro*- and a *macro-environment*. See Figure 2.10.

Throughout this analysis, it is important to identify factors that will either assist in the achievement of the marketer's objectives or hinder them. The behaviour models all explain the role of the person's characteristics in influencing behaviour. The analysis discussed in this thesis shows how particular characteristics are linked with greater or lesser likelihood of being a smoker. The *macro-environmental* factors are the overall factors that shape the market place. For example, the legal environment affecting the sale and consumption of cigarettes in Australia was discussed above. This is an important factor that is likely to enhance the effectiveness of any social marketing program as it creates an environment hostile to smoking. Similarly, community attitudes and the attitudes of those close to the person will also have an impact on the effectiveness of an antismoking program. The technological environment could have a profound impact if for example, a "safe" tobacco were discovered or some other method of delivering the nicotine benefits without the current side-effects. Changes in the economic environment could also have positive or negative impact on the effectiveness of an antismoking program. For example, (Datta *et al.*, 2006) found a strong relationship between poverty and other economic and social factors, and smoking prevalence among black women in the U.S.

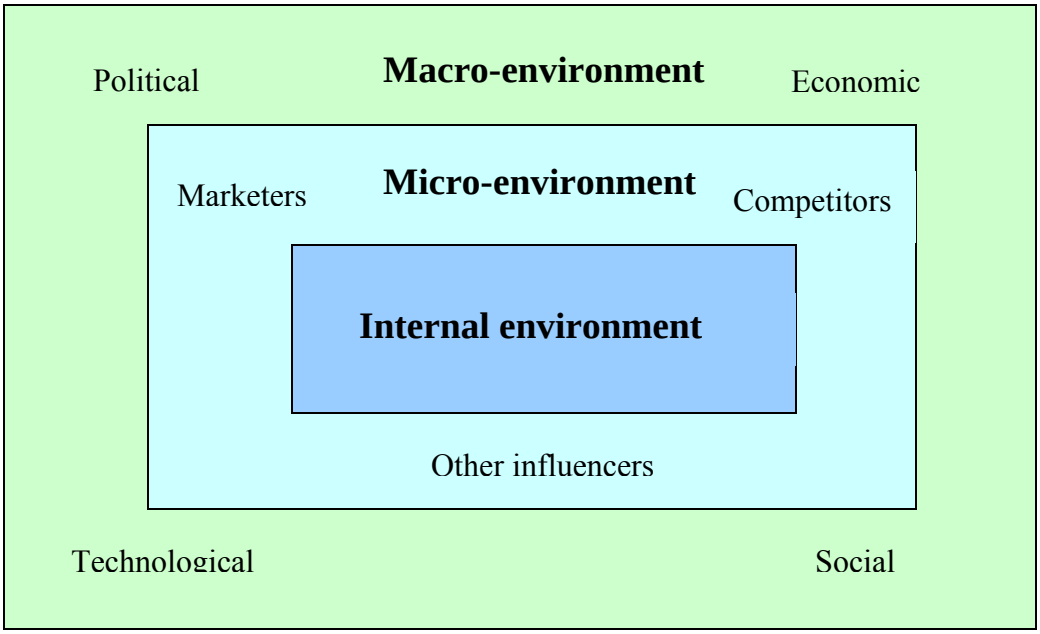


Figure 2.10. The social marketing environment

The social marketer must be aware of these factors and their impact on the proposed strategy but they are usually beyond the influence of social marketing; social marketers cannot realistically address poverty in the community but it would be pointless attempting to address the smoking prevalence problem without taking into account the poverty issue.

Micro-environmental factors are also outside the person but their impact tends to be more unique to each party in the market, compared with macro-environmental factors which tend to be the same for all people (there is only one legal framework, for example). Competition, in this context, refers to the barriers to achieving antismoking objectives and these tend to be more specific to the individual. The competitors to the antismoking program include the factors that encourage smoking initiation and continuation of smoking. They are the perceived benefits of smoking. These factors are discussed in more detail below but they are not recognised in the antismoking programs discussed in this thesis.

The next section deals specifically with tobacco smoking, its impact on the community and the need for an effective antismoking social marketing strategy.

2.10 Tobacco smoking

There is extensive literature on the history of tobacco smoking extending back more than seventy years. For example, a large number of authors trace the spread of tobacco smoking in the U.K. and the U.S. (A. Brandt, 2007; Corti, 1931; Ferrence, 1989; Karen, 1996; Meyer, 1992; Sobel, 1978; Wagner, 1971) An alternative approach is to examine the social context in which tobacco smoking spread through the community. A. Brandt (1990); Lohof (1969) and A. M. Brandt (1999) examine the growth of tobacco smoking in the U.S. cultural context. Tobacco smoking has a long and chequered history in European society.(Musk and De Klerk, 2003). King James I described it as, "a custom loathsome to the eye, hateful to the nose, harmful to the brain, dangerous to the lungs and in the black, stinking fume thereof nearest resembling the horrible Stygian smoke of the pit that is bottomless"(Gately, 2001) Yet its popularity grew and by the time of the Second World War, its use was officially encouraged with cigarettes being included in defence force rations. Smoking prevalence in Australia reached its peak in 1944-47 (Makkai and McAllister, 1998). It continued to grow in other countries (see Smoking prevalence 2.10.2). Soon after the War four key reports confirmed a link that had been suspected for some time. Richard Doll published the first of his papers linking tobacco smoking with lung cancer.(Doll and Hill, 1950) Levin, Goldstein, and Gerhardt (1950); Schrek, Baker, Ballard, and Dolgoff (1950) and Wynder and Graham (1950) all reported similar conclusions. Hammond and Horn (1954) found not only a connection between tobacco smoking and death rates but also a positive correlation between death rates and amount smoked. The United States Surgeon General then released the first in a regular series of reports condemning tobacco smoking as a cause of avoidable morbidity and mortality in the U. S. (USDHHS, 1957) (Luther Terry identified tobacco as the leading cause of avoidable morbidity and mortality in the U. S. in his Surgeon General's report in 1964). Despite controversy and counter-argument (especially from the tobacco companies), the message seemed to be effective in changing people's smoking behaviour

and overall smoking prevalence dropped in many developed countries. The drop in smoking prevalence is followed by a corresponding drop in smoking-related death and illness, lagged by approximately thirty years. (Lopez *et al.*, 1994)

The history of tobacco smoking in the U.S. shows a similar pattern of increasing consumption from the Civil War period to 1981, when it peaked at 630 billion units (a unit is a cigarette, cigar or standard quantity of loose tobacco). Since then, consumption initially declined and then "righted itself" (that is, stopped declining), in the 1990s. (Lesch and Middendorf-Brand, 1997) The decline is attributed to gathering community and institutional rebellion against the cost that tobacco smoking was inflicting on the community.

This indicates that tobacco smoking is an important threat to the community's welfare and a suitable target for a social marketing campaign to attack. J. O. Prochaska (2001) labelled tobacco smoking the 'number one public health problem." In the following sections, there is a review of various attempts to calculate the cost to the community of tobacco smoking. This is followed by a review of the literature relating to smoking prevalence; its levels, patterns and changes, smoking initiation, and a review of important antismoking campaigns.

2.10.1 The damage caused by tobacco smoking

Approaches to calculating the cost of tobacco smoking to the community vary enormously but there is widespread agreement that the cost is very large. Mary Anne Pentz (1998) points out the need for a longer-term perspective as many of the true community costs associated with health-risking behaviour such as tobacco and drug use are incurred over a twenty or thirty year time span. Rice (1999) provides a summary of key attempts to evaluate the cost of smoking in the U.S. and finds conflicting results. Warner claims that there have been over 70,000 papers from epidemiologists contributing to the calculation of the impact on the community's health of tobacco smoking (Warner, 1998). Prominent among these authors is Peto *et al.* who calculated that of the people

alive in the world in 1990, 500,000,000 are expected to die of smoking-related causes and because they would die before they would have if they had not smoked, these people will be deprived of a total of 5 billion years of life. (Peto *et al.*, 1994) The authors concluded,

> The arithmetic of the tobacco epidemic is simple and stark. Cigarettes kill half of their lifelong users (Lopez *et al.*, 1994)

Other epidemiologists to calculate the human toll include English *et al.*, (1995) who concluded that,

> active smoking killed 18,920 Australians in 1992 and caused 88,266 person years of life to be lost before age 70 years, at an average of 4.7 years of life per death. It also caused the occurrence of 98,373 hospital episodes and 812,866 hospital bed days. Cigarette smoking is the leading cause of drug-caused deaths and hospital morbidity in Australia. (English *et al.*, 1995)

Ridolfo and Stevenson developed a similar estimate of the Potential Years of Life Lost (PYLL) in Australia to produce an estimate of the loss suffered by the community (Ridolfo and Stevenson, 2001) Mathers *et al.* (2001) found "tobacco smoking was the single biggest risk factor responsible for the greatest disease burden" in Australia.

On an individual state basis, Unwin and Codde (1999) estimate that "nearly a fifth of all deaths [in Western Australia] were due to drugs and 80 percent of drug-deaths were due to tobacco smoking." Mannino *et al.* (2001) examined U.S. health statistics and found "Differences in lung cancer death rates across birth cohorts of US men and women primarily reflect differences in the prevalence and duration of smoking in these birth cohorts." Schnoll *et al.* (2006) examined smoking behaviour among Russian cancer patients and confirmed a strong correlation between smoking and cancer. In addition to cancer and other tobacco-related deaths, there are other non-fatal but debilitating conditions associated with smoking. J. G. Johnson *et al*. (2000) examined the link between tobacco smoking and anxiety disorders. They found that adolescents with

anxiety disorders are not at increased risk of becoming tobacco smokers but they found evidence that cigarette smoking may increase the risk of onset of anxiety disorders. Many authors have found correlations between the presence of psychological characteristics including disorders such as depression and increased smoking prevalence in various populations.(Chandra *et al.*, 2005; Dierker, Ramirez, Chavez, and Canino, 2005; Lewinsohn *et al.*, 2000; Waxmonsky *et al.*, 2005) Davies *et al.*, (2006) found that there was a two- to four-fold increase in tuberculosis cases among those who smoke more than 20 cigarettes per day in the U.K., China, India and the U.S.

Other harmful effects associated with tobacco smoking include:

- Alcohol drinkers have an increased risk of bladder cancer if they are tobacco smokers compared with alcohol drinking non-smokers. (Brownson, Chang, and Davis, 1987)
- Increased risk of laryngeal cancer.(Brownson and Chang, 1987)
- Increased risk of lung cancer due to the presence of a known carcinogen in nicotine. (Hecht, 2006)
- Increased risk of colorectal cancer in women. (Rohan *et al.*, 2000)
- Increased risk of social deviance and violent behaviour in American adolescents. (Orlando *et al.*, 2005)
- Increased mortality among Maoris. (Blakely *et al.*, 2006)
- An association between heavy smoking and increased risk of suicide. (M. Miller, Hemenway, and Rimm, 2000)
- Increased risk of age-related vision loss due to macular degeneration. (T. Houston, 2001)
- No reduction in the risk of coronary heart disease when alcohol and tobacco consumers quit alcohol but keep on smoking. (Ebbert *et al.*, 2005). Rea *et al.* (2002) found an association between tobacco smoking and an increased risk of recurrent coronary heart events.
- Shortened remission and subsequent survival from leukemia. (Thomas and Chelghoum, 2004)

- Impact on fetal health, including low birth-weight (R. W. Miller *et al.*, 1976; Visscher *et al.*, 2003)
- Increased risk of unhealthy behaviours including female college student smokers have an increased likelihood of perceiving themselves as overweight and higher scores on depression measures. (Kelley n*et al.*, 2003) This is particularly important as Klesges found that 35 percent of the smokers among the university students they interviewed used smoking as a dieting strategy. (R. C. Klesges and Klesges, 1988)

There have been suggestions that the net cost to the community of tobacco smoking is not very large. Many governments reap large tax returns from the sale of tobacco products and because tobacco smokers die younger than non-smokers on average, they do not collect pensions and the public health system does not incur costs as the smokers enter old age. These "savings" and revenues, it is suggested, balance the additional costs incurred by the health system to treat the disease caused by tobacco smoking. Barendregt *et al.* addressed this question directly and concluded "it depends." (Barendregt *et al.*, 1999). It depends on exactly which costs are included, the discount rate assumed and the time horizon to use. Chaloupka, Jha, and Peck (1998) provide a framework that addresses many of these issues by providing methodologies to separate costs and an econometric model to calculate whether there is a *consumer surplus* or a *producer surplus*. Economists, David Collins and Helen Lapsley have proposed an alternative method of calculating the *human capital* lost to the community as a result of tobacco smoking. They compare the current population with a population that would have existed in the absence of tobacco-related deaths (D. J. Collins and Lapsley, 1992, 1996, 1999a, 1999b, 2001). The "cost" of tobacco smoking is the lost productivity foregone by the community. To make clear the practical implications of such a calculation, they show that it would be worthwhile for the state of Western Australia to invest up to AU$41 million per annum for the duration of a twenty year antismoking campaign (in 2000 prices). This is more than ten times the current rate of expenditure. In demographic and

economic terms, smoking was estimated to cost Australia 23,000 avoidable deaths and $18 billion per year. (D. J. Collins and Lapsley, 1996)

Chaloupka and Warner (1999), Kabra (1998) and many others suggest that the debate about whether or not antismoking campaigns make economic sense may miss other important points and that there are important non-economic (e.g., social and moral) issues to consider as well as the economics. For example, what is the community's attitude to handing on a legacy of tobacco addiction to future generations? What are the real benefits of tobacco smoking to the smoker and to the community? As mentioned in the table above, Klesges (1988) found that a significant number of young women use tobacco smoking as an effective weight control strategy (not always a positive benefit) and that weight was regained after quitting. (Clemens *et al.*, 2003) also found that heavy smoking was associated with a more active life-style and lower BMI among black women. There is no indication of any causality in this association but the greater activity and lower BMI are generally beneficial for the respondents in this sample. Even including these extra costs and benefits, the consensus is that while tobacco smoking delivers some benefits to the community, the costs outweigh the benefits.

2.10.2 Smoking prevalence

The proportion of the population that smokes tobacco products (smoking prevalence) is a good indicator of the future pattern of tobacco-related death and illness (Lopez *et al.*., 1994). Government policies and social marketing campaigns are justified, developed, monitored and in part, evaluated with reference to changes in smoking prevalence levels. It is therefore, an important topic in community welfare literature. Most papers and articles dealing with antismoking campaigns of any sort will include comments on smoking prevalence as part of their introduction and justification for the project. Most antismoking campaigns are evaluated, at least in part, by reference to changes in smoking prevalence. A focus on tobacco smoking prevalence *per se* is less common and it is usually measured as part of some other project. A search of the EBSCO database using

the terms *tobacco* and *prevalence* will therefore generate a list of 1,374 of papers where tobacco smoking prevalence is considered in a wide range of contexts.

(Jha *et al.*, 2002) developed an estimate of worldwide smoking prevalence (29 percent of people 15 years and over 1995) and found that smoking is significantly more prevalent in East Asia than in other regions. Lopez *et al.* (1994) developed estimates of smoking prevalence for a large number of countries. Steimle (1999) estimated prevalence in E.U. countries. Estimates for individual countries are common. For example, Haidinger *et al.* (1998) estimated smoking patterns in Austria, Neufeld *et al.* (2005); Reddy *et al.* (2006) in India and Manwell *et al.* (2002) in Poland. Analysis also goes down to individual state level

Estimates of the prevalence of smoking in a population are usually based on surveys in which respondents report their own cigarette smoking behaviour. The Australian Bureau of Statistics (ABS) has included tobacco smoking questions in National Health Surveys since 1990. Smoking has been included in the National Drug Strategy Household Survey conducted by the Australian Institute of Health and Welfare (Fitzsimmons and Cooper-Stanbury, 2000). In 1994, Alan Lopez and others collated data from these sorts of surveys on cigarette consumption and the patterns and trends of major tobacco-related diseases from a large sample of developed countries covering up to 100 years of records (Lopez *et al.*, 1994). They used this data to develop a four-stage model of the *trajectory* of the *cigarette epidemic* in these developed countries, as discussed below. There are risks associated with this methodology. Biener *et al.* (2004) suggest that the changes in reported smoking prevalence might in part, be a consequence of falling response rates – samples might be becoming less representative of the population.

2.10.3 Self-reported smoking behaviour

In addition to sampling difficulties, there has been a long discussion on the possibility that respondents will tend to under-report what they regard as socially undesirable behaviour and to over-report desirable behaviour (social desirability bias (Edwards, 1957)). Others to find evidence of bias include Acosta *et al.* (2004); Boyd *et al.* (1998; Fisher and Katz (2000) and Webb *et al.* (2003). Percy *et al.* (2005) found that a number of adolescent respondents in a longitudinal study of drug use in Northern Ireland initially reported drug use and then recanted these reports in subsequent surveys. The authors suggest that this recanting casts doubt on the initial reports. The bias can be either conscious and deliberate or unconscious and lead to under reporting or, as in the case of the Percy report, possibly over reporting. Other authors have raised the issue in different areas of social marketing and health education research, with conflicting results. For example, Klesges *et al.* (2004) found evidence for the bias in the self-reporting of dietary and other weight-loss behaviours. However Bjarnason and Adalbjarnardottir (2000) and Motl *et al.* (2005) found no evidence of significant bias in the self-reporting of physical activity and tobacco use respectively. Attempts to validate self-reports using alternative indicators of the variables under consideration have also produced inconsistent results.(Assaf *et al.* (2002) Patrick *et al.* (1994) discuss 51 comparisons in 26 reports and conclude that self-reports are mostly accurate but identify survey methods which tend to be associated with greater accuracy, including interviewer-administered questionnaires and reports by adults. Williams *et al.* (1979) also identified factors such as guaranteed confidentiality as factors that improve the correspondence of self-reported and cotinine-validated smoking behaviour. These factors are all present in the National Health Surveys that are analysed later in this thesis.

Caraballo *et al.* (2004) compared student respondents' self-reports of their tobacco smoking behaviour with checks of cotinine (a residual chemical left in the bloodstream after nicotine has been metabolised by a smoker(Zevin *et al.* (2000)) in the respondents' saliva and found a small (approximately 2%) understatement. Bauman *et al.* (1989) and Wills and Cleary (1997) found no significant difference between biomedical and self-reported estimates of smoking. ((Biglan *et al.* (1986) also contains advice on how to

improve the accuracy of cotinine checking.) On the other hand, de Meyrick and Yusuf, (2006) compared respondents' self-reports of expenditure on tobacco products with government tax receipts from the sale of tobacco products and found as much as 40 percent under-reportage. Strategies to deal with the bias have not been entirely successful. T. Johnson and Fendrich (2005) confirmed the existence of the bias in some contexts but were unable to reliably model the process. Biglan *et al.* (2004) was unable to develop a reliable simple correction factor because the bias is not consistent across different respondent groups, research methodologies and research topics. Nichols *et al.* (2004) found that young women's future smoking behaviour showed a strong relationship with the young person's perception of their mother's smoking behaviour but not with the mothers' self-reports of their behaviour. (See further description of this study in Risk factors, below). Cowling *et al.* (2003) found a small (4 percent) understatement among women who were occasional smokers, not among any other segments.

There are also difficulties of comparing different surveys across different times and different countries. The methodologies, samples, questions and variables lists change between surveys. Despite these difficulties, Lopez *et al.* collated sufficient smoking and illness data to develop a model tracing the *trajectory* of the tobacco epidemic in developed countries (Figure 2.11).

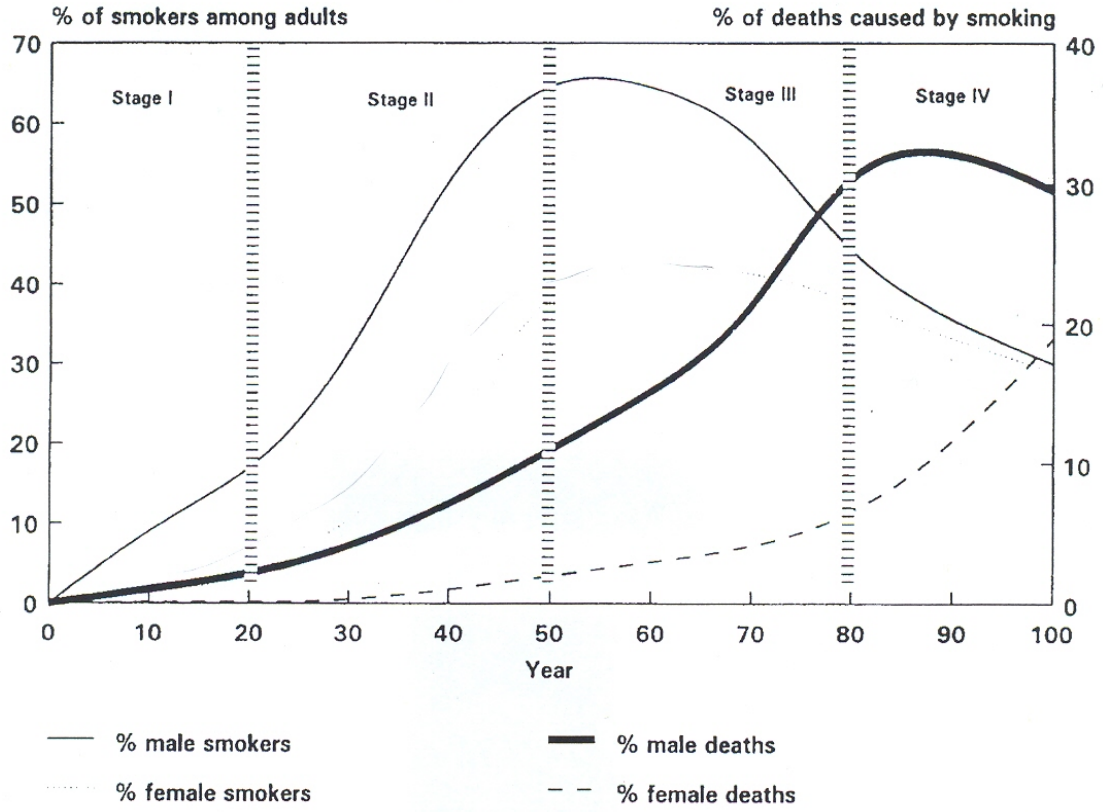


Figure 2.11. A model of the cigarette epidemic (Source: (Lopez *et al.*., 1994)

The trajectory and its four-stage structure resembles the *product life cycle* model discussed above (2.7.1). Graham (1996) found a similar pattern in the development of smoking prevalence among women in selected European Union countries. She attempted to show that the trajectory followed the path of the product lifecycle and that the demographic characteristics of the female smokers at different stages in the cycle corresponded with those described by Rogers' Diffusion of Innovation model described above (2.7.2). While the demographic characteristics were not inconsistent with the Rogers model, there is insufficient data to identify the key psychological traits such as a propensity towards risk-taking, which separate *innovators* from others. Corrao *et al.* (2000) added data from contemporary smoking behaviour surveys to allocate countries into appropriate stages as shown in Table 2.4.

Table 2.4. Countries in different stages of the tobacco epidemic

Stage I	Stage II	Stage III	Stage IV
• sub-Saharan Africa	• China • Japan • Southeast Asia • Latin America • North Africa	• Eastern Europe • Southern Europe • Latin America	• Western Europe, UK • USA • Canada • Australia

Source: (Corrao 2000)

Corrao suggests that any country can locate itself on the trajectory and if they follow the examples of Stage IV countries including Australia, they will shorten the timescale of the trajectory and reduce the peak prevalence level. Estimates based on survey data in (D. Hill and White, 1995; D. Hill, White, and Scollo, 1998; David J. Hill, White, and Gray, 1988; D.J. Hill, White, and Gray, 1991) project a "hypothetical" decline in male prevalence to zero "around 2022 when about 8% of women will still be smoking, women not reaching zero until 2034." It will be shown below that this has important ramifications for policy-makers and social marketers because it assumes that antismoking campaigns fully explain the shape of the trajectory and that if current antismoking campaigns are maintained, smoking prevalence will continue to decline to zero. Tobacco smoking's trajectory may not maintain this decline; it may develop a cyclical product life cycle. It will be shown below that there is already evidence that the slope of the decline in stage IV countries is levelling off. Klein (1993) suggests that smoking and the reaction against it, is currently "at an apogee in one of the cyclical movements of encouragement and prohibition of smoking" and that smoking prevalence will follow this repeating pattern of rise, fall, rise and fall again.

Molarius *et al.* (2001) also developed a similar model to show the "evolution" of the smoking epidemic in selected communities. Stanton *et al.* (2004) identified six different possible "trajectories" in the escalation of adolescent smoking (early rapid escalators, late rapid escalators, late moderate escalators, late slow escalators-smokers, stable puffers, and late slow escalators-puffers but not quitters) and use demographic, psychological and other variables to predict the occurrence of any particular trajectory. All six trajectories integrate into the overall trajectory for smoking prevalence in the community as described by Lopez and the others. Miller (2005) and Miller (2002) also developed a model to predict future smoking behaviour among young people.

Observation of overall prevalence figures may disguise important changes in prevalence patterns in segments within the population. Ten years of antismoking programs in Italy from 1985 to 1995 had generally been beneficial but had left smoking rates in some population groups "rather high." (Arciti *et al.* (1995). While overall prevalence rates in the U. S. have fallen, prevalence of cigarette smoking among young people was no longer declining by 1994 (B. Lynch and Bonnie, 1994) and has increased in each year between 1992 and 1999 (Henningfield and Jude, 1999). A similar pattern is observed in Australia. (Hill *et al.*, 1999) found that, "The decline in adolescent smoking seen in the late 1980s has stopped." Johnson *et al.* (2002) found that while increasing numbers of adolescents were taking up smoking in the U.S., they found no demographic or geographic differences between young smokers and non-smokers. Bauman and Phongsavan (1999) found sustained increases in smoking prevalence among school-based adolescents across a wide range of countries.

2.10.4 Segments within the smoking population

Smoking prevalence in Australia has been in steady decline since 1945 but there are important changes in prevalence patterns in different segments of the community. For example, Makkai and McAllister (1998) found that the drop in lifetime smoking prevalence (that is the percentage of the population that has used tobacco at least once in

their life) among males has been greater and more sustained than the drop among females. See Figure 2.12.

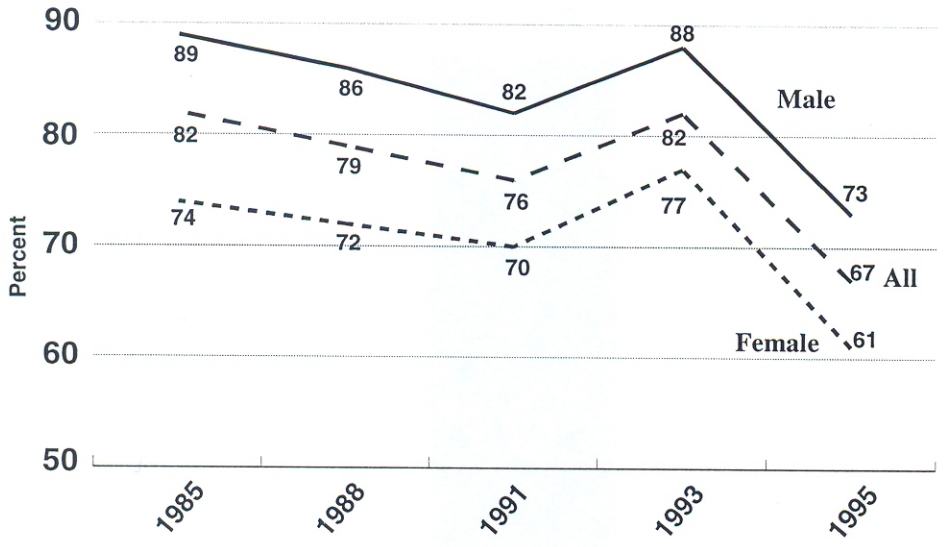


Figure 2.12. Trends in lifetime prevalence by gender (Source (Makkai and McAllister, 1998))

It will be shown later in this thesis that overall smoking prevalence in Australia is no longer declining and that there are important differences in the changes in smoking status among different segments of the Australian population.

In the past, higher smoking prevalence was associated with lower socio-economic status in Australia. (D. Hill and White, 1995; D. Hill *et al.*, 1998; D.J. Hill, 1988; D.J. Hill and Gray, 1982, 1984; D.J. Hill *et al.*, 1991). It was also associated with lower levels of education.(D. Hill and White, 1995; D. Hill *et al.*, 1998; D.J. Hill, 1988; D.J. Hill and Gray, 1982, 1984; D.J. Hill *et al.*, 1991) Young men and women have responded differently to the same antismoking messages (de Meyrick and Yusuf, 2006) and smoking prevalence levels are now very similar where prevalence among males was much greater than it was among females in the past. Haddock *et al.* (2007) found different smoking behaviour among different age cohorts of U.S. Air Force recruits. This

cohort effect among Australian residents is also examined below using data from four National Health Surveys.

Several authors have explored other differences among smoking patterns in different groups. Georgiades *et al.* (2006) found that despite higher levels of economic hardship (which was expected to be associated with higher smoking prevalence), immigrant young people in Canada were less likely to smoke than those born in Canada. This may be due to poorer integration and greater reliance on the family. This brings into play other "defence" factors such as exposure to fewer smoking parents and to young smokers. Wagenknecht *et al.* (1998) found differences in smoking prevalence in gender and ethnic segments in the U.S. Unger *et al.* (2000) and (2003) also found different segments in U.S. smokers based on ethnic differences and urban versus rural residence. Epstein *et al.* (1998) found significant gender and ethnic differences in smoking prevalence among inner-city American adolescents. In fact, the impact of ethnicity on smoking behaviour is widely researched. The following reports all identified differences between ethnic groups in relation to initiation, status or consequences of smoking behaviour: Bettes *et al.*, (1990); Clemens *et al.*, (2003); Elek, Miller-Day, and Hecht (2006); J. Epstein, Botvin, and Diaz (2000 and 2001); Epstein *et al.*, (1998 and 1999); Houston *et al.* (2005); Jenkins *et al.* (1997); Marsiglia, Kulis, and Hecht (2001); Neumark-Sztainer *et al.*., 1996; Nichols *et al.*., 2004; Novotny *et al.* (1988); Parker *et al.* (1998); Perez-Stable *et al.*, (2001); Robinson *et al.*, (2006) and Sallis *et al.* (1997).

Camenga *et al.* (2006) found different prevalences in different groups of adolescent American smokers. In this case, differences in smoking prevalence were associated with changes in other risk-taking behaviours in different groups. Siegel *et al.* (2000) found that smoking prevalence in California had continued to decline during a period in the U.S. when national prevalence levels had levelled off. They associate this difference with a "comprehensive tobacco control program" in California that was not available in other states. McAlister *et al.* (2006) conducted a similar study in Texas and Weintraub and Hamilton (2002) in Massachusetts. Crampton *et al.* (2000) found a similar association between lower socioeconomic status and increased smoking prevalence in New Zealand. In addition, they found that at each socioeconomic level, Maori smoked

more than others. Kaplan *et al.* (1997) found high levels of smoking prevalence among Alaskan natives, particularly among females and pregnant females whose smoking prevalence was significantly above levels in similar non-native populations.

Fukuda *et al.* (2005) found a strong relationship between socioeconomic, gender and age groups and smoking prevalence in Japanese adults. They conclude that socioeconomic status substantially predicted smoking status but that the relationship varied across gender and age groups. Honjo *et al.* (2006) examined the "other side of the coin" and found a clear association between higher social class and greater success in quitting smoking among a large sample of U.S. smokers. They suggest that this might in part be due not just to the higher social class respondents having greater access to resources but, because of the social class gradient in smoking prevalence mentioned elsewhere, these respondents are less likely to be mixing with other smokers either at home, socially or at work. Apodaca *et al.* (1997); Brownson, Hopkins, and Wakefield (2002; Brownson *et al.* (1992); Lasater, (2005); Lefebvre *et al.* (1987); O'Loughlin *et al.* (2002); Mary Ann Pentz (1999) and Stamatakis, Brownson, and Luke (2002) all found that ethnic differences had a significant impact on smoking behaviour.

Graham (1996) looked at the history of smoking prevalence among women in a selection of EU countries and found that while prevalence levels were different in the different countries, they "appear to be at different points along a common trajectory" – a reference to the Lopez trajectory mentioned above. Sutherland and Willner (1998) found clear differences in smoking (and alcohol and illicit drug usage) prevalence between young males and young females in the U.K. Steimle (1999) discusses a report showing that more young women in the EU are taking up smoking and agrees with a call for "specifically tailored anti-tobacco campaigns for women, especially young women and girls to prevent them from taking up the hazardous habit." Watson *et al.* (2003) found differences between smoking patterns among black women and white women in the U.S. and also found differences associated with income and education level. Huisman, Kunst, and Mackenbach (2005) found differences in smoking prevalence associated with differences in education and income levels in EU countries. The association with

education differences remained significant even after controlling for other socioeconomic indicators.

Emery (2000) suggested segmenting smokers along behavioural lines. They suggest that "hard core smokers" have a much stronger addiction and may need much more intrusive, harder-hitting campaigns than smokers who are less attached to the habit. Tong *et al.* (2006) suggest that this latter group ("non-daily smokers") may respond to simply being asked to quit. Velicer, Prochaska, and Redding (2006) call for segmented, specifically targeted antismoking campaigns, applying Prochaska's Trans Theoretical Model discussed above (see 2.3.4). Chapman (1993) found important psychological differences between current- and ex-smokers. A key difference is that smokers are much less likely than ex-smokers to accept that smoking is harmful. Furthermore, smokers exhibit "self-exempting beliefs," that is, even if they accept that smoking is harmful, they do not accept that they personally are vulnerable to the harm. Ayanian and Cleary (1999) also found that despite continued education campaigns in the U.S. smokers, regardless of whether they are heavy smokers or not, do not recognise their increased risk of heart disease and cancer. This is similar to a phenomenon McKenna (1993) labelled "smokers' optimism" and could seriously undermine the impact of antismoking initiatives, especially fear-arousing campaigns. Merrill, Hilton, and Daniels (2003) found a significantly lower burden of smoking-related disease among members of the Church of the Latter Day Saints (Mormons) and associated this with the impact of the church's doctrines relating to tobacco smoking.

Other demographic segmentation approaches include Nystedt (2006) who found differences in smoking prevalence associated with "marital life course events" in Sweden. Principal among these is "protective effect of marriage." Smoking prevalence is higher among divorced people than among married people. Widowed people are also less likely to smoke than never-married or divorced people with otherwise similar demographic characteristics. Bjarnason *et al.* (2003) and Griesbach *et al.* (2003) both found a relationship between family structure and smoking behaviour. Griesbach found that even after controlling for other demographic factors associated with increased likelihood to smoke, 15-year-olds in seven European countries were significantly less

likely to smoke if they were in an "intact" family than in a stepfamily. While Shavers et al. (2005) found differences in smoking prevalence among different racial groups in the U.S., they did not find an association with occupation or industry, after adjusting for other demographic variables such as gender and age. King, Bendel, and Delaronde, (1998) and King, Polednak, *et al.* (1999) further divide ethnic groups, finding differences in smoking behaviour between groups of African-Americans and between those born in America ("native") and those born in another country ("foreign-born"). On the other hand, Abdullah *et al.* (2006) found no significant differences attributable to age or gender in smoking cessation success in young people in China.

Researchers such as Medhi, Hazarika, and Mahanta (2006) examine individual occupational groups in specific areas – in the case of Medhi *et al.*., it was tea workers in Assam in India. Eriksen (2006) researched workplace environmental factors than are associated with successful smoking cessation among Norwegian nurses' aids and Banwell *et al.* (2006) found elevated levels of smoking prevalence and other problems among building industry workers in the Australian Capital Territory. Anderson *et al.*, (2002) showed how the U.K. tobacco industry had identified key segments such as low-income smokers and developed specifically targeted marketing campaigns to build and maintain relationships with them. Despite all this evidence to the contrary, antismoking campaigns in Australia have continued to rely principally on a standard, health-consequences, fear-inducing message strategy. Sasco and Kleihues (1999) attribute the failure of campaigns in Lyon, France to decrease the rate at which young people are taking up smoking, in part to taking a "uniform approach to diverse populations" but strategy development in Australia seems to consist of finding new, more shocking and intrusive ways to express the same threatening message to all segments of the target audience.

2.10.5 Smoking initiation

Most tobacco smokers took up the habit in their teenage years (Griffin *et al.* (1999). In Australia, the mean age of initiation of tobacco smoking has remained stable at approximately 15 years. (See Table 2.5.)

Table 2.5. Mean reported age of tobacco smoking initiation

	National Drug Strategy Household Survey		
	1995	**1998**	**2001**
Mean age of initiation (years)	15.6	15.7	15.5

Source: (AIHW, 2002)

In the 1990 and 2005 NHS surveys, respondents were asked to recall the age at which they became smokers. The mean age at which respondents took up smoking, regardless of whether they were current or ex-smokers at the time of the survey, was 17.5 years in the 1990 survey and 17.7 in the 2005 survey. While this is older than the means mentioned above and those reported from other countries (below), it is still below the age of 20. In both surveys, at least 80 percent of these respondents reported taking up smoking by the age of 20.

This is a pattern that is found in many, if not most countries. The Global Youth Tobacco survey found remarkable consistency 131 countries plus Gazza and The West Bank. (Warren *et al.* (2006) The US Department of Health and Human services found that 89 percent of current adult smokers took up smoking before the age of 19 years. (USDHHS, 1994) While Harrell *et al.* (1998) found a mean age of 12.3 years among US school students, with small variations across socio-economic and race groups. Joffe found that smoking begins in childhood and adolescence and declared it a paediatric condition (Joffe, 2001) coinciding with the approach of Najem *et al.* (1997) who also found a mean onset age of less than 16. Everett *et al.* (1999) also report an adolescent onset of tobacco

smoking. Smedlund and Ahn found similar ages of initiation in Norway and the U. S. but much higher prevalence levels in Norway for all age-groups less than 60 years (Smedslund and Ahn, 1999). Charles W. Warren *et al.* (2000) found similar ages of initiation across a wide range of countries and like Flay (1993), they found that knowledge and understanding of the health risks associated with tobacco smoking did not inhibit initiation. Chen *et al.* (2001) found patterns similar to those reported in the U. S. Osaki and Minowa (1996) found significant levels of smoking "even in junior high school," indicating a young age of smoking initiation in Japan.

Degenhardt, Lynskey, and Hall (2000) reported a similar age of initiation in Australia but also found that the mean age is creeping lower as successive cohorts reported starting smoking slightly younger. Regional and ethnic differences have also been found. For example Ma *et al.* (2002) found a higher mean initiation age among Asian-Americans in the state of Delaware (18.3 years). Graber, and Brooks-Gunn (1999) and Tucker *et al.*, (2005) suggest that this vulnerability in the teenage years might be because adolescence is a period when they are undergoing rapid, profound physical and psychological changes associated with puberty and adolescence. This is a period of experimentation and discovery for these young people and tobacco smoking is one of experiences to be tested. (Graber and Brooks-Gunn, 1999) Trauth *et al.* showed that nicotine is primarily and most lastingly active in the cholinergic systems of the brain and that these systems are "in a vulnerable developmental stage during adolescence," so changes in the brain's systems will be more readily accepted and become permanent changes at this stage than later, when the brain's systems are more mature and stable. (Trauth *et al.*, 2000)

The implications for the social marketer are clear; if one of the objectives is to help people avoid taking up tobacco smoking (a preventative strategy), then the target segment is approximately 15 years old. Dalton *et al.* are very critical of the sort of standard, health-consequences campaigns included in current antismoking campaigns aimed at reducing smoking initiation; "teaching adolescents and teens about the negative consequences of smoking is unlikely to change their intent to smoke."(Dalton *et al.*, 1999)

Pechman together with a number of other authors explore a number of recommendations when developing antismoking campaigns directed specifically at young people because of their particular vulnerabilities and their particular needs. (Pechmann, 1997; Pechmann and Ratneshwar, 1994; Pechmann and Thomas Reibling, 2000a, 2000b)

2.10.6 Risk factors for smoking initiation

A social marketing campaign designed to reduce smoking prevalence must be mindful of the competition, that is, barriers to the successful execution of the intended strategy (Bryant, 2000; Mckenzie-Mohr, 2000) (Also see Andreasen and the discussion about the marketing environment 2.9, above). The role of the tobacco companies in promoting their products is discussed in more detail below. Other barriers to a successful cessation campaign include the benefits the smoker receives from smoking and the nature of nicotine addiction (see 2.10.8, below). Competitors to a successful smoking reduction campaigns are the factors that encourage young people to take up smoking and, having taken it up, to continue to smoke. Baker, Brandon, and Chassin (2004) and Bogart *et al.* (2006) describe the factors associated with the development of smoking prevalence in the U.S. and provide a starting point from which to identify these competitors.

Other researchers in this area include Leatherdale *et al.* (2006) and Leatherdale *et al.* (2005) who examined a range of factors often associated with smoking initiation among junior and elementary level school students. They found that increased risk of a young person taking up smoking was associated with environmental factors as varied as the proportion of smokers in the school's senior students, as well as the presence of other smokers in the family or close circle of friends. Peterson *et al.*, (2006) found a relationship between smoking prevalence and the presence of smoking parents. Miller and Volk (2002) also identified family factors which indicate likely future tobacco smoking behaviour. In a similar vein, Sallis *et al.*, (1994) found that parental behaviour and specifically, prompting, is associated with smoking behaviour among young people in a large city in Mexico. Nichols *et al.*, (2004) found that, among a sample of urban minority group young women in the U.S., their perception of their mother's smoking

behaviour showed a strong relationship with their subsequent smoking behaviour but the mothers' self-reported smoking behaviour did not. They also found that the strength of this relationship varied between groups with black girls being more influenced than others. Kropp, Lavack, and Holden (1999) found strong peer pressure *not* to smoke among the sample of U.S. college students they surveyed. Smokers in this environment are students *less* influenced by peer pressure. Buller *et al.*, (2003) also found that the environment influences a child's vulnerability to taking up smoking, especially environments where smoking is more common and there is "no pressure to stay off cigarettes."

Peer pressure is a commonly cited reason for taking up smoking. The peer pressure can be active (friends offered cigarettes and encouraged smoking) or more passive (want to be like the other members of the group and they smoke). Conrad, Flay, and Hill (1992) reviewed 27 studies of predictors of smoking initiation and found strong support for *peer influences* in the studies. The presence of and sensitivity to peer influences was found to be a strong indicator of future tobacco smoking onset in a large range of studies. Peer group attitudes to smoking, the presence of friends who smoke and other "peer effects" were found to be strong predictors of smoking initiation by Beal, Ausiello, and Perrin, (2001); Bobo and Husten, (2000); Choi, *et al.* (2002); Derzon and Lipsey (1999); Elders *et al.* (1994); Lo *et al.* (1993); Najem *et al.* (1997); Powell, Tauras, and Ross (2005); Riedel *et al.* (2002a); Sasco *et al.* (2003); Unger *et al.* (2003) and many others. Pederson *et al.* (1998) found that the relationship between peer influences was not "all or none" but graduated with more peer pressure associated with greater uptake. Jackson (1997) found a specific form of peer influence "modelling of use [of tobacco] by best friends [but not by parents]" to be a strong predictor. Rissel, McLellan, and Bauman (2000) approached the problem from the other direction and found that the absence of tobacco smoking among peers and families in the Vietnamese community in Australia was associated with a delayed uptake of tobacco smoking. Valente, Unger, and Johnson's (2005) finding is a curious one, that more popular students are more likely to smoke. Unfortunately, their research was not able to uncover anything more than the correlation – causality or direction of effect is not clear. Rugkasa *et al.*, (2001) identified a potential intervening variable – the young person's perception of a smoker. They found that young respondents

perceived adult smokers as losers who smoke to cope with anxiety and therefore not to be emulated. Young smokers on the other hand, were perceived to be "cool" and to be copied if one wanted to be "cool." The perception of peer groups and peer pressure can be influenced by appropriate social marketing, communications strategies. Dusenbury *et al.*, (1992) found that peer influence was the strongest predictor of cigarette smoking among Latino adolescents in New York. Alberts, Miller-Rassulo, and Hecht (1991) found that the influence of peer pressure to take drugs is mitigated by such situational factors as the identity and relationship with the person offering the drugs, which drug was offered and the location in which the offer was made. Another aspect of peer influence was found by Conway *et al.*, (2004) who found that quit smoking campaigns among female U.S. Navy recruits were more effective when the proportion of non-smokers among recruits was increased. They also found that separate "relapse prevention" campaigns were needed as the protective effect of quit campaigns wore off after the smokers had been persuaded to quit.

Epstein, Botvin, and Spoth (2003) found a strong relationship between smoking behaviour among young rural people and a combination of peer pressure and the young person's perception of adult smoking norms.

2.10.7 Other risk factors

In addition to peer effects, other common risk factors have been explored in the literature. The following is a list of typical other risk factors and a sample of reports dealing with this risk.

- Lower socio-economic status is associated with greater risk of smoking. (Conrad *et al.*, 1992; Harrell *et al.*, 1998; Joffe, 2001)
- Lower level of school achievement is associated with greater risk. (An *et al.*, 1999; Elders *et al.*, 1994; Griffin *et al.*, 1999; Joffe, 2001)

- Truancy and school absences is associated with greater risk. (An *et al.* 1999; Joffe 2001)
- Males are at greater risk than females. (Harrell *et al.*, 1998; Reddy *et al.*, 2006)
- Some ethnic groups are more susceptible to tobacco smoking uptake than others. (Harrell *et al.*, 1998; Unger *et al.*, 2000)

Lower socio-economic status is one of the environmental variables (see *Marketing Environment* 2.9 above) much like the legal or technological variables, that the marketer needs to include in their strategy development but as it is not under the marketer's control, it is not a part of the social marketer's mix. Social marketing strategies must be developed taking into account the socio-economic variables rather trying to develop a strategy to change them.

Pro-tobacco advertising and promotion has been severely curtailed in Australia but the strength of nicotine addiction (see 2.10.8, below) means that there is still a large number of smokers who might have originally been influenced to take up smoking by tobacco company activities and who are now an important component of the environment in which adolescents are contemplating taking up smoking. Direct evidence of the impact of tobacco advertising and promotion comes mainly from outside Australia but confirms its effectiveness. See MacFadyen, Hastings, and MacKintosh (2001) for example. Research in the related areas of alcohol and unhealthy food consumption also found that company-sponsored promotions had a similar impact on young people and supports the call for social marketing interventions to counter these activities. (Cooke *et al.*, 2004; Ellickson et al., 2005; G. Hastings, Stead, and McDermott, 2004) On the other hand, Tucker, Ellickson, and Klein (2002) identified social and demographic factors which are predictors of successful smoking cessation among young smokers in the U.S. These are all potential regarded as risk factors for quitting.

In many cases, the impact of risk factors is mitigated by other factors, in other words, there are segments within vulnerable groups who respond differently to the same risk factors. Many of the examples described above include this interaction between factors.

Etter, Prokhorov, and Perneger (2002) found important differences between males and females in terms of the impact of risk factors which may explain differences in smoking prevalence among males and females in Switzerland.

The antismoking programs discussed in this thesis do not address most of these risk factors.

2.10.8 Nicotine addiction

Taking up tobacco smoking has serious consequences because nicotine addiction is very rapidly acquired and extremely resilient. The World Bank points out that nicotine is recognised as addictive by international medical organizations and tobacco dependence is listed in the International Classification of Diseases.(WorldBank, 1999) Researchers report that a large proportion of teenagers who take up smoking become addicted to or dependent on tobacco.(Riedel et al., 2002b) Joffe estimated that fifty percent of young people who take it up will go on to become daily smokers and dependence is established after as few as 100 cigarettes. (Joffe, 2001). McNeill reported that the majority of young smokers in a sample of nearly 3,000 U.K. schoolchildren were dependent on tobacco (McNeill, 1991). Once acquired, the dependence is hard to dislodge. Russell (1990) estimates that "Over 90% of teenagers who smoke 3-4 cigarettes are trapped into a career of regular smoking which typically lasts 30-40 years." Pierce talks of a minimum 20 year addiction.(Pierce and Gilpin, 1996). Stapleton (1998) attributes the disparity between the relatively low rate of successful quitting compared with the high proportion of smokers who regularly report that they wish to stop to "the addictiveness of tobacco." Other reports of the strength of nicotine addiction include Attebring *et al.* (2004); Humfleet *et al.* (2005); Killen and Fortmann (1994); Lasater (2005); O'Loughlin *et al.* (2002); Prochaska *et al.* (2006) and Taylor et al. (1990). These reports all find that despite having clear motivation to quit, for example being pregnant or being treated in hospital for coronary disease, a large proportion (often a majority) of smokers either cannot give up smoking or recommence smoking within twelve months of leaving the treatment

environment. (Riedel *et al.*., 2002a) take advantage of the fact that most young smokers want to quit the habit to recruit them to trials of different smoking cessation treatments.

Explanations for addiction and nicotine addiction in particular continue to be actively researched. An economist's explanation suggests that addiction is rational behaviour, it is simply an attempt to maximise utility over time.(Becker, Grossman, and Murphy, 1994; Becker and Murphy, 1988) The addict trades off future costs (illness and early death) for short term pleasure (relief of withdrawal symptoms or peer respect). The trade-off is determined by the discount rate that the addict uses to calculate the *present value* of these future costs. Bretteville-Jensen (1999) proposed that the mechanism might be the other way around – one of the effects of the addiction might be to distort the addict's time preference and choice of discount rate. A successful attack on the addiction would involve changing the addict's time preferences so that the present pleasure is worth less than the future cost. This could be achieved by shortening the time period to the costs, increasing the perception of the costs or some combination of these.

An emphasis on the *social* aspects of addiction is typified by Cameron 's (2000) proposal of *interlocking consumption.* This suggests that the tobacco is not actually the focus of the addiction. The smoker only smokes or smokes more heavily, when they are out having a drink with friends. It is the social interaction that the smoker is addicted to and the need for a cigarette is experienced by association. Cinciripini *et al.* (1997) fuses the social with the chemical. Social factors such as peer pressure (see 2.10.6, above) lead to experimentation whereupon the biological action of the nicotine leads to addiction. This can happen rapidly because smoking is a very efficient delivery mechanism to transport the nicotine to the brain. Joffe (2001) estimates that it takes only ten seconds from inhaling the smoke to traces of nicotine being detectable in the brain. Jessor supports the concept of a two-stage process, "few adolescents continue to smoke for the thrill of seeing whether they can avoid pulmonary disease," there must be other factors at work. (Jessor, 1991)

Henningfield and Jude (1999) attack the rational addiction scheme, pointing out that a principal distinguishing characteristic of an addiction is a strong "drive to continue using

even in the face of harm and with a strong desire to quit." (1999:42). They propose that there are biological factors influencing behaviour and addictive behaviour is not explained by a lack of knowledge, will power or some other personality defect. Kupfermann, Kandel, and Iversen (2000) add two other characteristics of addiction; tolerance and dependence. The first cigarette is usually very unpleasant, even nauseating. Very rapidly though, this reaction disappears and thereafter, not only is the unpleasant reaction gone, the addict often has to imbibe increasingly large doses of the substance to achieve the same "high." Dependence is achieved when there are unpleasant "withdrawal" symptoms associated with depravation of regular doses of the substance. Both of these characteristics apply to nicotine addiction. A search for the biological mechanism of addiction focuses on some of the cellular mechanisms (Dani, 2001; Dani and De Biasi, 2001; Dani, Radcliffe, and Pidoplichko, 2000; Walton *et al.,* 2001), including neural systems (Picciotto and Corrigall, 2002) such as the pleasure/reward circuitry of the brain (E. L. Gardner and David, 1999). Clementi, Fornasari, and Gotti, (2000) have identified a range of *neuronal nicotinic receptors* involved in complex processes such as cognitive functions, arousal, perception and memory. The role of the neurotransmitter Dopamine appears critical and its interaction with nicotine. (Balfour *et al.*, 2000; Stephenson, 1996) The interaction appears to bring about "long lasting changes in behaviour and neurochemical sensitivity" (Schoffelmeer *et al.*, 2002) which includes "cell death and altered neurochemistry" (Slawecki and Ehlers, 2002), an example of the sort of cellular mechanism sought by Dani and others. In summary, nicotine addiction is a chemical and biological fact and it explains why smokers have so much difficulty in quitting and why interventions to promote cessation need to be so powerful. Social marketing persuasion and education can go some way towards overcoming addiction but its role is usually to motivate the addict to seek out help in the form of a much more intrusive intervention – clinical help, for example.

Riedel *et al.* (2003) found that young people who were more likely to progress from experimental to regular smoking status changed their reports on their initial smoking experiments. When surveyed later, these respondents reported that their initial experience of smoking made them feel relaxed although relaxation was not one of the effects reported when these people were surveyed within a year of their first smoking

experiences. It is possible that one effect of nicotine addiction is to repress unpleasant memories associated with past smoking experiences. Cuijpers and Smit (2002) found that nicotine dependence in young people is related to alcoholism and tobacco use among their parents and suggest that there might be a genetic as well as an environmental aspect to addiction. The strength of nicotine addiction suggests two separate, important social marketing objectives: (a) help young people avoid taking it up at all and (b) provide sufficiently powerful help for smokers trying to overcome their addiction.

2.10.9 Implications for social marketers

The role of the tobacco companies in promoting cigarette consumption has been extensively examined.(Adams, 1999; Altman *et al.*, 1987; Davidson, 1996; Ernster, 1985; Fahs, 1996; Whiteside, 1971) Davidson and Whiteside describe how "deadly", sinful or antisocial products such as tobacco have been successfully promoted to the community. White (1988) refers to the tobacco companies as "merchants of death." The way in which tobacco companies detected important cultural changes in the community and in turn, influenced the changes is discussed in Smith and Ziegler (1990) and Starr (1984). Many authors have explored in detail some of the techniques and strategies used by tobacco companies to encourage smoking or at least, undermine the case against smoking by raising doubts about the validity of the evidence linking tobacco smoking with medical consequences. (G. A. Fine, 1974; M. N. Gardner and Brandt, 2006; Mangan, 1996; Rolef, 1998; Rosenzweig, 2000) Simon Chapman (1986) described these techniques in a book with his hallmark punning title, "Great expectorations: advertising and the tobacco industry." At a time when tobacco smoking was less controversial in the U.S., Leo Burnett's, a large advertising agency, cited their work on Marlboro as an example of the outstanding and effective campaigns they were capable of developing. (Burnett, 1958). Petrone (1996) regards tobacco advertising as "the great seduction" of the community. Hilts (1996) looks closely at the "tobacco industry cover up" when they attempted to blunt antismoking messages. Miller (1992) examined how tobacco companies employed one of the marketing communication techniques, public relations, in the early stages of their campaigns to undermine antismoking messages. Throughout

these reports, there is a common thread: the tobacco companies have been sophisticated, successful users of marketing techniques to influence peoples' behaviour.

MacFadyen *et al.*, (2001) examine the impact of these marketing initiatives, measuring the susceptibility of U.K. young people to tobacco companies' point of sale promotional activities. There is also a similarity in the marketing successes of the alcohol companies (Cooke *et al.*, 2004). There is a clear need for social marketing programs to be equally sophisticated and successful in reversing the effects of the tobacco companies' activities.

Tobacco smoking is a major cause of avoidable morbidity and mortality around the world. There is a clear need to reduce the prevalence of tobacco smoking in the community. The progress of tobacco smoking both at the country and individual levels is increasingly well understood. Lessons from alcohol prohibition and campaigns to eradicate illicit drug usage indicate that a legislative and policing strategy is not enough. An effective approach must incorporate strategies to influence people's behaviour. As was explained above, marketing focuses on influencing people's voluntary behaviour, by persuading people to behave in a certain way by communicating the value of the recommended behaviour compared with alternatives. Key marketing concepts include a focus on the customer's perspective, perceived value and an exchange. Marketers are also aware that peoples' needs change over time and that demand for a product grows and decays in a life cycle similar to that of living things. Marketers recognise the need to understand the factors that determine the shape and timing of this cycle.

Social marketers must recognise that a key element in their marketing environment is the expertise of the tobacco companies. Their success in attracting young people to smoke and their strategy of helping smokers counteract the various antismoking strategies put forward by social marketers and policy makers are the key threats that must be overcome by antismoking programs. While most of these pro-tobacco strategies are no longer available, the addictive nature of nicotine and their campaign's success in establishing smoking in the cultural environment have to be considered in the development of antismoking social marketing strategies. Development of antismoking strategies has never been without controversy (see *A page from history: arguments for and against the*

ban of cigarette advertisements (Moss and Henderson, 1994)) but the thorough application of social marketing principles will incorporate these environmental factors and increase the chances of the strategies being adopted and succeeding.

Marketing uses insights developed by marketing researchers and a host of other disciplines to develop models of how peoples' behaviour is influenced, taking into account environmental and individual factors that influence this behaviour. These models also extend to persuasive communication. A key marketing concept in this regard is the need to tailor the message to the audience and to be aware of the limitations of affective appeal strategies such as fear appeals.

Current antismoking campaigns have maintained a standard message strategy aimed at reducing smoking prevalence in Australia. The message strategy relies on the increasingly graphic depiction of the long term harmful medical consequences of tobacco smoking (heart disease, lung cancer and lung disease, limbs amputated due to gangrene, among other, equally gruesome afflictions), to generate sufficient fear in the audience to prompt smokers to quit. Attachment 1 shows a current ad running in major national magazines. The photo in the ad is a still from a television commercial run at the same time. The text is extracted from the voice-over in the commercial. There are other executions of the same strategy, for example featuring a close-up of a woman's mouth hideously disfigured by mouth cancer. Note the clear, unambiguous message: do not smoke because tobacco smoking will do this to you. The key elements of this campaign are also reproduced in graphic detail in "warning panels" on cigarette packets.

2.11 Social marketing applications

Hastings and McLean (2006) identify social marketing's potential to affect behaviour change in relation to addiction, especially nicotine addiction. They identify a method of segmenting the market on the basis of their behaviour and show how social marketing campaigns must be developed taking into account inequalities between parties in the marketing exchange. There is much research drawing together the marketing principles

discussed above and using them to guide development of social marketing campaigns. A very important consideration found in many studies is the need for market segmentation. For example, Novotny *et al.* (1988); Terry-McElrath *et al.* (2005); Unger *et al.* (2001) and Windsor *et al.* (1985) all point out the need to recognise different target segments when developing a strategy so that the message can be tailored to the needs of the particular audience. Flay (1999) suggests a two stage segmentation approach. He identifies *students* as a group at risk of tobacco smoking and suggests that while it is possible to develop a tobacco smoking prevention campaign to address to the whole student population, it may be necessary to supplement this overall program with programs "tailored for students at higher risk than most." Warnecke *et al.* (1992) points out the need to keep updating a campaign strategy to maintain its relevance as the needs of the target audience change. They point out that as smoking prevalence decreases, the characteristics of those continuing to smoke in the new environment will change and antismoking intervention strategies will need to change. Augustson and Marcus (2004) also suggested that the impact of antismoking campaigns might be waning as successive campaigns removed those less addicted to nicotine, leaving only what they called "hard core" smokers who might not be at all susceptible to strategies which worked on the rest of the smoking community. Hastings and Tracey (2005) show how the choice of communication channel to carry a social marketing message is influenced by the learning characteristics of the target audience (see also the discussion of Schramm and other communication models, 2.8 above for the impact of channel selection and frames of reference.)

Many authors restate the need for social marketing initiatives to be based on a model of behaviour change. See Flay (1999); Kelder *et al.* (2000) and Reardon, Sussman, and Flay (1989) for example. Others reinforce the need to ensure that the application of a model is supported by strong evidence and an understanding of the impacts and interaction of the factors in the model. (Flay, 1999; J. O'Loughlin *et al.*, 2002; Mary Ann Pentz, 1999; Reardon *et al.*, 1989 and Sussman *et al.*., 2004).

Interventions that can be broadly characterised as social marketing or containing a social marketing component, have been employed in a wide variety of contexts, not always with

great success. Foxcroft *et al.* (2003) concluded that twenty of the fifty-six interventions they examined to help young people avoid alcohol misuse had been ineffective at producing longer-term (three years) results. O'Loughlin, Paradis, Gray-Donald, and Renaud (1999) found that few of the community-based coronary health care interventions they examined produced lasting results but that some "have potential." On the other hand, Carleton *et al.* (1995) found that a similar program in Pawtucket showed that limited, longer term results were possible but that they needed considerable, sustained support from government, local authorities and other bodies. Ellickson, Bell, and McGuigan (1993) and Flay *et al.* (1989) both also found that the effects of early antismoking and anti-drug abuse programs wore off soon after the end of the programs. Niknian, Lefebvre, and Carleton (1991) found that an improvement in the awareness of health issues and better health practices among people in a community in New England, in the U.S. could only be attributed to the mass-media campaign run in the community and not to any other causes.

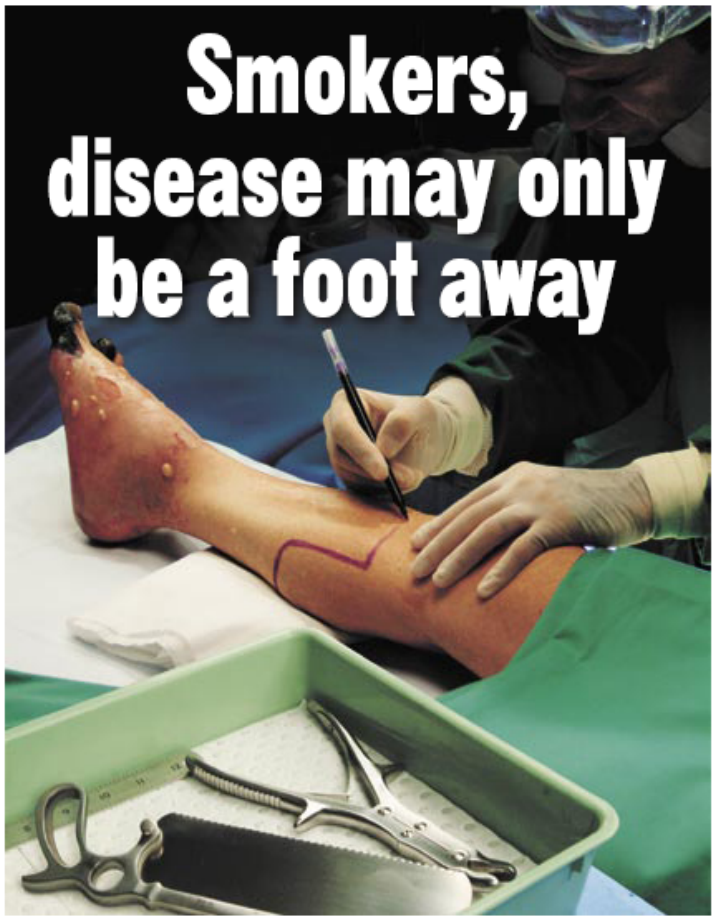
Wakefield *et al.* (2005) found that spending on antismoking messages aimed at the community in the U.S. was matched or exceeded by tobacco company and pharmaceutical company sponsored advertising and suggested that this may have undermined the effectiveness of the campaigns. Wakefield *et al.* (2006) found that a particular antismoking campaign had not produced significant improvements in the smoking behaviour of young people but it is hard to determine what the true objectives for this campaign were as it was developed and funded by tobacco companies.

Very often though, lessons can be learned from both successes and failures. For example, the paper by Lichtenstein *et al.* (1990) mentioned above, examined the problem of tobacco smoking prevalence and draw two important conclusions that support key social marketing concepts: (a) it is important to understand the audience perspective "rather than clinical perspective on tobacco" (in Andreasen's terms, to be customer focused) and (b) there is a need to pay "attention to the science of behaviour change" (in Andreasen's words, "behaviour change is the bottom line."). Altman *et al.* (1987) point out the need to take into account the cost of achieving the behaviour change as well as the extent of change achieved. They distinguish between the need to identify effective

strategies and then to improve on their efficiency. Metzler *et al.* (2001) review "behaviour management practices" in the context of disruptive student behaviour at school and highlight the necessity for a "behaviour support program" and a multi-disciplinary approach to the problem to ensure lasting results. The Sussman, Metzler and Wakefield papers, together with Elder (2001); Elder *et al.* (1993) and Taylor and Biglan, (1998) all indicate the need to evaluate the environment in which the strategy will operate. The social marketer must clearly identify allies in the process, including other disciplines and parties who can be enlisted in the campaign and competitors whose activities will seek to undermine the campaign's success.

The next chapter describes the data and methodology that are used to explore whether the current Australian antismoking campaigns achieve the key social marketing "benchmarks" established by Andreasen and whether this might have affected the achievement of a sustained reduction in smoking prevalence in Australia.

Attachment A. A current antismoking advertisement



Every working day, two Australian smokers have a limb, or part of a limb, amputated because of damage caused by smoking.

How do cigarettes do such harm so far from your lungs?

Every time you inhale tobacco smoke, toxic chemicals enter your bloodstream. As they travel to every part of your body they make your artery walls sticky and collect dangerous fatty deposits.

When arteries become blocked, gangrene can set in, which always requires amputation.

The graphic health warnings now on cigarette packs mean you'll be reminded of diseases like gangrene every time you reach for a cigarette.

When you look at the warnings, don't just see a gross picture, imagine the person who has that disease. And imagine being that person.

Most smokers want to quit and have tried to quit before. Find out how you can increase your chances of beating your nicotine addiction by talking to a Quitline advisor.

Call today on 13 QUIT (13 7848). The number is also on every cigarette pack. So until you do give up smoking it'll be in your pocket all day, every day.

Quitline.13 7848

A New South Wales Government initiative

cancer institute NSW

Chapter 3: Data and Methodology

3.1 Introduction

The first part of this chapter describes the data sets used in the analysis. A general description of the Australian National Health Survey (NHS) is followed by a more detailed description of the characteristics of the survey sample and a comparison of selected weighted data from the NHS with corresponding weighted data from the Australian Bureau of Statistics (ABS) estimates of the residential population in the years in which the NHS was conducted. This analysis was completed to validate the NHS samples and to ensure that findings from analysis of these samples can be generalised to the rest of the Australian population. This is followed by an analysis of responses to two questions (occupation and income decile) comparing respondents who did not provide an answer (not applicable, not stated and in the case of occupation, member of the armed forces) with those who did provide an answer.

Data analysis begins with an approximation of a cohort analysis. The NHS were conducted approximately five years apart and age data is grouped into five-year bands. So, while it is not possible to track individual respondents, it is possible to comment on changes in the age cohort as they move into the next age group in each successive survey. This is followed by a more detailed analysis of the NHS data. The first part, the preliminary analysis, examines patterns in smoking behaviour in the whole sample and then in selected segments. It plots the changing percentages of the sample who report being in one of the three possible smoking status groups, current smoker, ex-smoker or never having smoked, in successive surveys. The second part of the analysis uses logistic regression to identify the impact of selected demographic factors and the passage of time on the odds of belonging to one of these smoking status groups.

3.2 Hypotheses

It will be shown below that the reliance on a single message strategy that aims to both motivate smokers to quit the habit and help young, potential smokers avoid taking it up by inducing increasing levels of fear of the medical consequences of smoking, has not been associated with a continued decline in smoking prevalence and that different groups in the community have responded differently to it. The analysis tests the hypothesis that the strategy is becoming less effective at reducing overall tobacco smoking prevalence. The next part of the analysis tests the hypothesis that there are not different segments in the population with regard to smoking behaviour. This is explored by examining different personal characteristics that are associated with different smoking status. Finally, the analysis tests patterns of change in smoking behaviour within segments over time to show that the patterns of changes in smoking behaviour have been different from one segment to another.

These hypotheses are expressed in the following null hypotheses:

> H_{01}: Smoking prevalence has remained unchanged in Australia between 1990 and 2005.
>
> H_{02}: There is no difference in the pattern of smoking status in different segments of the Australian population.
>
> H_{03}: There is no difference in the patterns of change in smoking status in different segments of the Australian population between 1990 and 2005.

3.3 Data used in this analysis

As was explained in the literature review, comparison of smoking-related statistics gathered from different sources in different times and in different contexts can produce widely differing results that *prima facie*, owe more to differences in methodology or sample characteristics than to changes in the population statistics. The comparison of total expenditure on tobacco products reported in the ABS's Household Expenditure

Survey and the much larger figure calculated from Government receipts from taxation on tobacco sales de Meyrick and Yusuf (2006) showed a discrepancy of as much as 40 percent. Other evidence for the existence of social desirability bias in the self-reporting of potentially controversial behaviour such as cigarette smoking is inconclusive but studies such as Biglan *et al.* (2004) confirm that the context in which the survey is conducted may well introduce bias into the responses. They found that students who completed a questionnaire at home reported a lower prevalence of tobacco smoking than a comparable sample of students who completed the questionnaire at school. Other research noted in the literature review indicated that in certain conditions including where the survey is confidential and administered in person by an adult researcher, self-reported data is accurate. These conditions all apply to the NHS surveys examined here. For consistency, this analysis uses data taken from four consecutive surveys conducted by the same research organisation, using consistent sampling and survey methodologies, and conducted in a similar context among comparable populations.

3.3.1 The National Health Survey

The principal data source is the Australian National Health Survey (NHS) (ABS Catalogue number 4363.0). Data from the last four surveys, that is, those conducted in 1989/90, 1995, 2000/01 and 2004/5 were used in this analysis. Throughout the analysis, they are identified as the 1990, 1995, 2000 and 2005 surveys. The National Health Survey, as the name suggests, is a survey conducted by the ABS approximately every five years and covers an increasing range of health-related issues across the Australian resident population. The number of topics covered has increased with each survey but always includes the current state of the respondent's health, their use of medical services and products, and aspects of their lifestyle which may have a bearing on their health – including exercise, consumption of alcohol and since the 1990 survey, consumption of tobacco products.

For each survey, a large sample of domestic residences is chosen using a stratified multi-stage random sampling methodology. Commercial and institutional residences are not

included, so residents living in accommodation such as hotels, hospitals and prisons are excluded. All Australian states and territories are included but coverage of sparsely populated, remote regions is not comprehensive. Given the concentration of the Australian population in and around metropolitan areas, this is not a great limitation on the data. In the 1990 and 1995 surveys, the ABS interviewers personally interviewed all the usual residents of the selected households who were aged 18 years or more. In later surveys, a representative person was chosen according to the schedule below and personally interviewed by a trained ABS interviewer. Australian residents are included in the survey but not temporary residents such as diplomatic or military staff posted to Australia whose normal residence is outside Australia.

Sample selection schedule:

1990 and 1995:

- All residents, 18 and over
- With parental or guardian permission, all children 15 to 17
- Parent or guardian answered questions in respect of younger children

2000

- One adult, 18 and over
- With parental or guardian permission, one child 7 to 17
- Parent or guardian answered questions in respect of all children 0 to 6

2005

- One adult, 18 and over
- One child, 0 to 17 (The parental or guardian rules set out above were applied).

While the sample size has changed between surveys, it is always large. As Table 3.1 shows, the smallest sample size is nearly 26,000 people and the largest is over 54,000.

The size of these samples ensures that sample sizes within cells when the data is segregated into various different groups are always more than adequate for the analysis being conducted.

Table 3.1. Nation Health Survey sample sizes

Survey year	Number of households	Sampling proportion %	Number of records	Records 18 y.o. and over
1990			54,241	38,974
1995	23,800	0.3	53,828	39,110
2000	17,918		26,862	17,918
2005	19,501		25,906	19,501

Data from each survey is available in the form of Confidentialised Unit Record Files (CURFs). Each file contains confidentialised records of each respondent's answers to each question that they completed. The records are modified (confidentialised) to ensure that individual respondents cannot be identified or that respondents and responses cannot be connected, either accidentally or by deliberate manipulation of the data. This is principally achieved by removing any identifying material in each response and aggregating responses from very small groups rather than by altering any individual's response. This protects both the respondent's anonymity and the integrity of the data. The ABS also restricts access to the data to bona fide researchers who undertake not to attempt to identify respondents.

3.3.2 Smoking status records

In all four of the surveys, questions relating to tobacco smoking are not addressed to respondents under 18 years of age. The first step in the data preparation was therefore to select only the cases where the respondent was 18 or older at the time of completing the survey. Even these reduced samples are still large. Table 3.1 shows that the smallest of

the reduced samples is still close to 18,000 cases and more than adequate for the analysis methods used in this thesis. Smoking status was also recorded differently in different surveys. In the first two surveys, respondents placed themselves in one of three categories: *Current smoker*, *Ex-smoker* or *Never smoked*. As the name implies, a current smoker was regularly smoking at the time of the survey. An ex-smoker is a person who took up smoking at some stage but then successfully quit the habit and was not a smoker at the time of the survey. The remaining category includes all respondents who have never been a regular smoker. In the latter two surveys, the *Current smoker* category was subdivided into *Current – daily* and *Current – other*. The definitions of the other categories remained the same. To make comparisons between surveys easier to interpret in this analysis, the two *Current* categories were combined into one, current smoker category.

3.3.3 Changes in the reporting of country of birth and other variables

Other changes in variables included the treatment of country of birth (COB), age groups and occupation groups. In earlier surveys, respondents were able to select from up to 12 countries or groups of countries of birth. In the 1995 and 2005 surveys, there are only three categories; *Australia*, *Other – mainly English-speaking* and *All other*. The other, mainly English-speaking category principally includes people from the UK, USA, Canada and New Zealand. For this analysis, data in the earlier surveys was recoded into these three categories to enable meaningful comparisons to be made between surveys. In the 2000 NHS, there are only two COB categories; *Australia* and *Others*. Meaningful statistics such as percentages and odds can still be calculated for the Australian-born population and important differences were found between the two overseas-born groups in the 1990, 1995 and 2005 surveys. Rather than lose this detail, analysis of COB data for these surveys maintained the three values for this variable. Comparison of these statistics with a combined All Other countries category in the 2000 survey would not be meaningful and segregated data was not available for this analysis, so discussion in the preliminary analysis of the data excludes an analysis of overseas-born people in the 2000 survey. All other COB data is included in this preliminary analysis. Among the

preparatory steps when fitting the logistic regression model, all COB data was recoded into either Australian-born or born overseas.

Age group and occupation groups from different surveys were also combined and recoded to enable meaningful comparisons. In different surveys there are different age-group records. Most of these differences relate to the recording of the younger age groups that are not included in this analysis. At the other end of the age scale, oldest age group in the 1990 survey is *75 and over*. In the 1995 and 2000 surveys, this group is further divided into *75 to 79* and *80 and over*. In the 2005 survey the *80 and over* group was further divided into *80 to 84* and *85 and over*. Data from later surveys was recoded to include all the later groups in the *75 and over* category for this analysis, so that data in the older age groups was recoded to reflect the 1990 structure.

There were also variations in the way occupation was recorded. In later surveys, some occupation groups were divided into two. For this analysis, data in these groups were recoded to reflect the 1990 structure so that meaningful comparisons could be made.

The only other change to the data was the addition of another variable, *Survey Year*, so that the four data sets could be merged into one for logistic regression purposes.

3.3.4 Validation of the sample

The NHS sampling methodology is consistent across all four surveys and as described above, the samples are all large. To check whether the samples generated are representative of the Australian population, Table 3.2 compares the gender balanced and the age distributions of the populations as estimated by applying the person weights to each of the NHS surveys with the estimates calculated by the ABS in their Estimated Residual Population (ERP) estimates for these years (ABS, 2005). The ERP for a year in which there is a national census is calculated by adjusting the census data for under-enumeration and adding the number of Australian residents estimated to have been temporarily overseas at the time of the census. In the period after each census,

population estimates are obtained by advancing the previous year's estimates to the next year. This is done by subtracting deaths and adding births and net overseas migration. After each census, estimates for the preceding intercensal period are revised by incorporating an additional adjustment (intercensal discrepancy) to ensure that the total intercensal increase at each age agrees with the difference between the estimated resident populations at the two respective census dates. (ABS, 2005)

Table 3.2 Comparison of estimates based on NHS and National Census

	National Health Survey				**Estimated Resident Population**			
	1990	**1995**	**2000**	**2005**	**1990**	**1995**	**2000**	**2005**
	%	**%**	**%**	**%**	**%**	**%**	**%**	**%**
Gender								
Male	49.4	49.2	49.0	49.2	49.4	49.2	49.1	49.3
Female	50.6	50.8	51.0	50.8	50.6	50.8	50.9	50.7
Age								
18 to 24	15.6	14.3	12.6	12.7	15.6	14.5	12.6	12.7
25 to 34	22.5	21.2	19.8	18.8	22.5	21.2	20.0	18.5
35 to 44	20.6	20.5	20.6	19.8	20.6	20.5	20.5	19.4
45 to 54	14.4	16.7	18.5	18.3	14.4	16.6	18.1	18.0
55 to 64	11.7	11.3	12.7	14.2	11.7	11.3	12.2	14.1
65 to 74	9.7	10.1	9.1	9.0	9.2	9.5	9.1	9.0
75+	5.5	6.0	6.9	7.3	5.9	6.5	7.4	8.2
Total Population 18+ (million)	12.4	13.4	14.2	15.0	12.5	13.4	14.4	15.5

The estimated residential populations are very similar to the population estimated using the weighted data in the NHS, especially in the earlier years. The gender splits in each year are within one percentage point of each other and there are no major differences between the distributions across age groups in each year. This suggests that the methods used for the NHS produce a sample that represents the population as a whole.

As explained above, all four samples are large. Appendix 1 shows the characteristics of the samples after the recoding and other changes described above were completed.

The changes in the proportions of people in the three smoking status categories are analysed in detail in this thesis. Appendix 1 shows that while there were steady changes in the percentages in individual categories over the period covered by the four surveys, there do not appear to be any changes that are larger than would be expected over time. There is little evidence to suggest that the change in sample size resulted in a change in sample characteristics. Typical of these changes is the alteration in the gender mix. In the two earlier surveys, the mix was approximately 48 percent males and 52 percent females. In the smaller, later surveys the mix is approximately 46:54 percent.

3.3.5 Comparison of non-responses with the remainder of the sample

The treatment of changes in the recording of selected demographic and smoking status factors was described above. All surveys contain a significant number of respondents who did not record a response to the income or the occupation or both, questions, or the questions were not applicable. It is possible that these respondents might be atypical compared to the rest of the sample and that their responses to important questions might be significantly different from those of respondents in the other categories of these variables might introduce bias into the analysis. It is also important to try to identify any common characteristics that might be associated with these respondents so that their responses can be interpreted in context. Figure 3.1 shows the percentage of males and females over the age of 17 in each of the income deciles for the combined sample, including all four surveys.

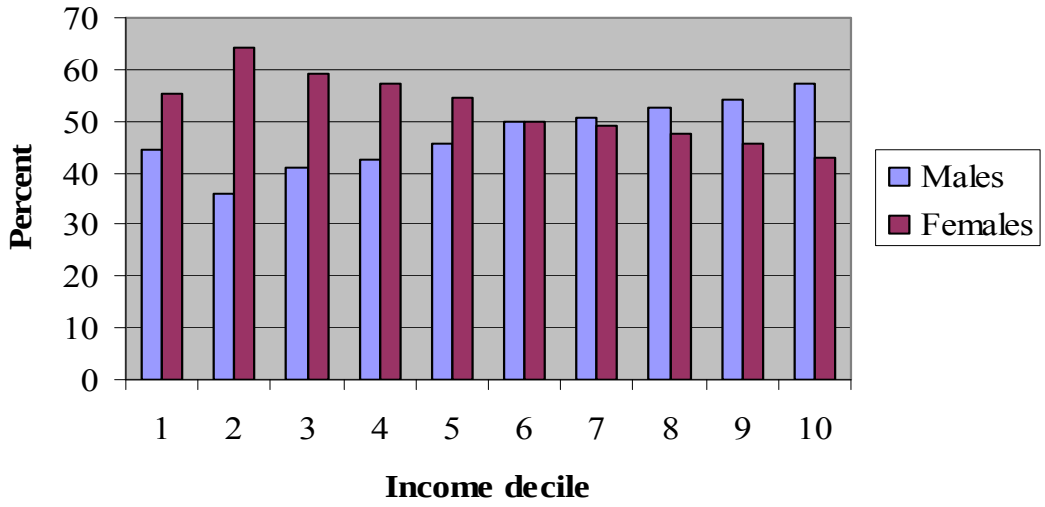


Figure 3.1 Percentage of males and females in each income decile.

Approximately 12 percent of respondents over the age of 17 did not report an income. The overall gender breakdown for the combined sample is 46.7 percent males and 53.6 percent females. The breakdown among respondents reporting no income is 46.5 percent males and 53.5 percent females. So there is no significant difference between the balance between males and females in the group who either did not report an income or for whom the question was not applicable and the sample as a whole. There appears to be no gender bias that might suggest smoking status in this group might be different from the sample and therefore bias the analysis. There is a strong gender bias between income deciles as females tend to outnumber males in the lower income deciles and males outnumber females in the higher deciles.

Table 3.3 shows the percentage of respondents in each age group that is located in each of the income deciles.

The age distributions among those respondents who did not report an income and those who did are very similar. The median age group for the non-reporters is 45 to 49 years old and the median for the remainder of the sample is 40 to 44 years old.

Table 3.3. Percentage of each income group located in each age group

	Income	
	Not stated	**Stated**
Age group	**%**	**%**
18 to 19 years	3.64	3.54
20 to 24 years	7.38	9.19
25 to 29 years	8.26	10.49
30 to 34 years	9.08	11.28
35 to 39 years	9.75	11.11
40 to 44 years	10.77	10.50
45 to 49 years	10.55	8.80
50 to 54 years	9.17	7.15
55 to 59 years	8.30	6.18
60 to 64 years	6.64	5.71
65 to 69 years	5.32	5.30
70 to 74 years	4.20	4.52
75 and over	6.94	6.23

The similarity of the age distributions suggests that there is no great concentration of respondents reporting no income in any particular age group which would suggest that their responses will be atypical of the other age and income categories and thereby introduce bias into this analysis.

3.3.5.1 Occupation not stated

Approximately 39 percent of respondents reported that their occupation was not included in the list offered in the questionnaire. The technical notes accompanying the NHS reports indicate that this category includes members of the armed forces, people who have retired, dependent adults not in paid employment outside the home (previously referred to as “Housewives”), adult students and those who are unemployed.

Figure 3.2 compares the mix of genders in the no applicable occupation group with that in the other occupation group responses.

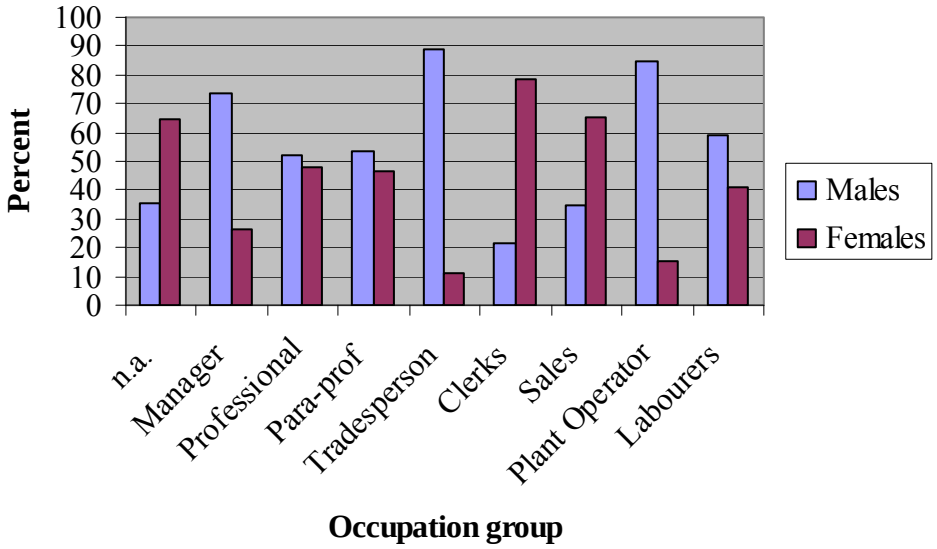


Figure 3.2 Gender balance within occupation groups.

The balance between genders in the not applicable occupation group (35.5 percent males, 64.5 percent females) indicates that slightly more females are represented in this group than in the sample as a whole. As with income, there is evidence of a clear gender effect in occupation groups. For example, the gap in the Tradespersons group is males 89 percent, females 11 percent and females predominate in the Clerks category (78:22 percent). There is no evidence that there is an atypical concentration of either of the genders in the not applicable occupation group that might introduce bias into this research.

Table 3.4 compares the age distribution among respondents over the age of 17 who stated an occupation and those who did not.

Table 3.4 Percentage of each occupation group located in each age group

	Occupation group	
	Not stated	**Stated**
Age	**%**	**%**
18 to 19 years	3.09	0.39
20 to 24 years	5.52	3.04
25 to 29 years	5.95	7.91
30 to 34 years	6.53	12.40
35 to 39 years	6.02	15.65
40 to 44 years	5.07	16.73
45 to 49 years	4.76	16.41
50 to 54 years	5.25	11.98
55 to 59 years	7.14	8.46
60 to 64 years	10.13	5.14
65 to 69 years	13.08	0.80
70 to 74 years	11.29	0.59
75 and over	16.16	0.51

If one assumes that all the respondents aged 60 years and over are increasingly retirees, then this explains the greater concentration of respondents with no recorded occupation in these older age groups. Approximately 50 percent of respondents are included in these four oldest age groups. The remainder of the respondents, that is those between 18 and 64, are of further interest. Table 3.5 compares the age profile between the genders among these respondents.

It can be seen from Table 3.5 that nearly 60 percent of male respondents who do not report an occupation are aged 60 years and over. There is also a significant percentage of the male respondents in the 55 to 59 age group.

Table 3.5. Age and gender profile among respondents not reporting an occupation.

	Gender	
	Males	**Females**
Age group	**%**	**%**
18 to 19 years	4.10	2.53
20 to 24 years	6.17	5.16
25 to 29 years	3.98	7.04
30 to 34 years	3.74	8.06
35 to 39 years	3.83	7.23
40 to 44 years	3.90	5.72
45 to 49 years	3.68	5.35
50 to 54 years	4.56	5.63
55 to 59 years	7.03	7.20
60 to 64 years	11.01	9.65
65 to 69 years	16.84	11.01
70 to 74 years	13.90	9.85
75 and over	17.25	15.56

These percentages support the suggestion that the largest group of males reporting no occupation are in fact retirees. The remaining male respondents represent the unemployed and members of the armed forces. Among females, there is less concentration in these older age groups. Approximately 46 percent of female respondents reporting no occupation are aged 65 years and over. There is a greater concentration of females among the younger age groups that are traditionally associated with starting and establishing a family.

In conclusion then, there is nothing in the profiles of the respondents who indicated *not applicable* in either or both of the income decile and occupation questions that suggests they might be biased in a way that would undermine this research. The differences between males and females who report no occupation will be borne in mind during the analysis. The male group appears to be dominated by retirees while the female group appears to have a much larger proportion of respondents who are younger than the typical

male respondent and, while they are fully occupied raising a family, they are not in paid employment outside the home.

3.4 Demographic and socioeconomic correlates of smoking status

As noted above, the process of identifying the answers to the research questions is undertaken in two stages. The first stage analysis examines overall changes in reported tobacco smoking status between surveys. The simplest measure of overall smoking behaviour is smoking prevalence, the percentage of the survey reporting that at the time of the survey, they are tobacco smokers. Changes in this percentage in the four surveys are shown in the graph in the first part of the analysis. Smoking questions in the NHS are only asked of respondents who are at least 18 years old, so smoking status figures in this thesis all relate to the population that is 18 or older. Tracking changes in this overall prevalence level provides the first part of the answer to H_{01}. When considering the other hypotheses, this analysis addresses the fact that overall prevalence is an average that may disguise the fact that smoking status in different groups within the population might be quite different and might be changing in quite different ways over time and across the groups. The combined effect of the hypotheses set out above is that the one standard, health-related message strategy is not associated with sustained, desirable changes in smoking prevalence and is associated with different changes in smoking behaviour in different segments in the community. The remainder of the analysis consists of closer examination of the differences in smoking status among different segments within the population and comparing changes in smoking behaviour during the period covered by these four surveys.

The proportion of the population that is currently smoking is also inadequate as a full descriptor of smoking behaviour in the community. The statistics of interest are the proportions of respondents who report being in one of the three smoking status categories mentioned above (current, ex-, or never smoked) as these groups may have responded quite differently to the positive and negative smoking messages they have encountered. Of primary interest is the way in which these proportions have changed in the different

segments of the population in a period when the whole population has been exposed to a consistent antismoking message strategy. Initially, the percentages in the three categories and the different surveys are shown in table form. For reasons set out in the next section, it is preferable to use the odds of belonging to a particular smoking status group rather than percentages. The percentages shown in this section are used to derive probabilities and then odds of belonging to a particular group. Differences in odds and changes in these odds are then analysed.

3.5 Odds

When testing for a relationship between two variables, it is usual to employ regression analysis to see if a change in one of the variables (the independent variable) is associated with a predictable change in the other variable (the dependent variable). When there is more than one independent variable influencing the dependent variable, a form of multiple regression is needed. If such a relationship between independent and dependent variables exists and can be modelled, then it is possible to predict the expected value of the dependent variable for any particular value of the independent variable. When the dependent variable is categorical rather than continuous, (that is, the variables can be measured using a limited number of values or categories compared with continuous variables that can, in theory, be measured using an infinite number of values (Powers and Xie, 2000)), it makes no sense to predict a value for the dependent variable. Despite the range of expected values predicted by the model, the observed value can only be either *Yes* – in a category or *No* – not in that category. No other values have meaning – there are not degrees of being an ex-smoker, the respondent either is or is not an ex-smoker.

Secondly, the numerical value given to a particular category is arbitrarily allocated. For example, current smokers might be allocated a code of 0, ex-smokers a code of 1 and never-smokers a code of 2. Alternatively, the codes could just as effectively have been the other way round or some other combination of numbers altogether. This is particularly important in medical and health-related research as most outcomes of interest are categorical (e.g., birth, death, marriage, pregnancy, the presence or absence of a

particular disease, or smoking status)(Powers and Xie, 2000). If the values are arbitrarily allocated, it is difficult to interpret an "increase" from 0 to 1, for example and to compare it with an increase from 0 to 2. The researcher is not interested in predicting a particular value of the dependent variable as much as determining, if the value of the independent variable is known, how accurately can one predict the likelihood that a respondent will be in one of the categories – in this case, how likely are they to be a current, ex-, or never smoker given a particular value of an independent variable such as gender, income decile or age group? Odds are widely used to express the likelihood of an event occurring, especially in a sporting contest where the outcome for a particular participant or team is either win or lose and are readily calculated. It will be shown below that they are widely used in health and medical research to express the likelihood of a particular outcome such as those listed above.

The odds of a particular outcome or of a particular case belonging to any category of the dependent variable is calculated as the probability of belonging to that category divided by the probability of not belonging. If the probability that a person is a current smoker is Prob(smoker), given a particular value of the independent variable, then the *odds* that they are a smoker is:

$$\text{Odds(smoker)} = \frac{\text{Prob(smoker)}}{1 - \text{Prob(smoker)}}$$

(Hair *et al.* ,2006)

Note that it is possible to deduce the probability of an event given the odds, by transforming the odds equation into:

$$\text{Prob(smoker)} = \frac{\text{odds(smoker)}}{1 + \text{odds(smoker)}}$$

When expressed this way, the probability of being a smoker is always positive and can range from 0 to 1. Odds can range from 0 to ∞. When the odds are 1, the probability of the event is 0.5 or 50 percent.

In the preliminary analysis, the probabilities were calculated by crosstabulating the percentages in the three smoking status categories and those in each of the categories of the variables of interest. These probabilities were used to calculate the odds shown in graphs, using the formula shown above. In order to help identify the significance of the differences between the odds associated with different categories, 95 percent confidence intervals (CI) are also included in the graphs, although, as explained above, the samples are very large and the resulting confidence intervals in this stage of the analysis are usually very narrow.

3.6 Regression analysis

As Hosmer and Lemeshow point out, taking the variables a couple at a time rarely provides an adequate model because the different variables may be associated with one another and "may have different distributions within levels of the outcome [dependent] variable."(Hosmer and Lemeshow, 2000). To explore the combined impact of the various factors, it is necessary to bring them together and to complete a form of multiple regression analysis. The relationship between the outcome and the independent variables can then be described thus:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k$$

Where Y is the outcome or the value of the dependent variable predicted by the interaction of specific levels of several independent variables (X). α, the intercept, shows the underlying value of Y without the impact of any of the independent variables (that is, when each X is zero). Each β shows the impact of a change in its associated independent variable on the value of the dependent variable.

The actual value predicted for Y for a given value of X may often not correspond exactly with every observation of Y with that X value (or particular combination of X values). This is sometimes reflected by including an error term (*e*) at the end of the regression equation.

α and β are *population parameters* and they are estimated by examining data from the phenomenon being modeled, in this case, the relevant data from four NHS surveys. The most common method of calculating these parameters if the relationship between the dependent and independent variables is linear, is the Ordinary Least Squares (OLS) method (Moore and McCabe, 2006) although similar estimates of the parameters can also be calculated using the Maximum Likelihood Estimation (MLE) method (Eliason, 1993). In each case, the chosen equation (or model) is the one that generates predicted values of Y that correspond most closely with the pattern of observed Y values.

For linear regression to be appropriate for a particular problem, a number of conditions must be met. Key conditions that are important in this situation include:

1. A linear relationship between independent and dependent variables.
2. Homoscedasticity: the variance of the error term is the same or constant for all values of the independent variables.
3. The errors are normally distributed for each set of values of the independent variables.

(Menard, 1995)

Linear regression can accommodate categorical independent variables through the use of dummy or design variables but it cannot accommodate a categorical dependent variable or violation of the conditions listed above. Linear regression generates an estimate or expected value of Y for a given set of X values. These estimated values of Y fall on a straight line and can extend well outside the range 0,1 (e.g., in the category, not in the category) described above, including values of less than zero. We have seen how the use of odds addresses the problem of estimates of less than zero because, like probability, odds cannot be less than 0. But further modification is needed to reflect the non-linear behaviour of probabilities. It was pointed out above that as odds increase from 0 to 1, the probability increases from 0 to 0.5. Probabilities of 0.5 to 1 result in odds ranging from 1 to ∞. Taking the natural log of the odds (the "logit transformation) resolves this asymmetry and changes the range from 0 to ∞ into $-\infty$ to $+\infty$.

In addition to the restriction that probabilities can only be positive and lie in the range 0 to 1, there is the added problem that, within that range, probabilities do not display a linear relationship with the independent variable. As values of the dependent variable increase, so the probability increases asymptotically towards 1. That is, the rate at which the probability approaches 1 declines at higher levels and the probability never actually reaches, let alone exceeds, 1. Similarly, as the value of the independent variable decreases, the probability asymptotically approaches 0. This S-shaped curve is best represented by the logistic curve shown in figure 6 rather than a straight line. To reflect the S-shaped curve, the dependent variable is transformed using the *logit* transformation described above.(Hair *et al.*, 2006) That is, taking the natural log of the odds.

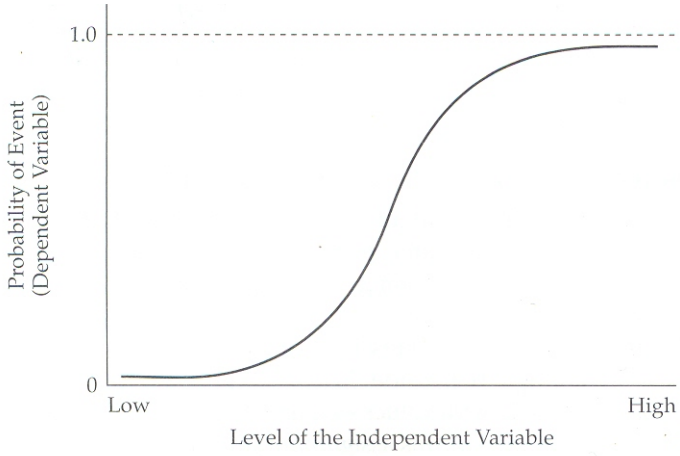


Figure 3.3. The S-shaped logistic curve. (Hair *et al.*, 2006)

Other problems associated with the application of linear regression analysis to categorical dependent variables relate to violation of the remaining two conditions listed above. The variance of a categorical variable is not constant over the range of values of independent variables, a condition known as heteroscedasticity and the error term for a categorical variable follows the binomial distribution, not the normal distribution. Neither of these violations of the conditions necessary for the application of linear regression can be rectified by the use of dummy variables or transformation of the variables. Logistic

regression deals with these problems using the logit transformation.(Eliason, 1993; Hair *et al.*, 2006; Menard, 1995; Powers and Xie, 2000)

3.7 Logistic regression

Logistic regression was developed to deal with binary or dichotomous dependent variables, that is, dependent variables with only two values and therefore has wide applicability in analysis such as this thesis. Examples of binary variables were given above and include birth, death, pregnancy and membership of a particular group. Appendix 2 lists more than forty applications of logistic regression in tobacco smoking research. As explained above, logistic regression focuses on the natural log of the odds of belonging to a particular group, that is the natural log of the odds that Y = 1, called *logit(Y)*. When logit(Y) is substituted into the regression equation it becomes

$$\text{Logit(Y=1)} = \ln\left[\frac{\text{Prob(Y}=1)}{1-\text{Prob(Y}=1)}\right] = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k$$

Logit(Y) can be any value in the range - ∞ to + ∞ and can be converted to odds by calculating

$$\text{Odds(Y=1)} = e^{\ln[(\text{odds(Y=1)})]} = e^{\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k}$$

The probability of belonging to the group can then be calculated by

$$\text{P(Y=1)} = \frac{Odds(Y=1)}{1+Odds(Y=1)} = \frac{e^{\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k}}{1+e^{\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k}}$$

Calculated this way, the probability will follow the logistic curve and always lie between 0 and 1. As the Logit(Y) equation is linear in form and can generate extremely large and extremely small values, the OLS method of estimating the parameters no longer applies and Maximum Likelihood methods are used (Hair *et al.*, 2006; Menard, 1995). As the outcome of interest is the likelihood of membership or non-membership of a particular

category, parameter estimates in logistic regression can only be calculated using the MLE method.

3.8 Data preparation

The steps taken to prepare the data from the four NHS for analysis were described above. To prepare for the logistic regression, the data was grouped according to values on each of the key variables:

Smoking status, the dependent variable, has 3 values: Current, Ex-smoker or Never Smoked

There are six independent or predictor variables:

- Survey year has 4 values: 1990, 1995, 2000 or 2005
- Gender has 2 values: Male or Female
- Age group has 6 values: 18-24, 25-34, 35-44, 45-54, 55-64 or 65 and over
- Country of birth was reduced to 2 values for the logistic regression analysis: Australian born or Born overseas
- Occupation has 5 values: Managers and Professionals, Paraprofessionals and Tradespersons, Clerical workers and Salespersons, Labourers and Plant and Machinery Operators or not applicable.
- Income group has initially has 11 values: ten income deciles or not applicable. In the later part of the logistic regression, it is regrouped into 6 values: five equivalent income quintiles or not applicable.

Dummy variables were created for each value of each of the variables with more than two values. In each analysis, the last category in the variable list is treated as the reference group. For example, gender is coded as Male:1 and Female:2, so females are the reference group and odds of a male belonging to a particular smoking category are

compared with the odds of a female belonging to that category. For each variable, the relative size of the reference category was checked to ensure that it was similar to or larger than other categories to minimize standard errors. The analysis to ensure that responses in the Not Applicable categories are not atypical and therefore likely to introduce bias was described above.

3.9 Binomial logistic regression

The first stage in the logistic regression analysis involved fitting a purely additive, multinomial logistic regression model including all the variables. Despite the fact that this model had a large number of variables, it converged after only forty iterations. The model deviance was very high but it provided a benchmark for comparison with subsequent models. The next steps involved the fitting of three binomial logistic regression models comparing the odds of belonging to each of the smoking status groups in turn with the rest of the sample. The comparisons are:

- Current smokers compared with non-smokers, that is, with ex- and never-smokers.
- Ex-smokers compared with people who have never quit smoking, that is with current smokers and those who have never smoked.
- Never smokers compared with those who have smoked at some stage, that is with current and ex-smokers.

These are all additive models, showing each of the factors as main effects, so the next step was to explore interactions between the predictor variables. The contributions of each of a series of interactions was assessed with a series of iterations of the logistic regression models and with ANOVA until a short list of possible important interaction factors was developed. The contributions of each of the interaction factors to the improvement in the deviance were assessed comparing each factor's deviance divided by

its degrees of freedom. Any interaction factor with a Deviance/df of less than 5 was eliminated from the list to be included in the models.

Important interactions were identified involving all of the factors and they were combined into two groups and the two groups were specified as main effects. One group consists of immutable factors, gender, age group and country of birth, all factors that do not change as a result of the respondent's situation or their efforts. This group is labeled "Demographic" in the analysis. The other group consists of characteristics that are subject to change as a result of the respondent's situation or their activities. These factors are occupation and income quintile and are labeled "Social" factors in the analysis. Survey year was found to be important in both groups and is included in them both. Including survey year (with four values) induced multicolinearity into the model and removed three degrees of freedom. The three groups involved were identified and their values were reset to the baseline to eliminate this colinearity. The deviance residuals for each of the models was calculated and demonstrates a very good fit in the case of the comparison of ex-smokers with the rest of the sample and good fits in the other two models. Outlying groups were identified in the models and the data checked to ensure that the outlier status could be explained and did not indicate a problem with the data. The graphs of these additive models are shown in the data analysis section and the tables of coefficients have been included in the appendix to the analysis.

3.10 Multinomial Logistic Regression

The logistic regression methodology described above was developed to deal with the simplest of categorical dependent variables: dichotomous or binary variables, that is, where their value is either 0 or 1. If the odds of one outcome are known, the odds of the other outcome can be readily calculated by subtraction. In the case of smoking status, there are three possible values for the dependent variable; current, ex- and never-smoker. Knowing the odds of belonging to one group does not of itself identify the odds of belonging to either of the other two groups.

The multinomial logistic regression model utilizes the fact that the sum of the probabilities of the three possible outcomes must be 1. When conducting multinomial logistic regression, one of the categories of the dependent variable is treated as the baseline or reference category. The odds of belonging to the remaining categories are then calculated and odds ratios are calculated comparing the odds of belonging to the group under consideration with the odds of belonging to the reference category. This is notionally similar to breaking the analysis into a series of interconnected binomial logistic regressions with the important difference that the outcome category is compared with another specific category, not the sum of the other two categories. In the binomial logistic regression, current smokers are compared with all others, that is, those who have never smoked *and* those who have smoked but have given it up. Combining these two groups in this way may conceal important differences between them and these important differences may be crucial with developing a communication strategy. For these reasons, the last stage in the analysis involves fitting sets of multinomial logistic regression models. Once again, the first step was to calculate additive, main effects models comparing current smokers with people who have never smoked, and current smokers with ex-smokers to explore differences between smokers who have successfully quit and those who have not. Finally, interaction models were developed to show the impact of the interaction factors on the odds of belonging to one or another of the smoking status categories. The same "Demographic" and "Social" interaction groups were used and are shown as main effects in the models.

Coefficients play a similar role in multinomial logistic regression and binomial logistic regression and interpretation is the same for both sorts of models. For any dependent variable category, a positive coefficient indicates that the odds of belonging to that category rather than the reference category increases as the value of that independent variable increases and a negative coefficient indicates an inverse relationship.

Appendix 1. Comparison of NHS samples

	NHS survey date							
Variable	**1990**		**1995**		**2000**		**2005**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	%
Smoker status								
Current smoker	11025	28.3	9381	23.9	4463	24.9	4585	23.5
Ex-smoker	9118	23.4	10903	27.8	4882	27.2	6142	31.5
Never smoked	18804	48.2	18826	48.1	8573	47.8	8774	44.9
Sex								
Males	19010	48.8	18945	48.4	8164	45.5	8898	45.6
Females	19937	51.1	20165	51.5	9754	54.4	10603	54.3
Age								
15 to 19 years	1683	4.3	1464	3.7	468	2.6	483	2.4
20 to 24 years	3905	10.0	3974	10.1	1160	6.4	1330	6.8
25 to 29 years	4586	11.7	4115	10.5	1633	9.1	1478	7.5
30 to 34 years	4540	11.6	4445	11.3	1846	10.3	1893	9.7
35 to 39 years	4249	10.9	4391	11.2	2025	11.3	1982	10.1
40 to 44 years	3974	10.2	4122	10.5	2035	11.3	2031	10.4
45 to 49 years	3082	7.9	3753	9.6	1706	9.5	1861	9.5
50 to 54 years	2480	6.3	2899	7.4	1502	8.3	1648	8.4
55 to 59 years	2288	5.8	2345	6.0	1184	6.6	1604	8.2
60 to 64 years	2329	5.9	1971	5.0	1082	6.0	1341	6.8
65 to 69 years	2186	5.6	1992	5.0	883	4.9	1063	5.4
70 to 74 years	1602	4.1	1648	4.2	922	5.1	999	5.1
75 and over	2043	5.2	1991	5.0	1472	8.2	1788	9.1
Country of birth								
Other - English speaking	4449	11.4	4262	10.9			2368	12.1
All others	6309	16.2	6557	16.7	4818	26.8	2777	14.2
Australia	28189	72.3	28291	72.3	13100	73.1	14356	73.6

Occupation								
Not applicable	15134	38.8	14636	37.4	7150	39.9	7699	39.4
Managers and Administrators	2772	7.1	2767	7.0	936	5.2	1187	6.0
Professionals	3264	8.3	3745	9.5	2338	13.0	2393	12.2
Para-professionals	1569	4.0	1619	4.1	1340	7.4	1566	8.0
Tradespersons	3817	9.8	3596	9.1	1277	7.1	1355	6.9
Clerks	4109	10.5	4241	10.8	1325	7.3	1356	6.9
Sales and Services	3154	8.1	3728	9.5	1851	10.3	2024	10.3
Plant and Machine Operators	1880	4.8	1637	4.1	820	4.5	952	4.8
Labourers and Related	3248	8.3	3141	8.0	881	4.9	969	4.9
Equivalent income decile								
First decile	2640	6.7	5758	14.7	3355	18.7	2065	10.5
Second decile	2758	7.0	3133	8.0	1384	7.7	1149	5.8
Third decile	3594	9.2	3067	7.8	1861	10.3	1501	7.7
Fourth decile	3837	9.8	3204	8.1	1574	8.7	2368	12.1
Fifth decile	3766	9.6	3155	8.0	1280	7.1	1934	9.9
Sixth decile	3511	9.0	3167	8.1	1254	7.0	1824	9.3
Seventh decile	3862	9.9	3210	8.2	1270	7.0	1723	8.8
Eighth decile	3889	9.9	3320	8.4	1341	7.4	1441	7.3
Ninth decile	4171	10.7	3438	8.7	1406	7.8	1730	8.8
Tenth decile	4470	11.4	3764	9.6	1575	8.7	2087	10.7
Not applicable	2449	6.2	3894	9.9	1618	9.0	1679	8.6
Total	38947		39110		17918		19501	

Appendix 2. Applications of logistic regression in tobacco research

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Chapter 4: Demographic and socioeconomic correlates of smoking status

4.1 Introduction

In previous chapters, the nature of the problem was described; tobacco smoking is causing enormous harm to people around the world, including in Australia. The cost in terms of avoidable morbidity and mortality is measured in millions of dollars and more importantly, in millions of years of life lost as smokers die prematurely, often after a period of severely reduced quality of life and productivity. Australia has been at the forefront of the battle to reduce the prevalence of tobacco smoking in the community and has developed social marketing campaigns and reduced smoking prevalence to among the lowest levels in the world. For some time however, these campaigns have almost always used the same underlying message strategy: do not smoke because smoking causes health problems. This is in contravention of a number of fundamental social marketing principles as set out by Andreasen. A key principle states that campaign messages must be differentiated to appeal to particular segments within the overall target market.

In this chapter, we set out to answer two questions:

- Is this one-message strategy equally effective at addressing both parts of the smoking prevalence question: encouraging current smokers to quit and encouraging potential smokers to avoid taking it up?
- Is the same message equally effective among different segments of the population?

Specifically, we take the first steps towards answering the questions expressed in the three null hypotheses set out at the end of Chapter 3:

H_{01}: Smoking prevalence has remained unchanged in Australia between 1990 and 2005.

H_{02}: There is no difference in the pattern of smoking status in different segments of the Australian population.

H_{03}: There is no difference in the patterns of change in smoking status in different segments of the Australian population between 1990 and 2005.

As explained in Chapter 3, analysis begins by looking at trends in the percentage of the population that is currently smoking – overall smoking prevalence. Then we examine trends in groups within the population by comparing the changing odds of belonging to one of the smoking status groups (current-, ex- and never-smokers) over time and with respect to demographic factors including gender, age, country of birth, occupation and income groups.

4.2 Overall trends in smoking prevalence

The most common measure of smoking prevalence is the percentage of the population that reports that they are currently smoking cigarettes. Table 4.1 shows the number and percentage of respondents aged 18 or older in the four most recent NHS who reported that they are current or regular smokers in each of the four surveys. This data is shown graphically in figure 4.1.

Table 4.1 Overall smoking prevalence

Survey year	Number of current smokers	Percent
1990	11,025	28.3
1995	9,381	23.9
2000	4,463	24.9
2005	4,585	23.5

Since the 1995 survey the prevalence has remained at approximately 24 percent. This represents a marked slowing in the rate of decline in smoking prevalence in Australia. It was noted in the literature review that smoking prevalence in Australia has been in steady

decline since soon after the end of the Second World War. The steady decline predates the current antismoking campaigns as it began well before these campaigns were developed. The Lopez *et al.* model shows Australia in the last or Stage IV of the smoking prevalence trajectory, with levels steadily declining towards zero.

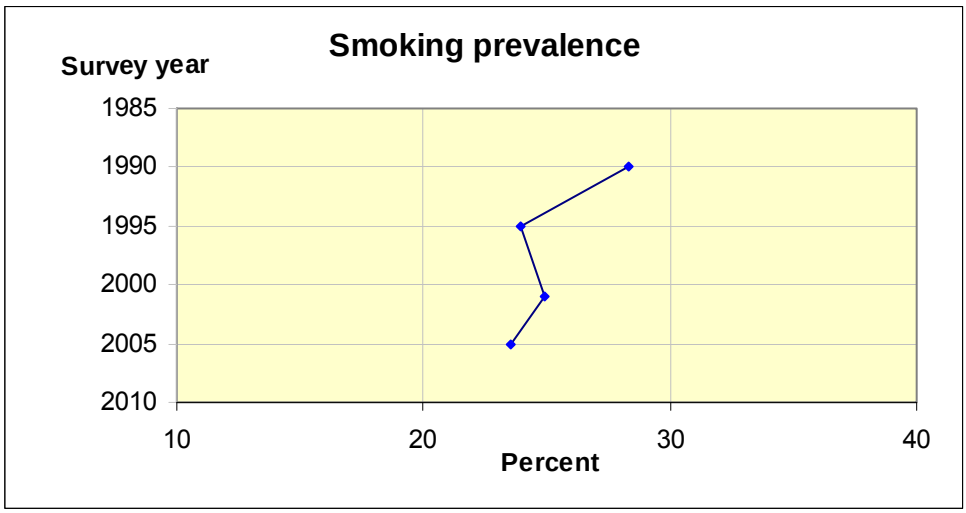

Figure 4.1: Trends in smoking prevalence

The graph in Figure 4.1 shows that this steady decline may not be continuing. Smoking prevalence's trajectory might have reached the sort of plateau suggested by the latter stages in one of the "hypothetical" product life cycles suggested by Levitt, rather than that suggested by Lopez *et al.* Stability in the overall prevalence rate does not mean however, that there have not been important changes in other aspects of smoking behaviour in the Australian population.

An overall measure of smoking prevalence in the population is important indicator of the success or otherwise of antismoking campaigns. The objective is to reduce the amount of damage done to the community by tobacco smoking. The relationship between smoking prevalence and the damage suffered by the community was identified by Doll and other researchers and modelled by Lopez and others. They showed that the level of smoking prevalence and its trajectory are reliable predictors of smoking-related mortality and morbidity 20 to 30 years into the future. Simple extrapolation of past prevalence levels will not provide as reliable a forecast of smoking prevalence's trajectory and therefore, of

the damage to the community, as one based on an understanding of the factors determining smoking prevalence at any time. As explained in Chapter 3, the next step in analysis focuses on three smoking status categories, current smokers, ex-smokers and never smoked. Table 4.2 shows the percentages of respondents in each of these categories for each of the four surveys.

Table 4.2 Percent of respondents in each smoking status category

Survey year	Current smoker %	Ex-smoker %	Never smoked %
1990	28.3	23.4	48.2
1995	23.9	27.8	48.1
2000	24.9	27.2	47.8
2005	23.5	31.5	44.9

As explained in chapter on methodology, when comparing rates such as these it is statistically preferable to use odds rather than percentages. It is more meaningful to compare the odds of belonging to a particular group and to examine changes in the odds than to compare simple percentages. Figure 4.2 shows the data from Table 4.2 expressed as the odds of belonging to one of the three smoking status groups. Although the sample sizes are large and the resultant 95 percent confidence intervals associated with these odds are small, the intervals are shown in the rest of this analysis so that the significance of any differences or changes is readily apparent. It can be seen from in Figure 4.2 that the graph representing the change in the odds of being a current smoker (shown by the black line) reflects the graph shown in Figure 4.1. Additional information in Figure 3.2 consists of the graphs showing the change in the odds of being an ex-smoker (shown by the pink line) and the odds of being a never-smoker (the blue line).

It can be seen that the odds of being an ex-smoker and the odds of being a current smoker moved in opposite directions and to a certain extent, match each other in the earlier surveys.

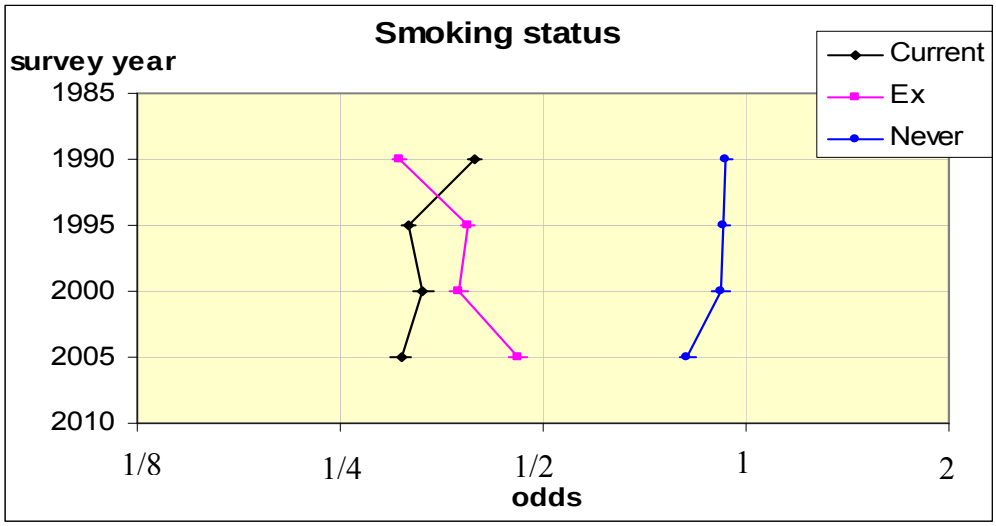

Figure 4.2: Trends in smoking status expressed as odds

When changes in the odds of being either a current smoker or an ex-smoker balance each other, the third component, the odds of being a never smoker, remain unchanged. Figure 4.2 indicates that this is the pattern for the first three surveys. However, in the period between the 2000 and the 2005 surveys, the odds of being a current smoker did not change significantly. There was a significant increase in the odds of being an ex-smoker in this period. In other words, there was a greater likelihood that a respondent was an ex-smoker, that is, they had successfully quit smoking. If the level of smoking prevalence was only determined by the rate at which smokers were giving up, then the changes in the two odds would be expected to be of similar size and in opposite directions, as shown in the earlier surveys. When the changes are out of balance, the difference is expressed in the changes in the odds of never having smoked. As mentioned above, the odds of never having smoked remained unchanged in the first three surveys as the changes in current and ex-smokers matched each other but in the last survey, the odds of being a never-smoker lengthened significantly. It is now less likely that a respondent has never smoked. Taking these two findings together, it is more likely in the 2005 survey that a person has taken up smoking and then has successfully given it up.

4.3 The effect of gender

These changes in the odds of having a particular smoking status have not been uniform across different groups in the community. Figures 4.3 and 4.4 show the trends in the odds of belonging to one of the smoking status groups separately for males and for females.

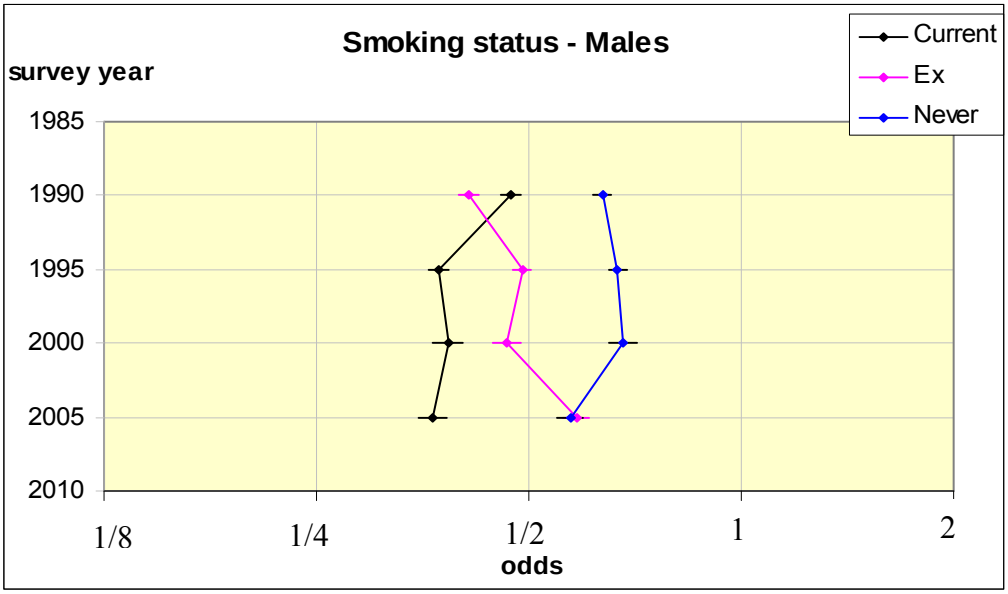

Figure 4.3: Trends in smoking status among males

Changes in the odds of belonging to one of the three smoking status groups in Figures 4.3 and 4.4 are approximately parallel with those observed in the overall sample (Figure 4.2) but are more pronounced. The odds of a male being a current smoker tend to be larger than those of the sample as a whole throughout the period covered by these surveys but change in the same directions as the whole sample. The lack of significant change in the odds of being a current smoker in the last three surveys is more pronounced among males as there is no significant change in this period at all. The odds of being an ex-smoker increased significantly between the 1990 and 1995 surveys and then very markedly between the 2000 and 2005 surveys. Again, as with the sample as a whole, there was no significant change in odds between the 1995 and 2000 surveys. By the 2005 survey, the odds of a male being an ex-smoker were significantly higher than they had been in any of the previous surveys and were significantly higher than those of a male being a current smoker. The change in the odds of a male being an ex-smoker was more marked than the

change in odds among the sample as a whole. As in the sample as a whole, there was no significant change in the odds of being an ex-smoker among males between the 1995 and 2000 surveys. The big discrepancy between changes in the odds of being a current or an ex-smoker is reflected in the very large change in the odds of a male being a never smoker in the 2005 survey. The odds of being a never-smoker among male respondents had been steadily, but not significantly, increasing in the three earlier surveys, then they dramatically lengthened to the point where they are virtually the same as those of a male being an ex-smoker. By the 2005 survey, a male is just as likely to be an ex-smoker or a never-smoker and least likely to be a current smoker. The likelihood that they have never smoked has decreased significantly over the period covered by these surveys. The balance between the increased likelihood of successfully quitting smoking and the decreased likelihood of not taking it up has left the likelihood of being a current smoker virtually unchanged.

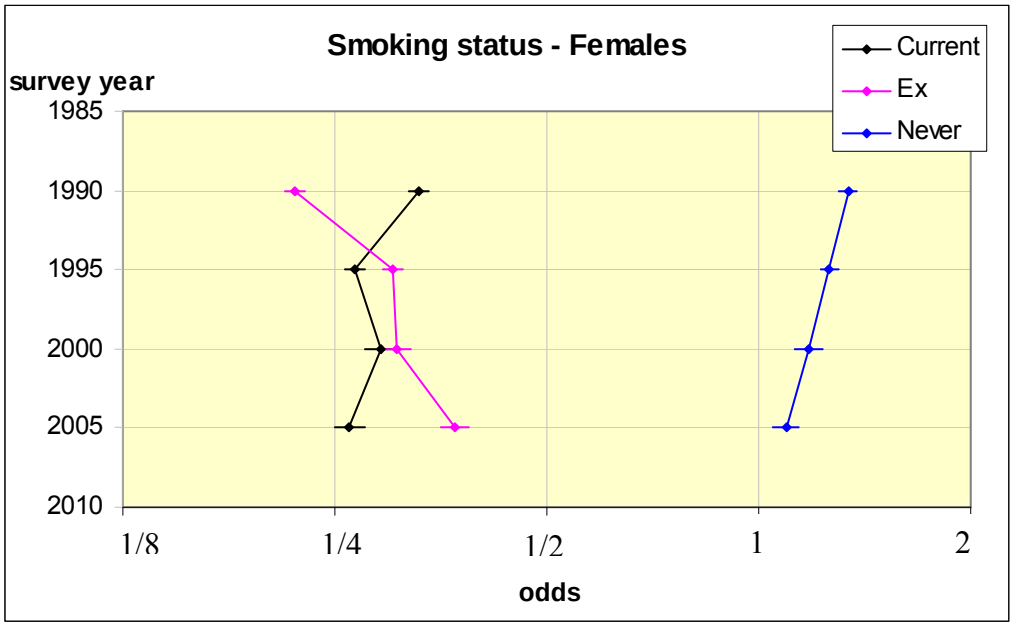

Figure 4.4: Trends in smoking status among females

In each survey, the odds of a female being a current smoker are smaller than the odds of a male being a smoker. Once again, the directions of the changes in odds among females are similar to those among males and similar to the patterns in the sample as a whole. In both groups, there is an initial improvement in that the odds of being a current smoker decreased, followed by no significant overall changes. In females, the initial decrease in

the likelihood of being a current smoker was followed by a noticeable, but not significant, increase and a noticeable decrease in the likelihood that left the odds of a female being a current smoker in the 2005 survey almost exactly where they were in the 1995 survey.

Among females, the odds of being an ex-smoker improved significantly between the first and last surveys with no significant change between the 1995 and 2000 surveys. Throughout the period covered by these surveys, there has been a steady decrease in the likelihood that a female respondent has never been a smoker. Although the change between any two consecutive surveys has not been significant, all the changes have been in the same direction and there is a significant difference between the likelihood that a female will have never smoked in the 1990 survey and the 2005 survey. Unlike the changes in the likelihood of males or the sample overall which reverse their direction between the last two surveys, the likelihood of never smoking among females steadily decreases throughout the period. In other words, it was becoming less and less likely that a female is a never-smoker. By the 2005 survey, a female is less likely to be a current smoker or to have never smoked and much more likely to have taken it up and then successfully quit.

4.4 Cohort analysis

While it is not possible to match cases from one survey to the next, as the surveys were conducted approximately five years apart and the age groups cover five years, it is possible to examine changes as each cohort moves into the next age bracket with each successive survey. Table 4.3 shows the percentage of current smokers in each age group from 18 to 19 years old onwards, in each of the four surveys for all respondents. Percentages have been used in this analysis rather than numbers to enable comparisons across surveys with very different sample sizes.

Table 4.3. Percent of current smokers in each age group in each survey

	Survey year			
Age group	**1990**	**1995**	**2000**	**2005**
	%	**%**	**%**	**%**
18 to 19 years	31.49	25.75	29.27	24.43
20 to 24 years	37.93	32.13	36.21	33.91
25 to 29 years	36.15	32.86	32.95	33.29
30 to 34 years	33.24	29.97	32.67	29.95
35 to 39 years	31.58	27.24	31.31	29.82
40 to 44 years	27.23	24.38	30.81	28.31
45 to 49 years	28.81	21.45	24.33	27.73
50 to 54 years	26.21	21.01	24.10	24.76
55 to 59 years	24.96	19.19	19.76	20.07
60 to 64 years	22.20	17.76	18.30	16.78
65 to 69 years	17.61	14.71	11.44	13.73
70 to 74 years	15.11	11.47	12.15	7.91
75 and over	8.32	7.33	5.57	5.31

The youngest group in the 1990 survey (18 to 19 year olds) moved into the next age group by the time of the 1995 survey. By the time of the third survey, 2000 they were in the third age group and the fourth by the last survey in 2005. As this group only included two ages (18 to 19) in the first survey and then became five-year group in the remaining surveys, comparisons of the changes between the first two surveys are not as reliable. Therefore, the analysis starts with the group who were aged 20 to 24 years in the 1990 survey. This cohort has been highlighted in red in the tables to make it easier to observe their progression through the age groups and surveys. Two other cohorts have also been highlighted to help navigate the table. Respondents who were aged 20 to 24 in the 1990 survey were born in the years 1966 to 1970. People born in this period are often referred to as *Generation Y*. The group in the middle of the table, those who were aged 40 to 44 in 1990, were born in the period 1946 to 1950. These people are often labeled the *Baby Boomers*. The oldest group to complete all four surveys consists of people who were aged 60 to 64 in 1990 and were born in the period 1926 to 1930, the generation born

between the two World Wars and in the period leading up to the *Depression*. Figure 4.5 shows the changes in current smoker prevalence in the three reference groups as they progress through the four surveys.

As the younger cohort (Generation Y) advanced through the age groups, there was an initial decline in the percentage of respondents who report that they are current smokers, between the 1990 and 1995 surveys. This decline stopped and there was no change in prevalence between the 1995 and 2000 surveys. This was followed by a decline between the last two surveys. As a result, the prevalence of current smokers in this group was much lower in the last survey than it was in the first, 1990 survey. This pattern is typical of the older cohorts, including the Baby Boomers but not the oldest group, the Depression generation. The 60 to 64 year old cohort in the 1990 survey reported a prevalence of current smokers of 22 percent. By the time this group reached 75 years and over, in 2005, smoking prevalence had decreased to less than a quarter of that amount. In most of the cohorts, the decline was not constant between all four surveys. In some groups, there was a leveling off in prevalence in the middle two surveys or in some cases an increase but in all groups, levels in the last survey were well below those when the group was fifteen years younger. For current smoker prevalence to decline as indicated in these figures, the percentage of people in the group who quit smoking exceeds the percentage of people taking it up.

The data indicates that there is an age effect; the prevalence of current smokers in the cohort is influenced by the age of the cohort and the pattern of change is influenced by the age at which the analysis starts.

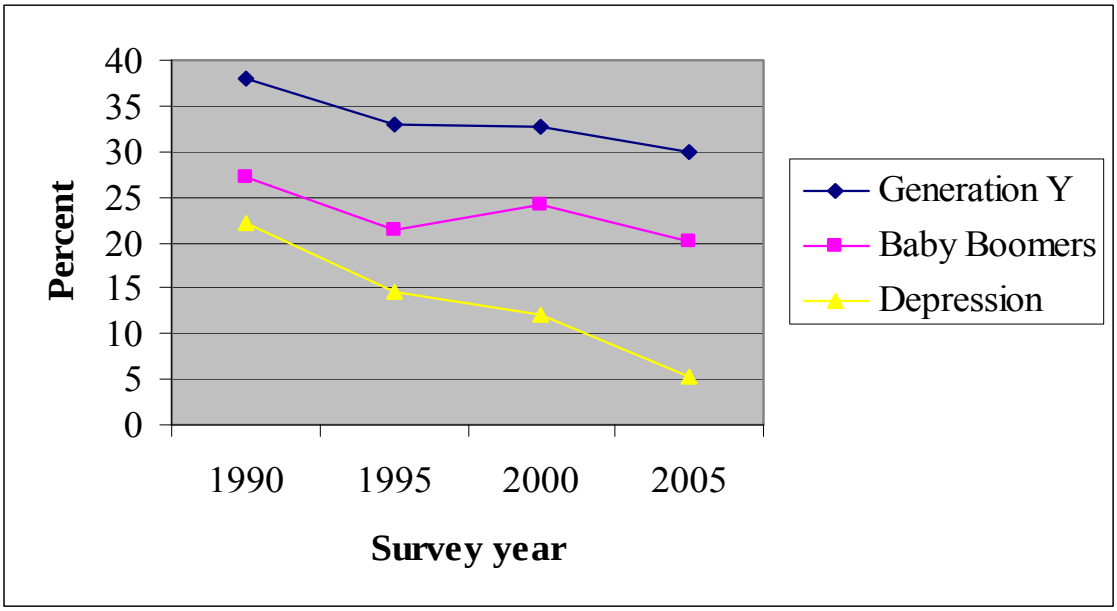

Figure 4.5 Percentage of respondents who were current smokers by survey year.

Ex-smokers are people who were smokers in the past but had successfully quit the habit and, at the time of the survey, were not smokers. Table 4.3 shows the pattern of changing percentages of ex-smokers among each age group for each survey for all respondents.

Figure 4.6 shows the pattern of changes in the three reference cohorts, the Depression generation, Baby Boomers and Generation Y.

Among ex-smokers, the trend is in the opposite direction from that among current smokers. There is a general increase in the percent of each cohort reporting that they are ex-smokers as the cohort moves into an older age group with each successive survey. The change is the most pronounced among the youngest cohort, Generation Y.

Table 4.3. Percent of ex-current smokers in each age group in each survey

	Survey year			
Age group	**1990**	**1995**	**2000**	**2005**
	%	**%**	**%**	**%**
18 to 19 years	6.89	8.54	7.26	11.18
20 to 24 years	11.86	13.69	13.28	16.17
25 to 29 years	17.73	20.66	15.92	21.52
30 to 34 years	21.10	25.56	20.96	26.20
35 to 39 years	21.84	28.17	25.14	25.93
40 to 44 years	23.45	28.97	26.54	30.48
45 to 49 years	26.25	29.26	28.25	33.53
50 to 54 years	25.36	33.05	29.36	31.98
55 to 59 years	30.38	33.82	33.28	36.10
60 to 64 years	32.29	36.28	36.69	41.98
65 to 69 years	36.37	40.56	37.26	42.43
70 to 74 years	35.77	43.39	40.67	43.74
75 and over	32.06	36.66	39.40	41.67

The percentage of this group who are ex-smokers by the time they reach the 35 to 39 years old age group, in the 2005 survey, is nearly 26 percent, twice the level it was when they were in the 20 to 24 year old group in the 1990 survey. The Baby Boomers also followed a pattern of increasing prevalence of ex-smokers between the first and second, and third and fourth survey, with a plateau between the second and third surveys. The prevalence in the 2005 survey was approximately 36 percent, one and a half times the 1990 prevalence in this cohort.

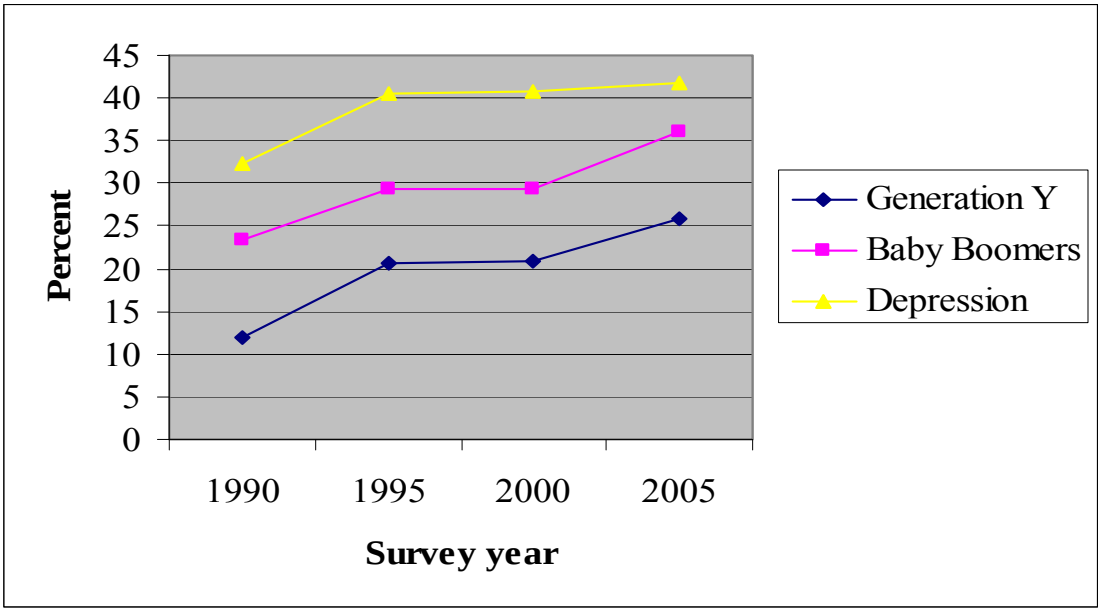

Figure 4.6 Percentage of respondents who were ex-smokers by survey year.

The change in the oldest group, the Depression generation, was not as great as that seen in the younger groups. This may be due to the fact that prevalence of ex-smokers is already comparatively high in this group in the 1990 survey, leaving less room for such a large increase in the ensuing surveys. Among this cohort, prevalence of ex-smokers increased between the first and second surveys (from 32 percent in 1990 to 40 percent in 1995) and then leveled off at close to 40 percent for the last three surveys. These figures are consistent with those in Table 4.3 and represent "the other side of the coin", as mentioned above. The overall increase in people quitting smoking, that is, becoming ex-smokers, explains the decrease in the percentage still smoking as each cohort ages.

This table indicates that there is also an age effect among ex-smokers; the prevalence of ex-smokers in the cohort is influenced by the age of the cohort and the pattern of change in this prevalence is influenced by the age at which the analysis starts.

The remaining smoking status category consists of people who have never smoked. Table 4.4 shows the percentages of all respondents in each age group and each survey who report that they have never smoked.

Table 4.4. Percent of never-smokers in each age group in each survey

	Survey year			
Age group	**1990**	**1995**	**2000**	**2005**
	%	**%**	**%**	**%**
18 to 19 years	61.62	65.71	63.46	64.39
20 to 24 years	50.22	54.18	50.52	49.92
25 to 29 years	46.12	46.49	51.13	45.20
30 to 34 years	45.66	44.48	46.37	43.85
35 to 39 years	46.58	44.59	43.56	44.25
40 to 44 years	49.32	46.65	42.65	41.21
45 to 49 years	44.94	49.29	47.42	38.74
50 to 54 years	48.43	45.95	46.54	43.26
55 to 59 years	44.67	46.99	46.96	43.83
60 to 64 years	45.51	45.97	45.01	41.24
65 to 69 years	46.02	44.73	51.30	43.84
70 to 74 years	49.13	45.15	47.18	48.35
75 and over	59.62	56.00	55.03	53.02

In general, as each of the younger cohort ages, there is a steady decrease in the percentage who have never smoked. Figure 4.7 shows the changes in the three reference cohorts. In the middle age groups, including the Baby Boomers, the decrease is not continuous but the percentage of never-smokers in the group when they reach their oldest age group (that is, in the 2005 survey) is always clearly less than the percentage when they were in their youngest group (that is, the 1990 survey). Except that in the oldest group to complete all four surveys (the Depression generation), in that group, the pattern is reversed and there is a steady increase in the percentage of never-smokers. As a result, in this group, the prevalence of never-smokers in the 2005 survey is much higher than it was when they were in the 60 to 64 year old group in 1990.

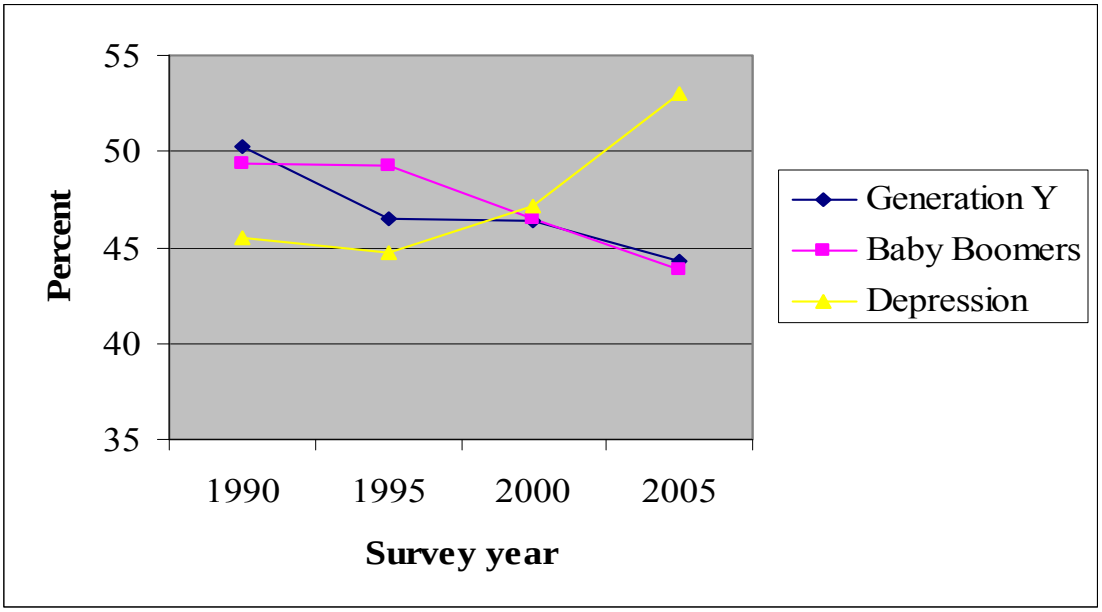

Figure 4.7 Percentage of respondents who were never-smokers by survey year.

Given the smoking-related mortality data collected by Doll, Lopez and the other researchers mentioned in the Literature Review, it is to be expected that the prevalence of never-smokers in older (that is, after about 55 years of age) age groups would increase. These researchers all found higher mortality among smokers than among non-smokers of a similar age but that the onset of this increased mortality lagged approximately thirty to forty years after smoking initiation. Success at quitting smoking explains the increase in the percentage of ex-smokers and the combination of cessation and mortality, especially among the older age groups, explains the decrease in the prevalence of smokers as each cohort ages. Further research is needed to uncover the cause of a decrease in prevalence of never-smokers as each group ages. Two possible explanations; increased mortality among never-smokers and an increase in people taking up smoking, are not consistent with the vast majority of research described in the Literature Review. As noted above, Doll, Lopez and other researchers found reduced mortality among never-smokers (even allowing for the effect of "second hand" or environmental tobacco smoke inhaled from other peoples' cigarettes) and research in Australia and most other countries indicates that a person is extremely unlikely to take up smoking after their twentieth birthday.

In general, though, there are clear differences in the changes in smoking status prevalences across age groups in a survey and as each cohort advances in age in each successive survey. The actual pattern of change is influenced by the cohort, that is, by the age at which the analysis begins.

4.4.1 The effect of gender among cohorts

The age effects found in the analysis of the whole sample may not be reflected in individual segments of the sample. Different segments may have responded quite differently to the same antismoking message.

Table 4.5. Percent of current smokers among males in each age group in each survey

	Survey year			
	1990	**1995**	**2000**	**2005**
Age group	**%**	**%**	**%**	**%**
18 to 19 years	29.88	25.35	30.51	26.16
20 to 24 years	39.35	34.40	37.09	38.59
25 to 29 years	39.78	36.18	36.05	35.98
30 to 34 years	36.91	33.36	35.98	31.42
35 to 39 years	37.03	31.41	34.51	31.66
40 to 44 years	30.84	28.02	33.30	32.44
45 to 49 years	32.42	24.67	27.78	29.85
50 to 54 years	30.42	24.47	26.31	29.78
55 to 59 years	28.84	21.63	24.65	23.28
60 to 64 years	26.50	20.62	19.67	19.30
65 to 69 years	21.54	18.60	14.49	14.94
70 to 74 years	17.17	12.60	12.96	10.76
75 and over	11.57	9.10	6.62	6.61

The tables and figures in this section repeat the analysis conducted above but this time, the patterns in the two gender segments are compared. Table 4.5 and Figure 4.8 show the percentages of current smokers among male respondents in each age group and how the percentages change as the cohorts advance through the age groups with each successive survey. Table 4.6 and Figure 4.9 show the same data for female respondents.

In general, the patterns of change found in the overall sample were also found among males. In the overall sample, as a cohort increased in age group with each survey, there was a general (but not always continuous) decline in smoking prevalence. In the 2005 survey, prevalence of smokers was significantly below the 1990 level and this pattern is found among the males in the sample. There was also an age effect as the trajectory of smoking prevalence among males was different in different age groups and in different cohorts.

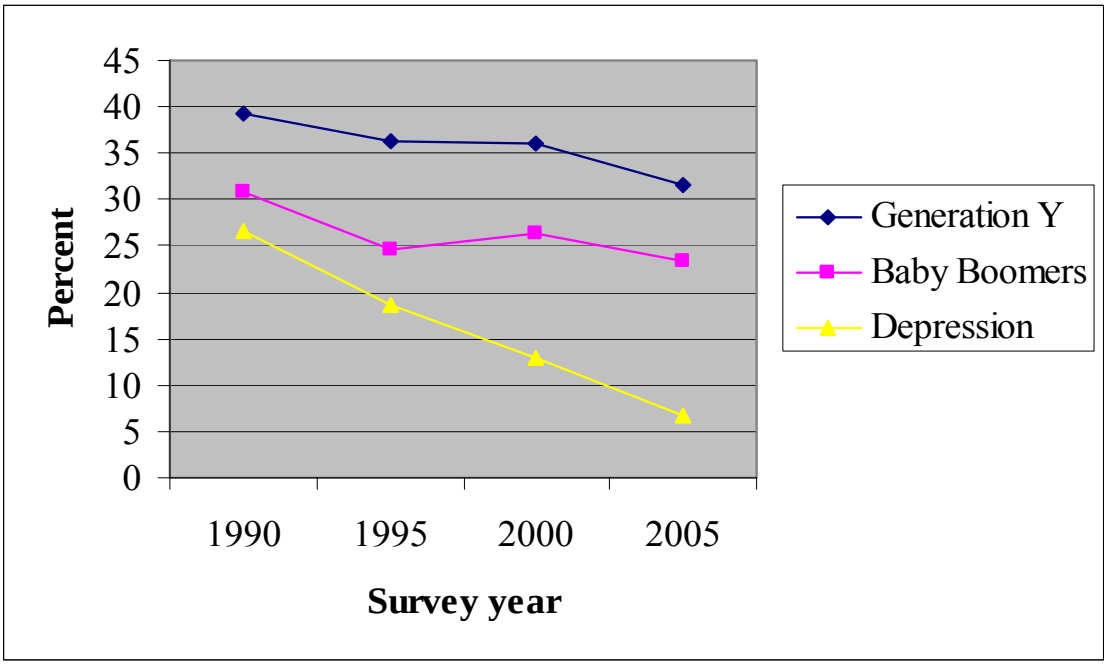

Figure 4.8 Percentage of male respondents who were current smokers by survey year.

Prevalence of current smokers among males in the Generation Y and Baby Boomer cohorts follow a similar trajectory to each other and to the sample as a whole. There is an initial decline in prevalence in all three cohorts between the first and second surveys and

between the last two surveys. Between the middle two surveys, the decline stops in both Generation Y and Baby Boomers. Among Baby Boomers, the decline is replaced by a slight increase. Despite this change of direction in these cohorts, prevalence of current smokers in the 2005 survey is below the levels in the 1990 survey. In the oldest cohort, the Depression group, there is a constant decline in current smoker prevalence across each survey so that, current smoker prevalence in the 2005 survey is approximately one quarter of the 1990 level. This highlights the age effect mentioned above. Table 4.6 shows the same data for female respondents.

Table 4.6. Percent of current smokers among females in each age group in each survey

	Survey year			
	1990	**1995**	**2000**	**2005**
Age group	**%**	**%**	**%**	**%**
18 to 19 years	33.13	26.13	28.02	22.76
20 to 24 years	36.54	29.97	35.48	29.80
25 to 29 years	32.74	29.77	30.47	30.99
30 to 34 years	29.73	26.88	29.95	28.66
35 to 39 years	26.03	23.29	28.56	28.29
40 to 44 years	23.69	20.88	28.62	24.55
45 to 49 years	25.08	18.26	21.28	25.77
50 to 54 years	21.80	17.46	21.93	20.25
55 to 59 years	20.59	16.68	15.26	17.22
60 to 64 years	18.13	14.96	17.20	14.39
65 to 69 years	14.37	10.99	8.74	12.74
70 to 74 years	13.41	10.51	11.50	5.93
75 and over	6.25	6.11	4.96	4.60

Among females, there was a general decline in smoking prevalence between the first and last surveys, as there was among males and the sample as a whole. As was noted above, the decline is not constant as each cohort advances in age from one survey to the next. In

general, the change in prevalence between the 1995 and 2000 surveys is different from the changes between surveys either side of these two.

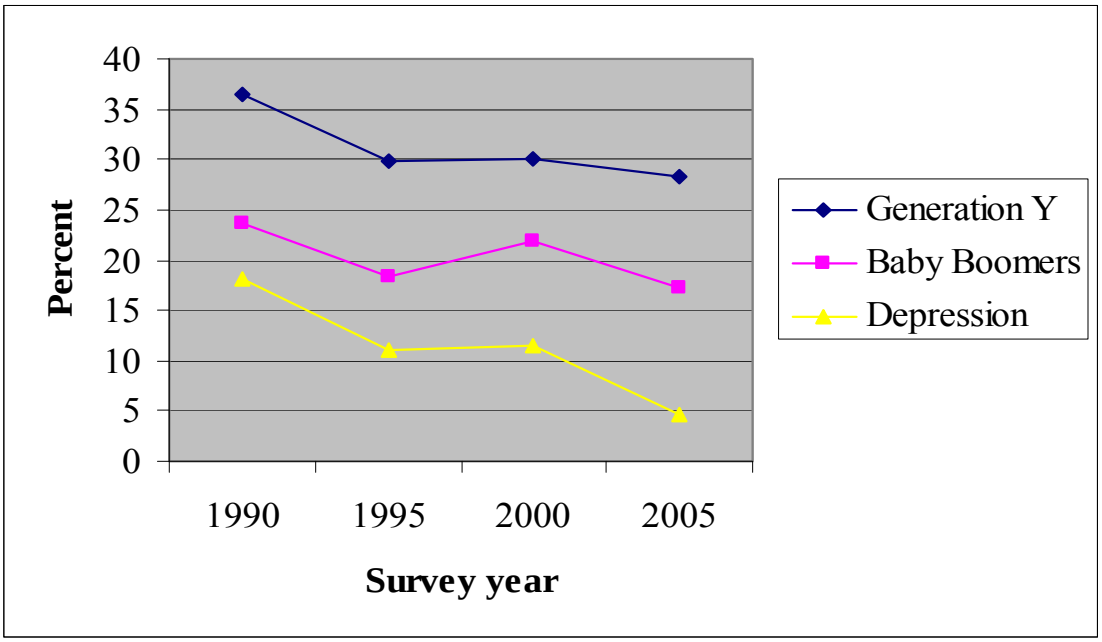

Figure 4.9 Percentage of female respondents who were current smokers by survey year.

Unlike the pattern found among males, the decline in smoking prevalence in Generation Y and among the Baby Boomers are quite different, although in both cohorts, current smoker prevalence in 2005 is much lower than it was when this group were surveyed in 1990 and in both groups, prevalence in 2005 is very close to prevalence in 1995. This is only true of Baby Boomers among the males. In the period between the 1995 and 2000 surveys, prevalence either remained unchanged or increased, as it did among the same cohorts in males. In the oldest cohort, the Depression generation, there was not the constant decline in prevalence seen in the males. Among females, the decline in smoking prevalence in this group followed the same trajectory as the Generation cohort, that is, a decline between the first and second surveys, no change, then a further decline, so that as mentioned above, prevalence in 2005 was below that in the three previous surveys. There appears to have been a different pattern of changes in smoking prevalence among female smokers from that found among males and differences between cohorts

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Table 4.7 and Figure 4.10 show the changes in the percentages of each age group of males that were ex-smokers at the time of each survey.

Table 4.7. Percent of ex-smokers among males in each age group in each survey

	Survey year			
	1990	**1995**	**2000**	**2005**
Age group	**%**	**%**	**%**	**%**
18 to 19 years	6.00	8.87	7.63	12.24
20 to 24 years	10.16	11.11	10.52	14.31
25 to 29 years	15.93	18.92	14.92	20.70
30 to 34 years	21.93	25.28	19.01	27.25
35 to 39 years	25.37	28.13	25.32	27.76
40 to 44 years	29.47	32.77	27.31	31.10
45 to 49 years	32.16	35.31	31.29	36.81
50 to 54 years	33.49	39.88	33.42	36.33
55 to 59 years	41.65	45.79	39.61	41.93
60 to 64 years	46.29	49.13	49.48	52.68
65 to 69 years	53.99	54.78	52.66	56.64
70 to 74 years	53.74	63.93	57.95	61.12
75 and over	55.85	60.02	62.50	68.03

There is a general increase in the prevalence of ex-smokers among males in the period covered by these surveys. Prevalence in all cohorts is much higher in 2005 than it was when the cohorts were surveyed in 1990. Typically, prevalence levels in 2005 are twice to two and a half times the levels when the cohort was surveyed in 1990. The increase in prevalence of ex-smokers, that is the greater percentage of the samples who have successfully given up smoking, reflects the pattern of the decrease in the prevalence of current smokers. There is the same pattern of change between the first two and the last two surveys and a plateau of reversal of the trend between the middle two surveys as was found in current smokers.

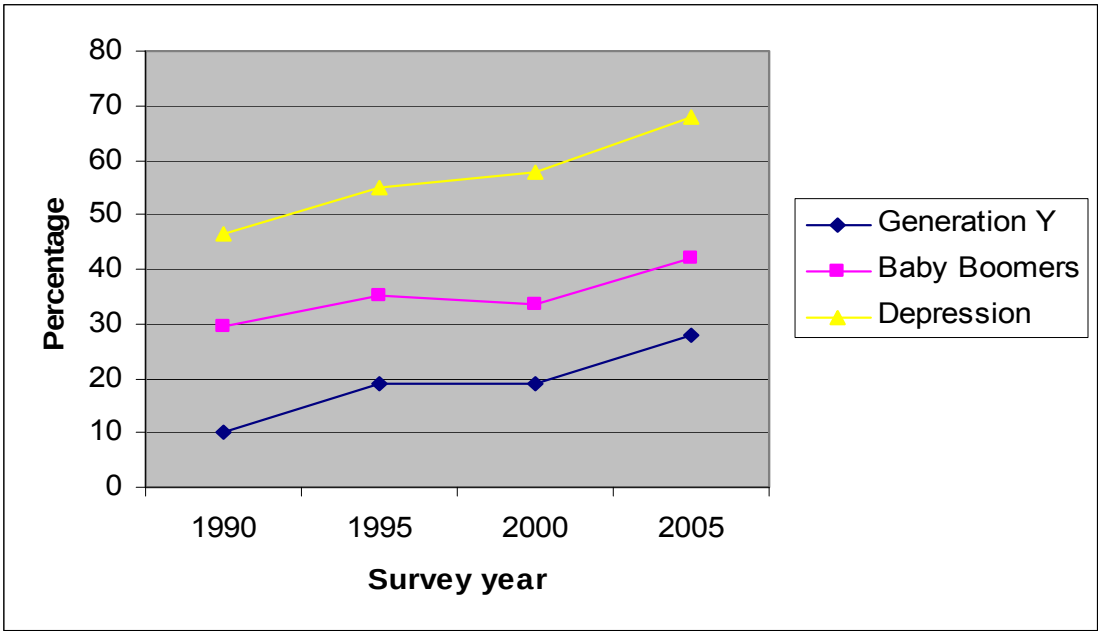


Figure 4.10 Percentage of male respondents who were ex-smokers by survey year.

Among male ex-smokers, it is the older two cohorts (Baby Boomers and Depression generation) which show the similar trend. Among the Generation Y cohort, there is a constant increase and less signs of a plateau or a decrease as seen in the other cohorts. As a result, by the time Generation Y respondents reach the age of 35 to 39 years old in 2005 prevalence of ex-smokers (27.2 percent) was approximately two and a half times the level it was when they were in the 20 to 24 year old age group in 1990. Among the overall sample, the difference was less than double. In the Baby Boomer cohort, there was an initial increase in prevalence between the first two surveys, then a decrease in the 2000 survey and a large increase in 2005. Prevalence of ex-smokers in this group was in 2005 (41.9 percent) was well above the level when they were in the 40 to 44 year old age group in 1990 but not by as wide a margin as was found in the overall sample. As with current smokers, there is evidence of an age effect among male ex-smokers. The pattern of change is different for different age groups and cohorts.

Table 4.8. Percent of ex-smokers among females in each age group in each survey

	Survey year			
	1990	**1995**	**2000**	**2005**
Age group	**%**	**%**	**%**	**%**
18 to 19 years	7.80	8.22	6.90	10.16
20 to 24 years	13.51	16.17	15.54	17.80
25 to 29 years	19.42	22.27	16.72	22.21
30 to 34 years	20.31	25.81	22.56	25.27
35 to 39 years	18.24	28.21	24.98	24.42
40 to 44 years	17.57	25.31	25.85	29.92
45 to 49 years	20.13	23.25	25.58	30.52
50 to 54 years	16.85	26.05	25.36	28.08
55 to 59 years	17.72	21.52	27.44	30.90
60 to 64 years	19.05	23.69	26.38	31.83
65 to 69 years	21.80	26.99	23.67	30.64
70 to 74 years	21.02	26.06	26.90	31.69
75 and over	16.91	20.54	25.86	27.15

Among females, there was a general increase in the prevalence of ex-smokers in each cohort as they increased in age between the first and second surveys. This was followed by a period of reduced growth in most cohorts as they progressed through age groups in successive surveys. Unlike in the case of males, this lack of change persisted into the later surveys and many cohorts showed no big changes in the remaining surveys.

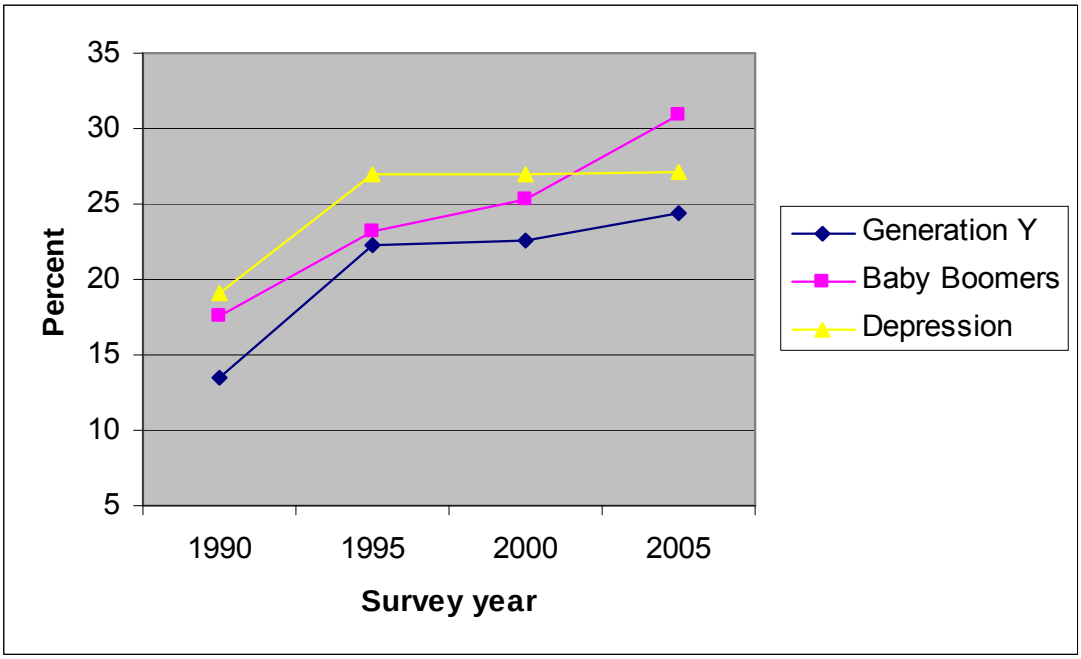


Figure 4.11 Percentage of female respondents who were ex-smokers by survey year.

The youngest cohort of females (Generation Y) recorded the same pattern of increasing prevalence of ex-smokers as they moved through increasing age groups in successive surveys as was found in the sample as a whole, although the difference between prevalence in the 2005 survey (24.4 percent) and when they were in the 20 to 24 year old age group in 1990 (13.5 percent) was smaller than the difference between these surveys in the male cohort. In the Baby Boomer cohort, prevalence of ex-smokers increased continually between surveys, without the decrease between the 1995 and 2000 surveys that was found among males. In the Depression generation, prevalence increased in the 1995 survey over the 1990 one but then remained stable at approximately the 1995 level. This is different from the pattern found in male respondents. In the male cohort, there was a steady, marked increase in prevalence of ex-smokers with each increase in age group in the surveys. Once again, there are important differences in the pattern of responses among male and the pattern among female ex-smokers.

The differences found between the patterns of changing prevalence of the other smoking status groups in males and females in the same age group and survey mean that there are also differences in the patterns of change in never-smokers. Table 4.9 and Figure 4.12

show the changes in the percentages of each age group that had never smoked at the time of each survey.

Table 4.9. Percent of never-smokers among males in each age group in each survey

	Survey year			
	1990	**1995**	**2000**	**2005**
Age group	**%**	**%**	**%**	**%**
18 to 19 years	64.12	65.77	61.86	61.60
20 to 24 years	50.49	54.50	52.39	47.11
25 to 29 years	44.28	44.90	49.03	43.32
30 to 34 years	41.16	41.35	45.01	41.33
35 to 39 years	37.59	40.46	40.17	40.58
40 to 44 years	39.69	39.21	39.39	36.47
45 to 49 years	35.42	40.02	40.93	33.33
50 to 54 years	36.09	35.65	40.27	33.89
55 to 59 years	29.50	32.58	35.74	34.79
60 to 64 years	27.21	30.26	30.85	28.02
65 to 69 years	24.47	26.62	32.85	28.42
70 to 74 years	29.09	23.47	29.10	28.12
75 and over	32.58	30.87	30.88	25.35

There was a greater variation in the pattern of change in the prevalence of never-smokers among male respondents as each cohort advanced to the next age group with each successive survey. In all cohorts, prevalence in the 2005 survey was below that when the cohort was surveyed in 1990 but the trajectory of the changes was different between groups.

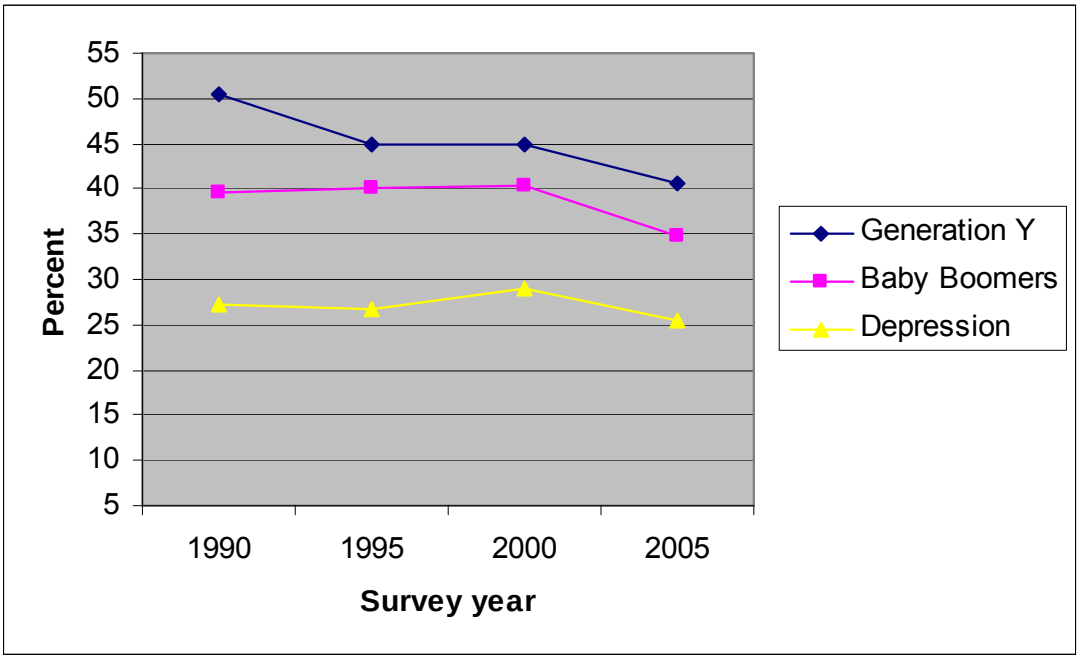


Figure 4.12 Percentage of male respondents who were never-smokers by survey year.

Among Generation Y, was a large decrease in prevalence between the 1990 and 1995, and the 2000 and 2005 surveys and a smaller decrease between the 1995 and 2000 surveys. In the Baby Boomers, there was no real change in the first three surveys and a large decrease in the prevalence of never-smokers in the last survey. In the Depression generation cohort, there was a slight increase in prevalence in between the 1995 and 2000 surveys and a further decline in 2005 survey. As a result, prevalence of never-smokers in 2005 (25.3 percent) was only slightly less than the level when this cohort was surveyed in 1990 (27.2 percent). Table 4.10 and Figure 4.13 show the pattern of changes in prevalence of never-smokers among females.

The differences in the changes between surveys among males and females are not as great among never-smokers as they were among the other smoking status groups.

Table 4.10. Percent of never-smokers among females in each age group in each survey

	Survey year			
	1990	1995	2000	2005
Age group	%	%	%	%
18 to 19 years	59.06	65.65	65.09	67.07
20 to 24 years	49.95	53.87	48.98	52.40
25 to 29 years	47.84	47.96	52.81	46.80
30 to 34 years	49.96	47.32	47.49	46.07
35 to 39 years	55.72	48.49	46.46	47.28
40 to 44 years	58.74	53.81	45.52	45.53
45 to 49 years	54.79	58.49	53.14	43.71
50 to 54 years	61.35	56.49	52.71	51.67
55 to 59 years	61.69	61.80	57.31	51.89
60 to 64 years	62.82	61.35	56.43	53.78
65 to 69 years	63.83	62.02	67.59	56.63
70 to 74 years	65.57	63.42	61.60	62.37
75 and over	76.84	73.34	69.18	68.26

The key difference is that there was a general decline in the prevalence of never-smokers among males as each cohort advanced in age. Among females, the pattern is less clear. In some cohorts there was a decrease and in others there was an increase. The trajectory of change was different for different cohorts to a much greater extent than was found among males.

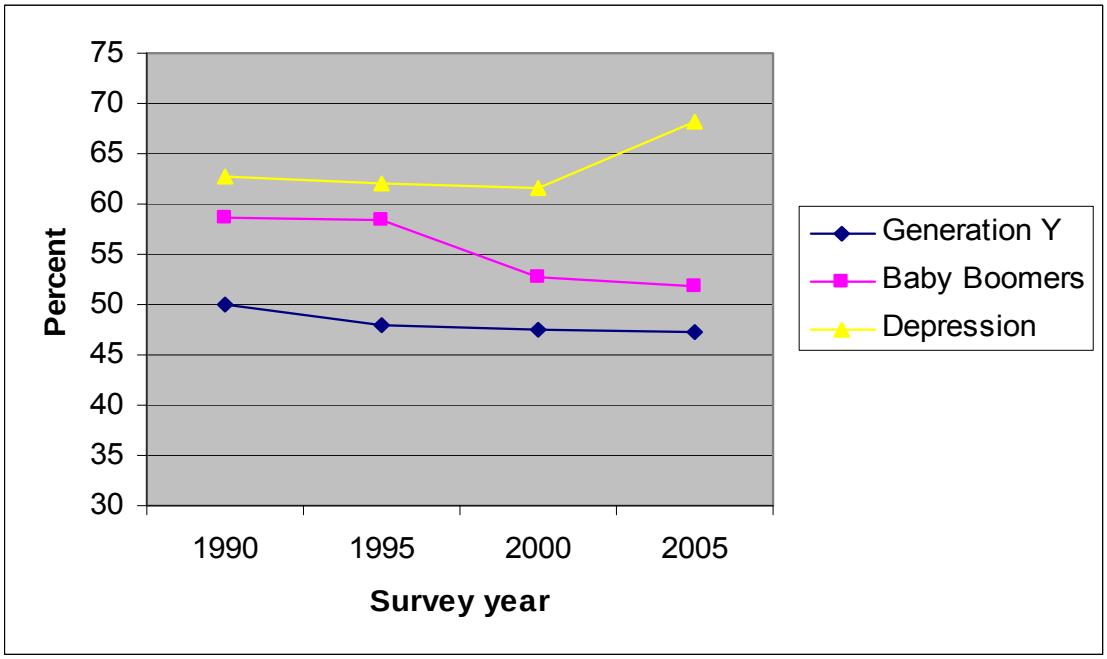


Figure 4.13 Percentage of female respondents who were never-smokers by survey year.

Prevalence of never-smokers in the Depression generation cohort actually increased between the 2000 and 2005 surveys, having remained largely unchanged in the three previous surveys. Prevalence among Baby Boomers declined between the 1995 and 2000 surveys but was unchanged either side of this period. Among Generation Y females there was no major change in prevalence in the period covered by these surveys, especially in the ten years when the cohort increased in age from 25 to 29 (in 1995) to 35 to 39 (in 2005).

4.4.2 Summary of cohort analysis

In summary, there have been important differences in the patterns of change in the prevalences of the three smoking status groups as cohorts increase in age with each successive survey. There are differences in the patterns of change influenced by the age group of the respondents and the age at which the analysis starts. There are also important differences in the patterns among males and among females. Using this data, it

is possible to identify different market segments based on demographic characteristics and differences in behaviour change related to tobacco smoking.

4.5 The effect of other variables apart from cohort

Figure 4.14 shows the changes in the odds of being either a current or ex-smoker or never having smoked with changing age group, using data from all four surveys. The 95 percent confidence intervals are shown but in view of the large numbers, they are very narrow and in this graph, they are partially obscured by the dots.

Figure 10. Smoking status odds by age group

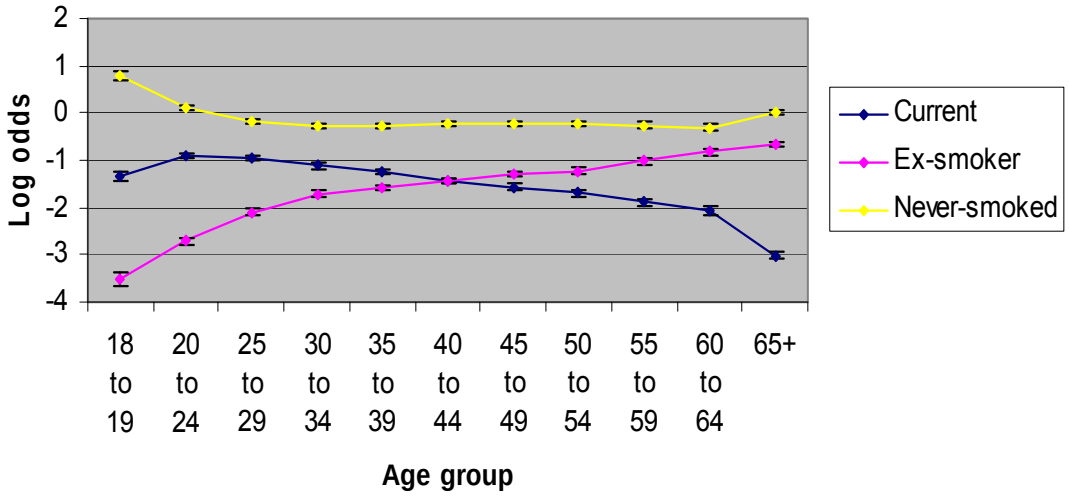


Figure 4.14 Smoking status odds by age group.

There is no significant change in the odds of being a never-smoker (the yellow line) over most of the age range shown here. This is consistent with the findings discussed in Chapter 2 that most smoking initiation takes place in the mid-teenage years and only a very small percentage of smokers commence smoking for the first time after the age of twenty. The increase in odds in the oldest group may reflect the impact of early, smoking-related mortality removing smokers from the sample, leaving only people who have either never smoked or those who have given it up (ex-smokers).

There is a clear age gradient in the odds of being either a current smoker (blue line) or an ex-smoker (pink line). The odds of being an ex-smoker increase with age. In each age group, the odds of being an ex-smoker are significantly higher than those in younger groups. The combined effect of increasing odds of successfully quitting smoking and no change in the odds of taking it up (that is, no change in the odds of being a never-smoker) is for the odds of being a current smoker to fall with increasing age. The odds of being a current smoker in any age group except 20 to 24 years old, are lower than those odds in younger groups. Throughout the age range shown in this plot, the odds of being a never-smoker are significantly higher than the odds of ever having taken it up and either given it up or remaining a current smoker. The odds of a young person being an ex-smoker are very low. As discussed in Chapter 2, if a young person takes up smoking, they are likely to remain addicted for many years. The odds of being an ex-smoker overtake the odds of being a current smoker in the middle age group (40 to 44 years). Thereafter, the odds of being an ex-smoker become increasingly greater than the odds of being a current smoker with each increase in age group and come closer to the odds of being a never-smoker.

In summary; the pattern of smoking status changes in the population with age group. In any age group, the odds of being a never-smoker are higher than the odds of belonging to either of the other smoking status groups. In younger through to middle age groups, a person is more likely to be a current smoker than an ex-smoker. In older age groups, the situation is reversed and a person is more likely to be an ex-smoker.

Figure 4.15 shows the pattern of smoking status odds in people born in Australia, born in another country whose main language is English, or in any other country.

There are three quite different patterns in the odds of belonging to one or other of the smoking status groups depending on country of birth. When data from all four surveys is combined, the odds of an Australian-born person being a current smoker are the same as the odds of them being an ex-smoker and lower than the odds of them being a never-smoker by a very wide margin.

Figure 11. Smoking status odds by country of birth

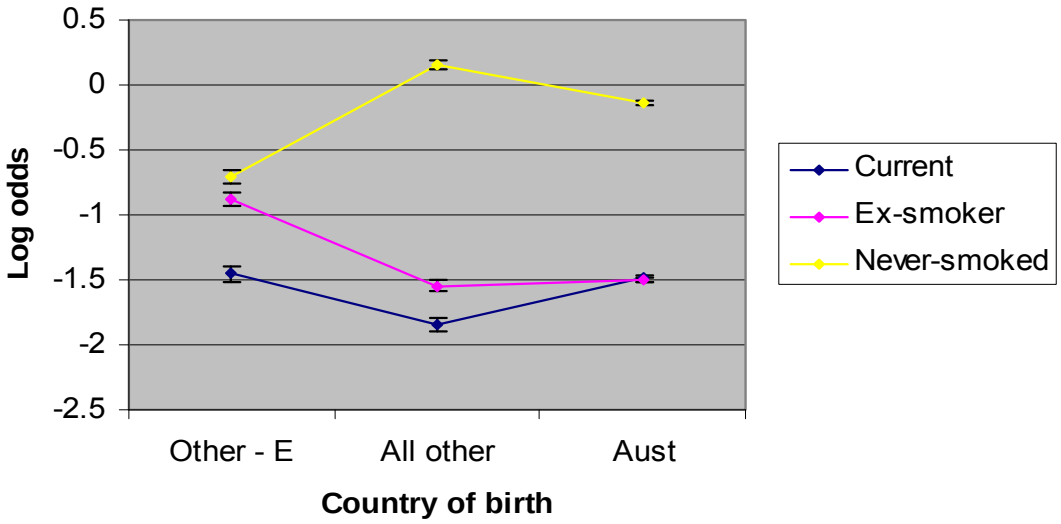


Figure 4.15 Smoking status odds by country of birth.

Among people born overseas in countries whose main language is English, the odds of being either a never-smoker or an ex-smoker are very similar and greater than the odds of being a current smoker. The pattern among people born in an overseas country whose main language is not English is more like that among Australian-born people. The odds of being an ex-smoker are not significantly different from those two groups but the odds of being a current smoker are significantly lower and the odds of being a never-smoker are significantly higher than the odds among Australian-born people.

Figure 4.16 shows the changes in smoking status patterns across occupation groups. In Australia, there is not a clear social hierarchy as seen in some other countries. Never-the-less, there is a difference in social status between managers and professionals and "blue collar" occupations including labourers and related occupations. In between these extremes are the groups whose relative social status is debatable (tradespersons, clerks and salespersons), so it is not suggested that these middle occupations are organized according to a firm ordinal scale.

Figure 12. Smoking status odds by occupation

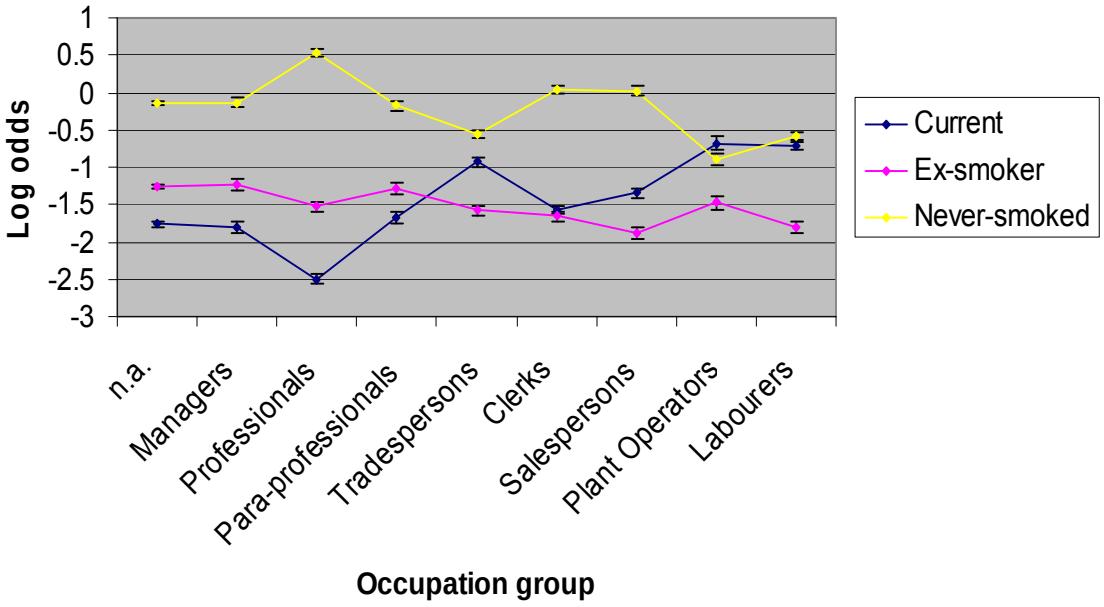


Figure 4.16 Smoking status odds by occupation group.

There is no clear occupation effect on the odds of being an ex-smoker although lower social status occupations such as labourers or salespersons are significantly lower than the odds among the higher social status occupations such as managers and professionals. Among current smokers on the other hand, there is a clear occupation effect. Higher social status occupations are associated with much lower odds of being a current smoker. The graphs suggest that smoking is strongly associated with lower social status occupations.

Among never-smokers, the pattern is less clear. Managers, paraprofessionals, clerks and salespersons all have very similar odds of being never-smokers. The lowest odds are among tradespersons and plant operators. In each grouping, occupations with similar odds of being never-smokers span a broad range of social status. Further research is needed to determine why a professional occupation is associated with the highest odds of being a never-smoker. The low odds of being a current smoker among professionals are

associated with high odds of being a never-smoker not with a greater likelihood of being able to successfully quit smoking.

As was the case with country of birth groups, there are significant differences between the patterns of smoking status between occupation groups. For example, the odds of members of the labourer and related group being either a current smoker or a never smoker are nearly the same and much greater than the odds of being an ex-smoker. This suggests that members of this group are more likely than other occupations to take up smoking (least likely to be never-smokers) and having taken it up, they are very unlikely to successfully quit smoking. Antismoking campaigns appear to be associated with little or no impact on reducing smoking prevalence or smoking initiation in this group. Salespersons are less likely to take up smoking but having taken it up, are less likely to quit. As a result, odds of being a current smoker in this group are higher than those in other groups with similarly high odds of being a never-smoker.

In many countries, income is linked to social status but as can be seen from the discussion of the estimated residential population, this relationship is not so clear in Australia. Figure 4.17 shows the pattern of smoking status odds across income deciles. On this scale, the first decile is the lowest income group and the tenth is the highest.

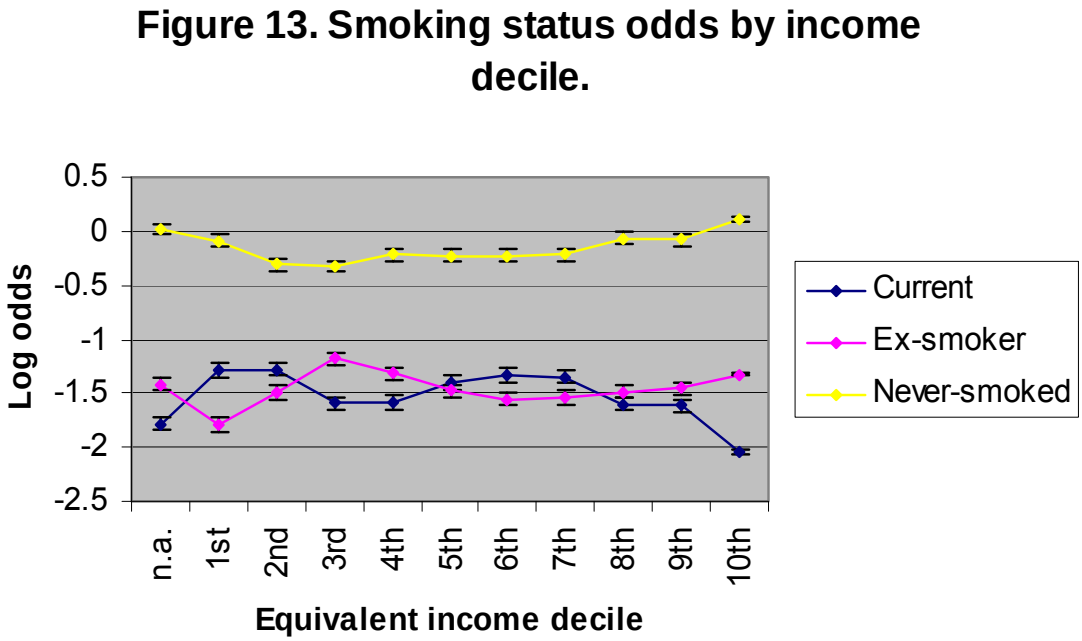


Figure 4.17 Smoking status odds by equivalent income decile.

There are no clear income gradients in the odds of belonging to any of the smoking status groups to correspond with the occupation gradient discussed above.

4.6 Summary

This preliminary analysis suggests that there are important differences in smoking status and patterns in the different statuses among different groups in the community. The next stage of the analysis will explore this proposition in greater depth.

Chapter 5: Logistic Regression models of smoking status

5.1 Introduction

As was explained in Chapter 3, logistic regression analysis of the data in the four NHS surveys conducted between 1990 and 2005 was completed in two stages. In the first stage, traditional binomial logistic regression explored the impact of the six independent variables (survey year, gender, age group, country of birth, occupation group and income group) on the likelihood of belonging to one of the three possible smoking categories (current, ex- or never-smoker). In each case, the likelihood of membership of the group was compared with the likelihood of non-membership. The characteristics of the data and the steps in the preparation of the data were explained in Chapter 3. Initially, simple additive, main effects models were fitted, then interactions were examined and models with two sets of interactions were identified. The sets were joined into two interaction factors and shown as main effects. One factor, labeled *Demographic*, included the immutable characteristics gender, age group and country of birth. The other factor, labeled *Social*, included occupation group and income. Survey year was included in both factors and the Data and Methodology describes how the resulting colinearity was treated.

The second stage in the logistic regression analysis involved fitting multinomial logistic regression models to the data. The data preparation and model-fitting steps were the same as those for the binary logistic regression analysis except that comparisons were not between membership and non-membership of a particular smoking status category but between membership of one smoking status category and membership of another category, the latter category is called the reference group.

5.2 Binary logistic regression models

Three additive, main effects models were fitted first. These models are in the form:

1. P(current smoker) = $\dfrac{Odds(current)}{1+Odds(current)} = \dfrac{e^{\alpha+\beta_1 X_1+\beta_2 X_2+\ldots+\beta_k X_k}}{1+e^{\alpha+\beta_1 X_1+\beta_2 X_2+\ldots+\beta_k X_k}}$

2. P(ex-smoker) = $\dfrac{Odds(ex-smoker)}{1+Odds(ex-smoker)} = \dfrac{e^{\alpha+\beta_1 X_1+\beta_2 X_2+\ldots+\beta_k X_k}}{1+e^{\alpha+\beta_1 X_1+\beta_2 X_2+\ldots+\beta_k X_k}}$

3. P(never smoked) = $\dfrac{Odds(never)}{1+Odds(never)} = \dfrac{e^{\alpha+\beta_1 X_1+\beta_2 X_2+\ldots+\beta_k X_k}}{1+e^{\alpha+\beta_1 X_1+\beta_2 X_2+\ldots+\beta_k X_k}}$

α is the intercept, each X is a dependent or predictor variable and each β is the associated coefficient. As explained in Chapter 3, dummy variables were created for each of the independent variables with more than two values, so there are 28 variables (Xs) in each of these models.

Plots of the odds ratios and their 95 percent confidence intervals for these main effects models are shown in Figure 5.1. The actual coefficients derived in these models are available from the author. The ratios are shown on a log scale. In each of the three sets of graphs, the first section, "year" shows the ratio of the odds for the three surveys, 1990 through to 2000 compared with the reference year, 2005. The next section, "sex" shows the ratio of male odds to female odds. The third section, "age" shows the ratio of the odds of each of the five, ten year age groups up to 64 years compared to the odds for the reference group, 65 years and over. The CoB ratio compares the odds for persons born outside Australia with Australian-born people. In the "occup" section, the odds for three occupation groups (Paraprofessionals and Tradespersons, Clerical and Salespeople and Labourers and Plant and Machine Operators) and "not applicable" are compared with the odds in the reference group, Managers and Professionals. For the logistic regression, the equivalent income decile data was regrouped into income quintiles. In this section of the graphs, the odds in the second through to fifth quintiles and not applicable are compared with the odds in the first quintile.

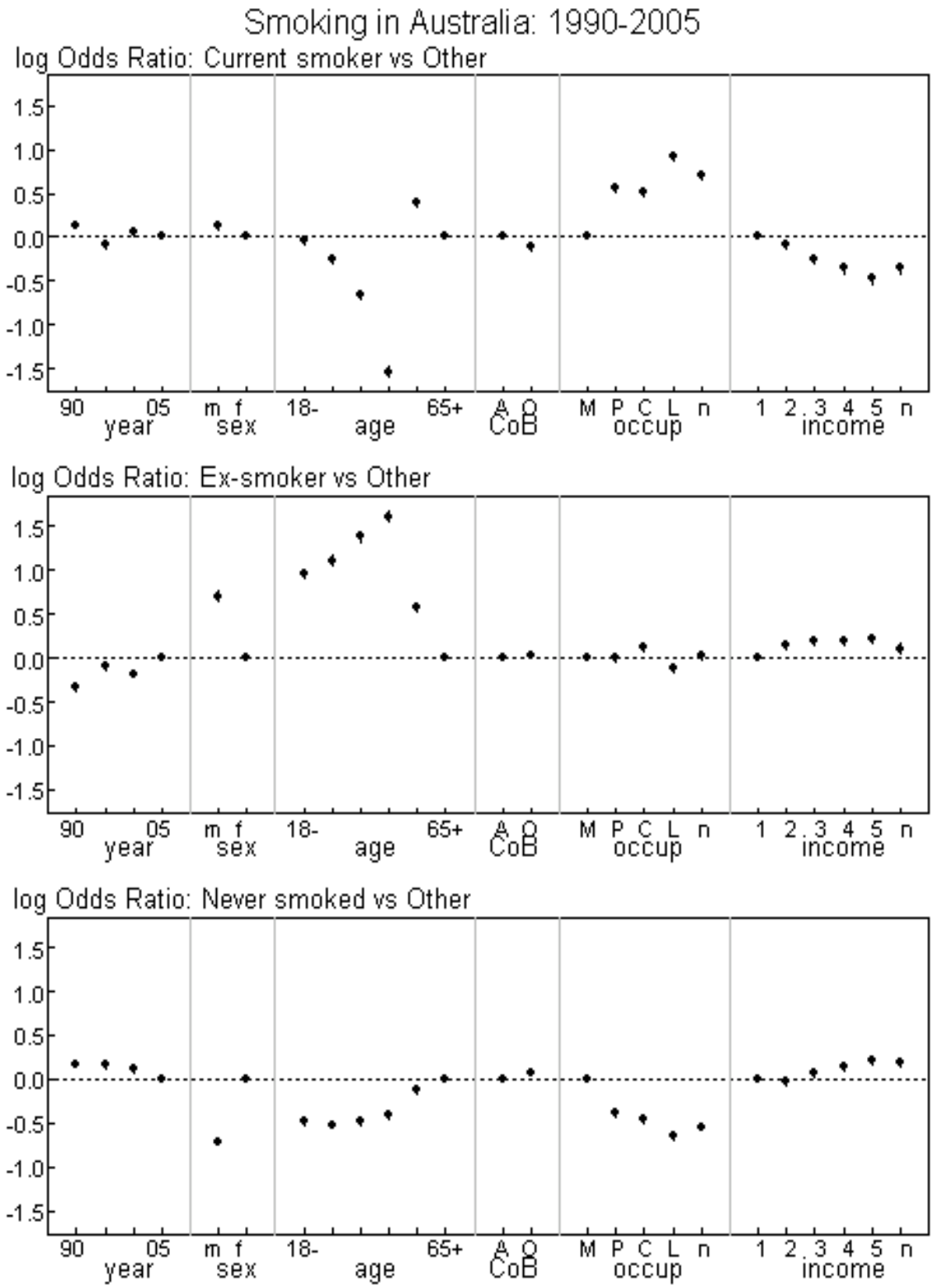


Figure 5.1. Odds ratios and confidence intervals for three binary logistic regression models.

5.2.1 Current smokers compared with all others

The graphs are consistent with the findings from the preliminary analysis: there was no major change in the odds of a respondent being a current smoker in the period covered by these surveys. 2005 is the reference year and the points indicate that while the odds of being a current smoker in 1990 were higher than they were in 2005, the difference is not great. This is consistent with the slight improvement in smoking prevalence found earlier. There was significant drop in the odds of being a smoker between the 1990 and 1995 surveys and then the odds increased. As a result, the odds of being a smoker in 2000 were higher than they were in 1995 and remained above the 1995 level in 2005. The closeness of the 2000 and 2005 odds indicates no significant change in odds and this is confirmed by their overlapping confidence intervals. While there may have been a steady decrease in smoking prevalence in Australia in the past, this data indicates that there has been no sustained decrease in the odds of being a current smoker in the period leading up to the 2005 NHS.

Gender remains an important indicator of smoking status but the gap between males and females is no longer very large. The graph shows that the odds of a male being a current smoker are higher than those of a female being a smoker but their confidence intervals are very close together, almost overlapping. The gap between male and female smoking prevalence was much larger than this in the past. These findings are consistent with the research reported above that smoking prevalence among females has not declined to the same extent that it has among males, thus reducing the gap between them.

The 65 and over age group are the reference group in the "age" section of the graphs. The likelihood of being a smoker in the first age group (18 to 24 years) is the same as the likelihood among the oldest group. There is a steady decrease in the likelihood of being a smoker in the next three age groups and then a large increase in the second last group, 55 to 64 years of age. Examination of the data suggests that this is a function of comparing current smokers with a group consisting of both ex-smokers and those who have never

smoked. It will be seen below that the odds of being an ex-smoker increase with age in the first four surveys and then decrease. Research described earlier indicates that worldwide, the onset of tobacco smoking is typically in mid-teenage and only the smallest percentage of smokers (typically less than five percent) commenced regular smoking after the age of twenty. Therefore, smokers in the last two age groups have been smoking the longest and may be the most resistant to quitting. Antismoking strategies that are effective with younger, less committed smokers may well be less effective with these "hard core" smokers who have withstood antismoking messages for thirty years or more. This would explain the initial increase and then large increase in the odds of being a smoker. Modelling by Lopez *et al.* and others indicates that smoking-related deaths lag as much as thirty years after smoking onset (see research in the Literature Review). The oldest age group may therefore be the group most affected by smoking-related mortality removing current smokers from the population. This would explain the drop in odds between the last two groups.

Although the odds of a person born outside Australia being a smoker are significantly lower than those of an Australian-born person, the difference is not great. Because the "born outside Australia" group is so diverse and the difference is so small, it is difficult to draw clear conclusions from this finding. However, it contradicts the suggestion that, because smoking prevalence in Australia is among the lowest in the world, people born here would have grown up in an environment where smoking was less common than in other countries and therefore might be less likely to smoke than someone born overseas. Among occupation groups however, there is a clear gradient. Occupation group is a strong indicator of current smoking status. The highest status occupation group, Managers and Professionals, is the reference group and all other groups have higher odds of being a current smoker. Movement from left to right in this section of the graph is to move from higher status, "white collar" occupation groups such as the Managers and Professionals, to lower status, "blue collar" occupation groups such as Labourers and Plant Operators. (The characteristics of the last group, not applicable, have been discussed earlier and they cannot be placed in this social status ranking.) Again, these results are consistent with earlier analysis that found increased smoking prevalence is associated with a decrease in the social status of occupation. The contrast is clearest

between the white and blue collar extremes. The social status differences between the middle occupation groups are not as pronounced in Australia as they are in other, more hierarchic societies and this is reflected in the lack of any significant difference in the odds of being a current smoker in these groups, occupations with similar social status have similar odds of belonging to one of the smoking status groups.

The other component of socio-economic status, income, also shows a clear gradient, consistent with earlier findings. The lowest income group (the first quartile) is the reference group and all other groups have less likelihood of being a current smoker. Movement from left to right in this section of the graph is to move from lowest to highest income quartile. Once again, the not applicable group cannot be fitted into this ordinal ranking. The graph shows that, the higher the income, the less likely it is that a person will be a smoker.

5.2.2 Ex-smokers compared with all others

The second set of graphs in Figure 5.1 show the odds that a person is an ex-smoker compared with the odds that they never given up smoking, that is, they are either current smokers or they never took up smoking. The odds of being an ex-smoker have significantly increased during the period covered by these surveys. The odds of being a smoker in the 1990 survey are very much lower than the odds in 2005. There was a period of slight (that is, not significant) decline in the odds of being an ex-smoker between the 1995 and 2000 surveys but overall, the odds of being an ex-smoker have shown strong growth. In social marketing terms, the group that has demonstrated the greatest behavioural change consists of smokers who have successfully quit the habit. The pattern of change in the odds of being an ex-smoker reflects the changes in the odds of being a current smoker. In the first three surveys, when the odds of being an ex-smoker increased, those of being a current smoker decreased. The changes in the odds of being a current smoker can be completely explained by the changes in the odds of successfully quitting smoking, there is no change in the odds of not taking it up. This is consistent with the findings in the preliminary analysis which showed a similar pattern.

In the period between the last two surveys, the change in the odds of being an ex-smoker were, to some extent, balanced by the change in the odds of never taking it up, so there was no change in the odds of being a current smoker. This illustrates the point made in the Literature Review that it is essential to understand the factors determining smoking prevalence at any time, the rate at which people are taking it up compared with the rate at which they are successfully quitting, if the objective is to lower smoking prevalence.

Gender is a strong predictor of ex-smoking status. All other factors being equal, the odds of a male being an ex-smoker are significantly higher than those of a female. There is a clear age gradient in the first four age groups among ex-smokers, as there is among current smokers but in the opposite direction. Among ex-smokers, the odds of being an ex-smoker are significantly higher in the first four age groups than in the oldest group and the gap increases with age up to the fourth group. As there was among current smokers, there is an abrupt change in trend direction at the fourth age group among ex-smokers but not to the same extent. The gap between the odds of a 45 to 54 year-old being an ex-smoker and those of a 55 to 64 year-old is much smaller than the gap in the odds of these age groups being current smokers. The fact that 55 to 64 year-olds and those aged 65 and over are less likely to be ex-smokers than members of younger age groups may be another reflection of the more entrenched smoking habit and smoking-related mortality discussed above.

Once again, there is no difference in the odds of an Australian-born person or a person born overseas being an ex-smoker. In contrast to current smokers, there are no clear occupation or income effects among ex-smokers. There is either no difference at all or no significant difference between the odds of any of the occupation groups, including not applicable, being an ex-smoker with the exception of Labourers and Plant Operators. The odds of being an ex-smoker in that last group are significantly lower than the odds in any other group. In this case, changes in the odds of being a current smoker are not reflected in changes in the odds of being an ex-smoker. The changes in current smoking odds are related to the changes in the odds of taking up smoking. The same is true for income groups; there is no income effect among ex-smokers. Apart from the first quintile and not applicable, there is no significant difference in the odds of any income

group being an ex-smoker; they are all greater than the odds in the first quintile by approximately the same amount.

5.2.3 Never-smoked compared with all others

The third set of graphs in Figure 5.1 show the odds that a person never took up smoking compared with the odds that they did take it up and are now either a current or an ex-smoker. There was no change in the odds that a person had never smoked between the first and second surveys. There was a slight decline in the odds of a person never having smoked (that is, an increase in the odds that they had taken it up) between the 1995 and 2000 surveys but the difference was not significant. Between the 2000 and the 2005 surveys, this trend increased and the difference is larger but the confidence intervals are still close to overlapping. The cumulative effect of these repeated insignificant changes in the same direction is that there is a clearly significant decrease in the odds of never having smoked between the 1990 and 2005 surveys. In other words, it has become increasingly likely in this period that a person will have taken up smoking. Increases in the odds of successfully quitting smoking are balanced by increases in the odds of taking it up. As a result, the odds of being a current smoker remain unchanged, as shown above. In social marketing terms, the success in persuading people to quit smoking has been undermined by the failure to dissuade people from taking it up. Those quitting smoking have been replaced by new smokers, leaving smoking prevalence unchanged.

In the period covered by these surveys, gender is a strong predictor of never-smoked status. The odds of a male never having smoked are significantly less than those of a female. In other words, males are much more likely than females to take up smoking. This is balanced by the greater odds of them being ex-smokers, leaving the odds of males and females being current smokers very close together. It was shown above that the age gradients among current smokers and ex-smokers to a certain extent balanced each other and this is consistent with the age pattern among never-smokers. There is no age gradient among younger never-smokers, the first four age groups are all significantly less likely than people in the two oldest age groups to have never smoked. The smoking-related

early mortality discussed above may explain the higher odds of being a never-smoker among the older age groups, rather than a greater propensity to take up smoking among younger age groups.

There is no significant country of birth effect among never-smokers. The odds of a person born overseas being a never-smoker are slightly (that is, not significantly) higher than those of an Australian-born person and this explains the slightly lower odds of them being a current smoker. As noted above, there is no difference in the odds of them being an ex-smoker.

The clear occupation gradient found among current smokers is also found among never-smokers but in the opposite direction. The odds of people in the lower social status occupations such as Labourers and Plant Operators being never-smokers are significantly lower than those of the higher status occupation groups such as Managers and Professionals. Considering the three graphs together indicates that lower status occupation groups are associated with greater odds of taking up smoking and continuing to smoke. There is no difference in the odds of them successfully quitting.

It is also necessary to consider all three sets of graphs to understand the income effect. The differences between adjacent groups is not significant but the cumulative effect of these small changes is that the odds of higher income groups, the third to fifth quintiles, being never-smokers are greater than the lower income groups. The odds of these groups being ex-smokers are also higher than those among the lower income groups. A lower propensity to take up smoking combined with greater odds of successfully quitting if they do take it up result in the strong income gradient found among current smokers. As was noted above, the odds of each successive income quartile being a current smoker decrease significantly as income increases.

5.2.4 Summary of simple binary logistic models

The main effects binary logistic regression models indicate that a desirable change in the odds of successfully quitting smoking (increasing odds of being an ex-smoker) are to some extent, being undermined by an undesirable change in the odds of taking up smoking (reduced odds of being a never-smoker). Gender is a strong indicator of the odds of taking up smoking and of successfully quitting. As these gradients tend to cancel each other out, gender is no longer a clear predictor of current smoking status. There are strong age gradients among current and ex-smokers. Changes in the odds of being a current smoker are explained in terms of changes in the odds of them successfully quitting. There is no difference in the odds of being a never-smoker. Country of birth is not a clear predictor of smoking status. There is a clear occupation gradient among never-smokers and current smokers. Occupation is not a predictor of ex-smoker status. Non-significant but consistent trends in odds of taking up and of quitting smoking among income groups result in a clear income gradient among current smokers.

5.3 Binary logistic regression models with interactions

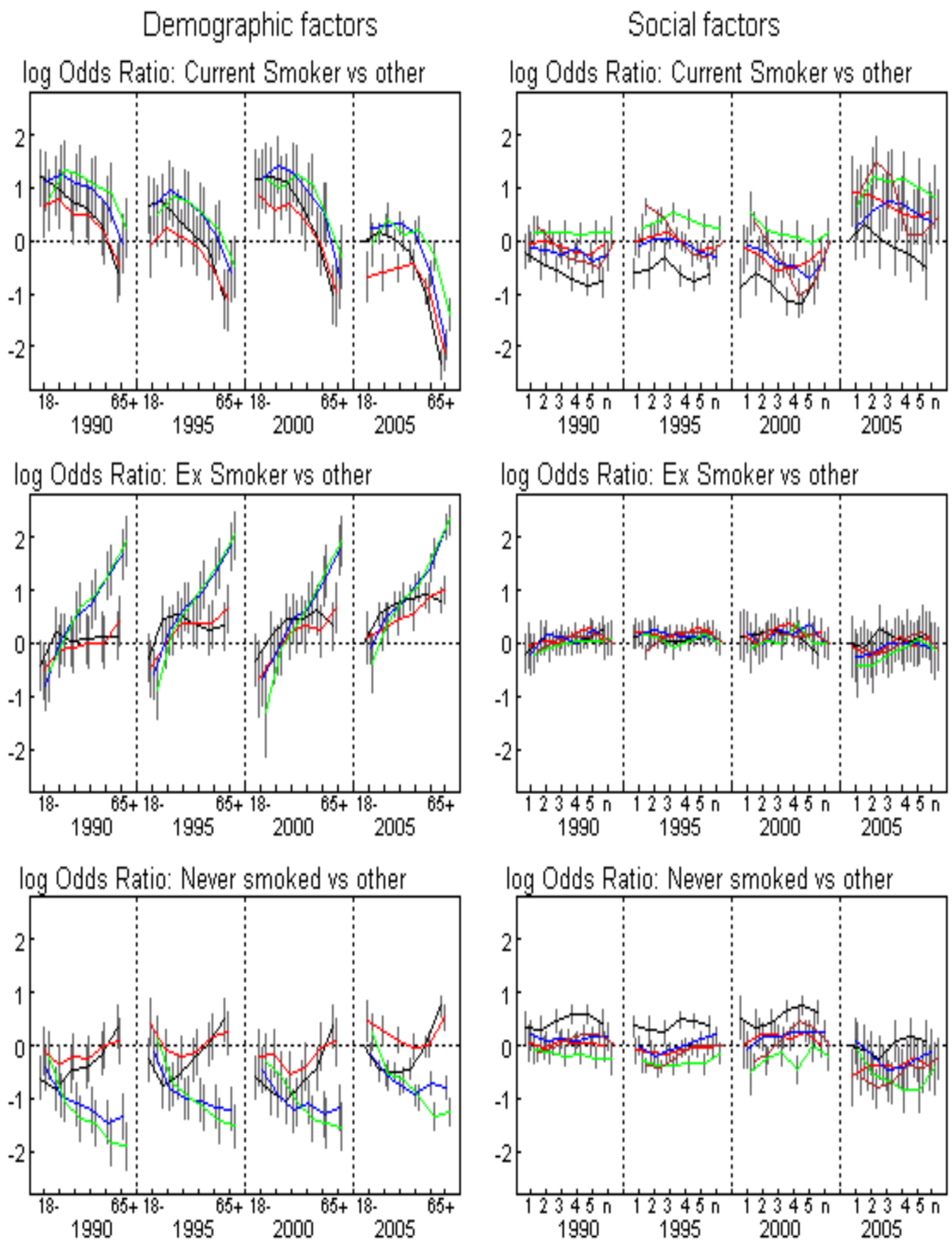
Interactions were grouped into Demographic and Social interaction factors and shown as main effects in three further binary logistic models. These models are in the form:

1. P(current smoker) = $\dfrac{Odds(current)}{1+Odds(current)} = \dfrac{e^{\alpha + \beta_1 X_1 + \beta_2 X_2}}{1 + e^{\alpha + \beta_1 X_1 + \beta_2 X_2}}$

2. P(ex-smoker) = $\dfrac{Odds(ex-smoker)}{1+Odds(ex-smoker)} = \dfrac{e^{\alpha + \beta_1 X_1 + \beta_2 X_2}}{1 + e^{\alpha + \beta_1 X_1 + \beta_2 X_2}}$

3. P(never smoked) = $\dfrac{Odds(never)}{1+Odds(never)} = \dfrac{e^{\alpha + \beta_1 X_1 + \beta_2 X_2}}{1 + e^{\alpha + \beta_1 X_1 + \beta_2 X_2}}$

Again, α is the intercept, X_1 is the Demographic interaction factor and X_2 is the Social interaction factor. β_1 and β_2 are the associated coefficients. The odds ratios and their confidence intervals are shown in Figure 5.2. The legend is shown on the following page.



Legend

Black = female, Aust-born

Red = female, o/s born

Blue = male, Aust-born

Green = male, o/s born

Black = Managers + Professionals

Red = Paraprofessionals +Trades

Blue = Clerical + Sales

Green = Labour + Plant Operators

Brown = n.a.

Figure 5.2. Binary logistic models with two interactions specified as main effects

5.3.1 Current smokers compared with all others

The Demographic interaction factors (graphs on the left) show the general age gradient found in the additive models, people in the older age groups are less likely to be current smokers than people in younger groups. The gradient tends to change direction with increasing age group. In all groups except Australian-born females (the black line), those in the 18 to 24 year old group were less likely to be current smokers than those in the next group, the 25 to 34 year olds, then the ratios are reversed. Females born overseas (the red line) have the lowest likelihood of being a current smoker compared with the others and very much lower than their male counterparts (the green line). The gap narrows in the older age groups, especially in the 2005 survey. Among young Australian-born people, there is no difference in the odds of a male (the blue line) being a current smoker compared with a female. In the older groups, males are more likely to smoke than females.

The more egalitarian nature of income distribution in Australia means that there is not the same correlation between income and social status of occupation that is found in some other countries. Where there were pronounced income and occupation gradients among current smokers in the additive model, the interaction model shows no such clear pattern. There is a general tendency for Managers and Professionals (the black line) to be less likely to be current smokers as income increases but the shape of the gradient changes dramatically between surveys. There is no significant gradient at all among Labourers

and Plant Operators (the green line) although, by the 2005 survey, those in the middle income quartiles appear to be more likely to be current smokers but the difference is not significant. As was found in the additive model, the odds of a member of the Paraprofessionals and Tradespersons group (the red line) being a current smoker and those in Clerical and Sales occupations (the blue line) are very similar although a gap has developed between these groups in the lower income quartiles in the last survey. These findings are consistent with the additive model and show the same occupation gradient – Labourers and Plant Operators are more likely to be current smokers than Managers and Professionals, with odds among Paraprofessionals and Tradespersons, and Clerical and Sales occupation groups in between.

5.3.2 Ex-smokers compared with all others

There is virtually no difference in the odds of an Australian-born male (blue line) and a male born overseas (green line) being an ex-smoker and the odds increase significantly with age. This pattern remains unchanged across all four surveys. Among females, Australian-born (black line) are generally more likely to be ex-smokers than females born overseas (red line). In the 1990 survey, there was no significant difference between the odds of a female, regardless of country of birth, being an ex-smoker in the four oldest age groups, that is, those aged 35 years or more. In three successive surveys, an age gradient emerged so that, in the 2005 survey, a gradient similar in shape but not in range, to that found in males is clearly evident. In the 2005 survey, older females are significantly more likely to be ex-smokers than younger females.

There is no clear income effect in any occupation group in any of the surveys. There is a small (that is, not significant) gradient in all groups except the Managers and Professionals (black line) in the 2005 survey.

5.3.3 Never-smoked compared with all others

Males are generally less likely to be never-smokers than females and increasingly so with increased age. In the 1990 survey, males in the younger age groups who were born overseas (green line) were slightly more likely than an Australian-born male (blue line) to be a never-smoker. From the 25 to 34 year-old age group onwards in this survey, the gap narrowed and in the older groups, widened in the opposite direction. As a result, in the oldest groups, they were less likely to be a never-smoker but the difference was not significant. In each successive survey, the cross-over from more likely to less likely occurred later and later. By the 2005 survey, the odds of these two groups are very similar up to the 45 to 54 year-old group. Throughout the period covered by these surveys, the likelihood of a male, regardless of country of birth, being a never-smoker increased. Among females, there are two different patterns depending on country of birth. The odds of an Australian-born female (black line) being a never-smoker have become increasingly similar to those among males, especially Australian-born males (blue line). In all but the oldest age groups, females born overseas (red line) are more likely to be a never-smoker than Australian-born females. Although the gap is not always significant, it is widening with each successive survey and is significant for most age groups in the 2005 survey. It was noted above, that females became less likely to be never-smokers (that is, increasingly likely to have taken up smoking) in the period covered by these surveys. This interaction analysis indicates that the problem is more pronounced among Australian-born females than those born overseas.

As was found in the other smoking-status groups, there is no general income effect among never-smokers. Across all income quintiles, the odds of a member of the Managers and Professionals occupation group (black line) never having smoked are greater than those of a member of the Labourers and Plant Operators group (green line) and those of the two remaining groups are between the two. There is a steady trend among Labourers and Plant Operators for the odds of being a never-smoker to decrease as income increases.

5.3.4 Indications of model fit

Figure 5.3 shows the deviance residuals plots for the binary logistic models including the interaction factors. The plots indicate a particularly good fit in the case of the model comparing ex-smokers with people who have never quit smoking (that is, they are either current or never-smokers). The plots of the other two models show a close fit but not as close as the ex-smoker/others. There are also several outlying groups in these graphs, especially in the case of the model comparing people who have never taken up smoking with those who have.

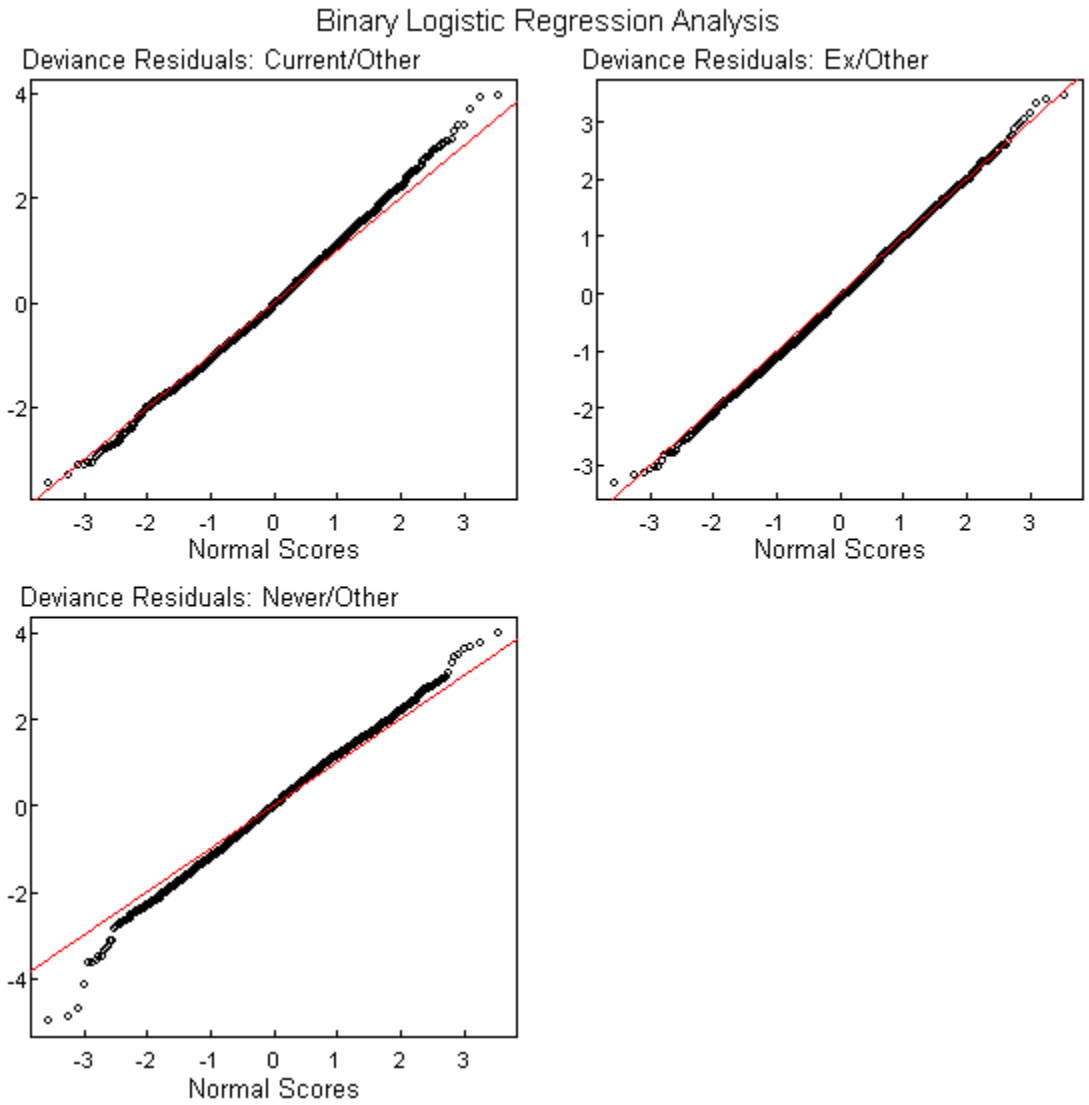


Figure 5.3. Deviance residual plots for three binary logistic regression models

When these groups were identified, it was found that they represented unusual combinations of characteristics (for example, high status occupation and low income) that suggest these are aberrant groups and do not indicate a problem with the data or the models.

5.4 Multinomial logistic regression models

Two sets of multinomial models were fitted, comparing current smokers with those who have never smoked and ex-smokers with those who are still current smokers. The first two models are additive and show the main effects of the predictor variables on current- or ex-smoker status. The variables and the grouping of data is the same as those used in the binomial logistic regression described above. Figure 5.4 shows the plots of the odds ratios with their 95 percent confidence intervals for each of the independent or predictor variables. The odds are shown on a log scale. The reference category against which the other categories are compared in each case is indicated by the point on the zero (that is, an odds ratio of 1.0) line. As the numbers in each cell of the analysis are quite large, the confidence intervals are very narrow. The second set of models show the impact of the Demographic and Social interaction factors described above.

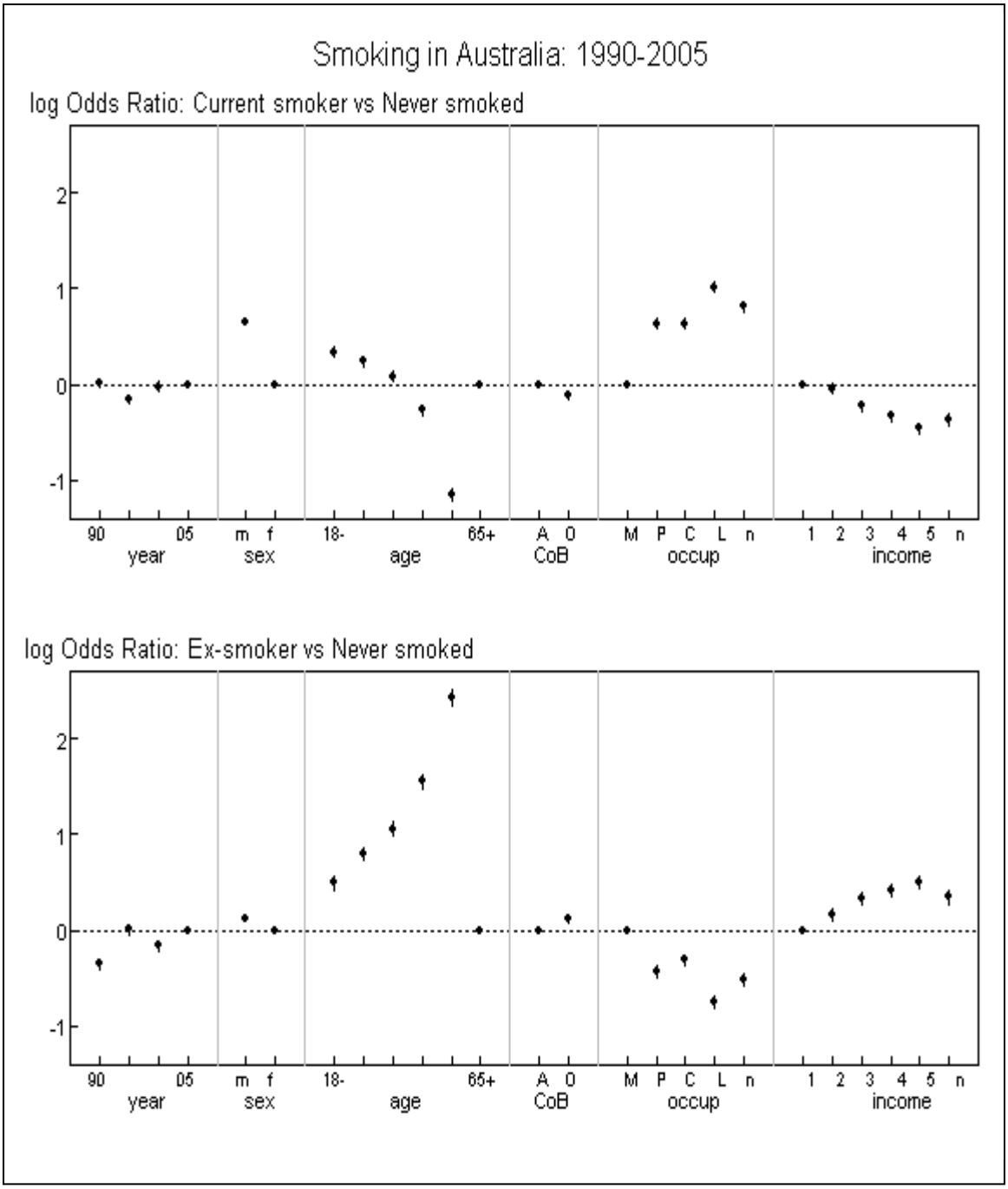


Figure 5.4. Odds ratios and confidence intervals for two multinomial logistic regression models.

5.4.1 Current smokers compared with never-smokers

The odds of being a current smoker compared with the odds of being a never-smoker in the 1995 survey are less than the odds in the other years by a significant amount. This is an exception, in the other three surveys, the odds are same, that is, the log of the odds ratios is zero in 2005, the reference year but also in 1990 and 2000. This indicates that the odds of being a current smoker have changed in the same direction and to the same extent as the odds of never having smoked. It further suggests that the changes, small though they were, in the odds of being a current smoker found in the binomial analysis above, are due to the fact that the odds of being an ex-smoker and those of being a never-smoker have changed in different ways. There is a difference in the pattern of changes in these two market segments in a period when they were both exposed to the same antismoking strategy. The odds of a male being a current smoker compared with being a never-smoker are very much bigger than the odds of a female being a smoker. Gender is a strong predictor of current smoking status compared with never having smoked. Once again, this odds ratio is significantly different from the one found in the binomial analysis, suggesting that the ratios comparing never-smokers and with ex-smokers are quite different. Combining the two groups obscures important differences between these two smoking-status segments.

The multinomial analysis shows a broadly similar age gradient to the one found in the binomial analysis. Respondents are increasingly less likely to be current smokers as age group increases. There are however, important differences between the two plots. In the binomial analysis, the odds of being a current smoker all age groups except the 55 to 64 year-old group are less than or equal to the odds in the 65 and over, reference group. The graph slopes downward and the gradient increases. Since the odds ratios are shown on a log scale, this indicates a very substantial decrease in likelihood as age group increases. Age group is a strong indicator of current smoker status in the binomial analysis. In the multinomial analysis, the odds of being a current smoker rather than never having smoked in the first two age groups are significantly greater than those in the 65 and over, reference group. The odds in the third group (35 to 44 years) are also greater than the reference group but by not as great a margin. The odds in the two remaining groups are

less than the odds in the oldest group and the odds in the 55 to 64 age group are much closer to a continuation of the trend in the younger groups. There is the same trend towards lower likelihood of being a current smoker rather than never having smoked but, especially among the younger age groups, the graph is shifted upwards and the gradient is much less steep, the odds are closer together. Once again, comparing the binomial and multinomial analyses suggests that combining never-smokers and ex-smokers obscures important differences between these two important segments. There appear to be different age effects in the two smoking status categories.

The multinomial analysis found a small but significant country of birth effect, similar to that found in the binomial analysis. The odds of a person born overseas being a current smoker are less than the odds of an Australian-born person being either a never-smoker or being in the combined never-smokers and ex-smokers category. Country of birth is an indicator of current smoking status indicating that there are important differences in smoking status between these two demographic segments. The clear occupation effect found in the binomial analysis was also found in the multinomial analysis. A decrease in the social status of the occupation group (that is, towards Labourers and Plant Operators) is associated with an increase in the odds of being a current smoker whether this is compared with the odds of never having smoked or with the odds of belonging in the combined non-smokers group. Occupation group can be a strong indicator of current smoking status (especially between occupations at either end of the social status scale) and can be used to segment the audience into more homogeneous groups. An income group gradient was also found in both analyses. There is a significant decrease in the odds of being a current smoker as income group increases, whether this is in comparison with being a never-smoker or a non-smoker (including ex-smokers). Income quartile is a predictor of current smoking status and can used to segment the audience for antismoking programs.

5.4.2 Ex-smokers compared with current smokers

This section compares the characteristics of people who have taken up smoking and then successfully quit with those who are continuing to smoke. This is the second model shown in Figure 5.4.

The multinomial analysis found the same pattern of increase, followed by decrease, followed by increase in the odds of being a current smoker in the period covered by the four surveys that was found in the binomial analysis. In the binomial analysis, the increase in odds between the 2000 and 2005 surveys was such that, in 2005, the odds of being an ex-smoker compared with the odds of being either a current smoker or never having smoked were greater than in any of the previous surveys. When compared with current smokers in the multinomial analysis, the odds in 2005 are the same as the odds in 1995. There was not the same level of improvement in the odds of being a successful ex-smoker. These findings, like those in the preliminary and the binary logistic regression analysis, indicate a lack of progress in achieving a sustained, significant increase in the odds of a person being a successful ex-smoker. The difference between the binomial and multinomial analyses also indicates that combining never-smokers and current smokers in the binomial analysis may obscure small but important differences between the two groups.

The multinomial analysis confirms that the odds of a male being an ex-smoker are much higher than the odds of a female being an ex-smoker. However, the multinomial found a much greater difference between the genders. The gap between male and female is much larger when comparing ex-smokers with current smokers (multinomial analysis) than it is when comparing ex-smokers with people who have never either taken up or given up smoking (binomial analysis). The differences between the binomial and multinomial analyses suggest that there are important differences between current smokers and never-smokers that are obscured by combining them in the binomial analysis. Both analyses confirm that gender is an indicator of likelihood of being an ex-smoker.

A positive age gradient among ex-smokers was found in both binomial and multinomial analyses; the odds of a person being an ex-smoker increase with increasing age-group, except in the oldest group (aged 65 or over) where the odds are the lowest of all. In the multinomial analysis (comparing ex-smokers and never smokers), the plot of the odds ratios covers a greater range and the gradient increases to a much greater extent. The odds in the second oldest group in the multinomial analysis (those aged 55 to 64) are also more consistent with a continuation of the trend seen in the younger groups rather than showing the abrupt and very large change of direction seen in the binomial analysis. Age group is a strong indicator of ex-smoking status in both the binomial and the multinomial analyses but is much stronger when compared with current smokes alone (the multinomial analysis) rather than with the combined group. The differences between the binomial and multinomial analyses once again indicate important differences in the age gradients in current and ex-smokers that can be used to segment the audience for antismoking programs.

The binomial analysis found no real difference in the odds of an Australian-born person being an ex-smoker compared with the odds of someone born overseas. The odds for the overseas person were slightly higher but the difference was not significant. The multinomial analysis found a clear difference; the odds of a person born overseas being an ex-smoker rather than a current smoker are significantly higher than those of an Australian-born person. Once again, comparison of the binomial and multinomial analyses suggests important differences in the country of birth effects between people who continue to smoke and those who have given it up that can be used to tailor antismoking programs to different segments in the audience. Another important difference between the binomial and multinomial analyses is occupation gradient. The binomial analysis found no clear occupation effect when comparing ex-smokers with the other smoking status groups. The multinomial analysis comparing ex-smokers with current smokers found a clear occupation group effect between the highest status occupations (Manager and Professional) and the lowest (Labourer and Plant Operator). Odds of members of the other two occupation groups (Paraprofessional and Tradesperson, and Clerical and Sales) are located between these two extremes. Occupation group is a strong indicator of ex-smoking status. The differences between the

binomial and multinomial analyses highlight important differences in occupation effects between current and ex-smokers.

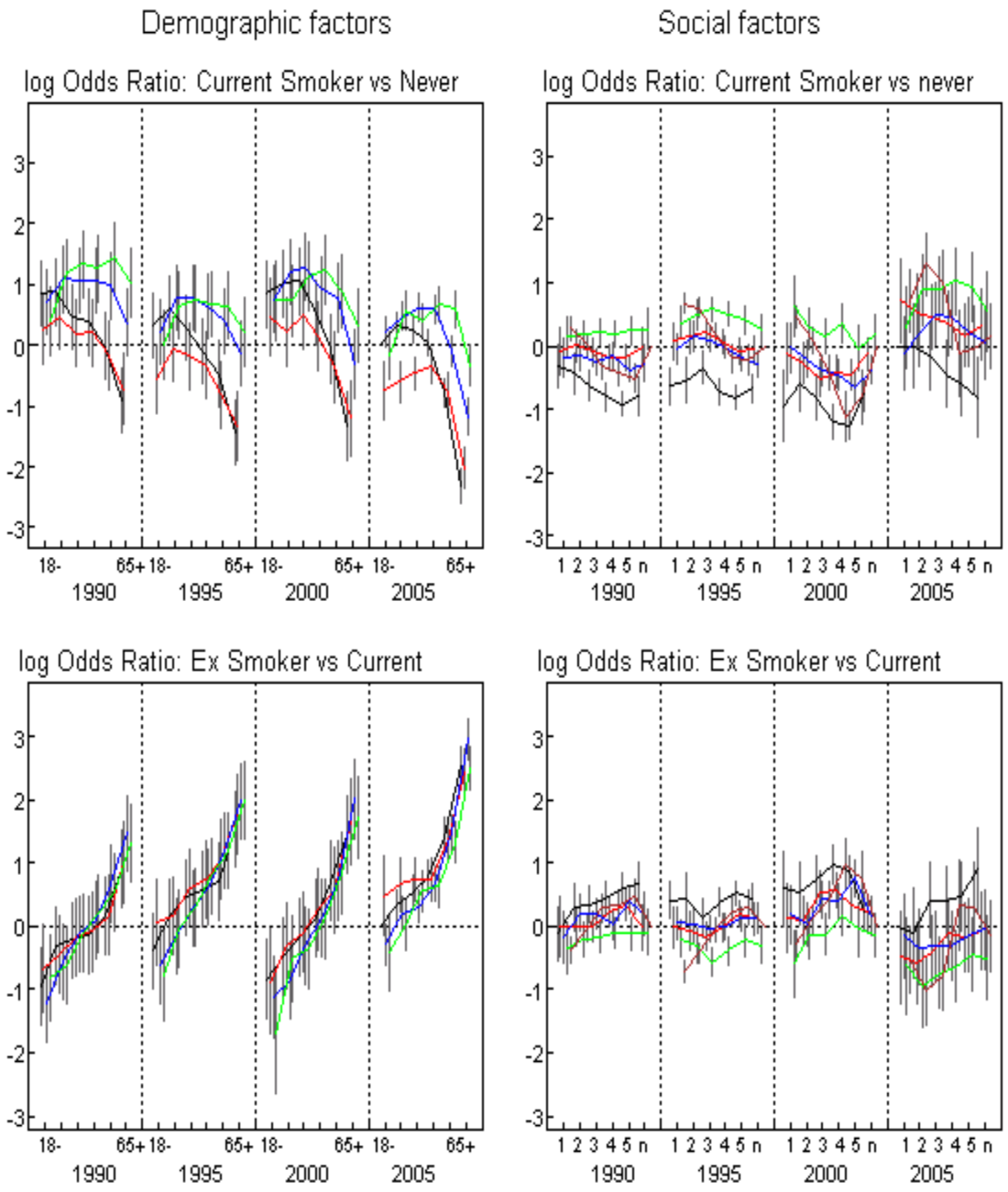
There is also a much clearer income effect when comparing ex- and current smokers in the multinomial analysis than there is when comparing ex-smokers with the combined group of current and never-smokers. The multinomial analysis found an increase in odds associated with an increase across the five income quintiles. Although the differences between adjacent quintiles is often not significant, the cumulative effect of these small increases is that odds of people in the fifth quintile (the highest income group) being ex-smokers rather than never-smokers are significantly higher than the odds among people in the lowest quintiles. Income quintile is a strong indicator of ex-smoking status and can be used to identify segments in the audience for antismoking programs.

5.5 Multinomial logistic regression models with interactions

Figure 5.5 shows the plots of the multinomial logistic regression models with the Demographic and Social interaction factors shown as main effects. The coding and layout is the same as those used in Figure 5.2.

Addition of the Demographic interaction factors makes clearer the difference between males and females regarding current smoker status compared with never having smoked. Older males are much more likely to be current smokers than never-smokers and much more likely to smoke than females. Females, regardless of country of birth, are very much less likely to be current smokers than never having smoked and much less likely than males whether born in Australia or overseas, to be a smoker. This pattern holds true across all four surveys but there is a general trend downwards in odds and the gaps between groups have narrowed. It was noted above, that smoking was traditionally a male habit but that recently, prevalence among young women has increased relative to prevalence among males, especially in Australia. This is reflected in two ways in these graphs. Firstly, the odds of a younger female being a current smoker are very similar to those of a male born in the same country. Secondly, with each successive survey, an

increasing gap appears between Australian-born females (black line) and females born outside Australia (red line). This is consistent with the findings discussed above, that females are now more likely to have taken up smoking compared with the odds in the past and compared with changes in odds among males. This analysis suggests that the problem is more widespread among Australian-born females than those born overseas.



Legend

Black = female, Aust-born	**Black** = Managers + Professionals
Red = female, o/s born	**Red** = Paraprofessionals +Trades
Blue = male, Aust-born	**Blue** = Clerical + Sales
Green = male, o/s born	**Green** = Labour + Plant Operators
	Brown = n.a.

Figure 5.5. Multinomial logistic models with two interactions specified as main effects

Addition of the Social interaction factors indicates that the income gradient found in the additive model above is not consistent across different occupation groups. In the 1990 survey, the gradient among managers and professionals (black line) is opposite to that among labourers and related occupations (green line), although the gradient among managers is much clearer than that among labourers. In subsequent surveys, the gradient among labourers becomes even less clear while that among managers reemerges quite clearly in the 2005 survey. In that survey, higher income is associated with lower odds of being a current smoker. In nearly all income groups and all surveys, managers have lower odds of being a current smoker than any other occupation group and this is especially true among the higher-income, possibly the more senior, managers and professionals. While a clear income gradient is not apparent in occupation groups other than the managers, the increasing occupation gradient is clear from the widening gaps between odds in each of the occupation groups. Labourers have consistently higher odds of being a smoker than the other occupation groups and as noted above, managers have lower odds.

The age gradient among ex-smokers compared with current smokers that was found in the additive model also appears in the interaction model. Addition of the Demographic interaction factor does not add any further information as there are no significant differences between the patterns of odds in either gender, regardless of country of birth. Addition of the Social interaction factors confirms the absence of a significant income gradient in the odds of being an ex-smoker compared with being a current smoker, except among managers and professionals (black line) in the 2005 survey even there, the

gradient is not a clear as it is when comparing current and never smokers. The occupation gradient found above also applies when comparing ex-smokers with current smokers; the odds of a member of the labourer and related occupation group (green line) are consistently below those of most other groups in all surveys and by an increasing margin with each successive survey.

5.5.1 Summary

Analysis of the data contained in the last four NHS does not support rejection of H_{01} (Smoking prevalence has remained unchanged in Australia between 1990 and 2005) as there has been a significant change in smoking prevalence in the community between the 1990 and 2005 surveys. Such a conclusion would give a false impression of the picture, though. There were two quite distinct patterns of change in this period; a significant decline in the prevalence of current smokers between the first two surveys and then no change for the remainder of the period surveyed. To present a more accurate picture of trends in this period, it is necessary to split H_{01} into two hypotheses:

> H_{011}: Smoking prevalence has remained unchanged in Australia between 1990 and 1995. and
>
> H_{012}: Smoking prevalence has remained unchanged in Australia between 1995 and 2005.

The data does not support H_{011} and it can be rejected. The data is consistent with H_{012} however, and it cannot be rejected. This pattern was first identified in the preliminary analysis and then supported in each of the following stages of data analysis. The data suggests that the period of steady decline in smoking prevalence in Australia that began soon after the Second World War may not have continued into the ten years between the 1995 and 2005 surveys. The data indicates that more recently, the objective of reducing smoking prevalence in Australia, and thereby the damage that cigarette smoking is doing to the community, is not being met.

The data does not support H_{02} (There is no difference in the pattern of smoking status in different segments of the Australian population) and it should be rejected. Preliminary data analysis identified clear differences between the smoking status of males and females. The logistic regression confirms the presence of clearly different segments in the audience for antismoking programs. It found differences between the genders and differences in smoking status across age groups, country of birth, occupation group and, to a lesser extent, income group. Each of these factors, singly or in combination with others, provides a strong indicator of the likelihood of belonging to one or other of the three smoking status groups. For example, males and workers in lower status occupations are more likely to be current smokers than those in higher status occupations.

Analysis of the data does not support H_{02} (There is no difference in the patterns of change in smoking status in different segments of the Australian population between 1990 and 2005) and it should be rejected. The analysis identified significantly different patterns of change in smoking behaviour during the period covered by the survey. Previously, there was a large difference in smoking prevalence among males and females. More recently, the gap has narrowed because the changes in smoking behaviour in the two genders have been different. The tendency for more young women, especially Australian-born women, to take up smoking is significant. It is a change in smoking-related behaviour in the opposite direction to that which must be achieved if the objective of a sustained reduction in smoking prevalence is to be met.

Chapter 6: Discussion and conclusions

6.1 Introduction

The analysis suggests that there has not been a thorough application of social marketing theory to the important community problem of tobacco smoking and that, as a result, the overall impact on smoking prevalence and the consequent avoidable damage to the community has not been as positive as it might have been. This is a case where there is clearly identified behaviour on the part of particular people which is having a proven, detrimental effect on the welfare not just of the smokers but the entire community. There is a clear need to influence this behaviour in two ways; current smokers need to be persuaded to quit and potential smokers need to be persuaded not to take it up. The evidence suggests that, as the application of social marketing methodology to this problem has not met Andreasen's benchmarks, the achievements have been less than optimal.

In the previous chapters, data from four large surveys were analysed to test whether there is evidence to support any or all of three hypotheses concerning changes in peoples' behaviour related to tobacco smoking and the findings were described. In this chapter, those findings are discussed and the conclusions relating to the hypotheses and the recommendations for social marketers are outlined.

Once again, this chapter follows the framework of Andreasen's recommendations for a true social marketing program. As described in Chapter 1, Andreasen identified three factors that distinguish social marketing:

1. It holds behaviour change as the "bottom line,"
2. It is fanatically customer-driven, and
3. It emphasises creating attractive exchanges that encourage behaviour. (Andreasen, 2002)

These three factors were expanded into six "benchmarks" that Andreasen suggests can be used to identify genuine social marketing approaches to influencing particular behaviour in the community:

1. Behaviour change is the benchmark used to design and evaluate interventions.
2. Projects consistently use audience research. The research had three roles: formative (when developing the intervention strategy), pretesting of an intervention, and monitoring the intervention's impact.
3. There is careful segmentation of target audiences.
4. The central element of any influence strategy is creating attractive and motivational exchanges.
5. The strategy attempts to use all four Ps in the traditional marketing mix.
6. Careful attention is paid to the competition faced by the desired behaviour. (Andreasen, 2002)

The antismoking campaign strategy discussed in this analysis diverges in several important ways from the principles recommended for the formulation and execution of a social marketing strategy to influence the voluntary behaviour in a way that will benefit not just the individual but also the community of which they are a part. The data indicates that the strategy may be having reduced success overall and has had a different influence on different segments of the community. In one important aspect (prevention of smoking initiation), it does not appear to have had as much impact as it has had in persuading current smokers to quit. There are also important differences between the changes in behaviour found in some groups and not, or to a lesser extent, in others.

6.2 Behaviour change is the benchmark

6.2.1 Smoking prevalence

The behaviour that is the target of the strategies considered here is tobacco smoking and the objective is a reduction in smoking prevalence. This will reduce the damage that is caused by tobacco smoking in the Australian community. The simplest measure of smoking prevalence is the percentage of the population that is currently smoking and this analysis indicates that the application of the standard fear-appeal campaign strategy has not been associated with continued decline in smoking prevalence over the fifteen year period covered by these surveys across the Australian community. Smoking prevalence had reached its maximum level in Australia around the end of the Second World War and had been in steady decline since then. Lopez *et al.* (1994) and many others plotted the trajectory of this change in smoking prevalence in Australia and a large number of other countries. The trajectory that Lopez describes for smoking prevalence is similar to the original, simple form of the Product Life Cycle model developed by Levitt (1965) and widely used by traditional marketers. According to both Lopez and the Product Life Cycle, all things being equal, smoking prevalence will continue to decline to an insignificant level in the near future. (Corrao *et al.*, 2000) added the proviso that smoking prevalence in any particular country will achieve and follow the decline trajectory only if the antismoking policy-makers adopt the strategies developed in the leading countries, that is countries including Australia that are in the final, Stage IV of the cycle. Estimates based on extrapolating several studies by Hill (including Hill, (1998)) support this forecast and suggest that smoking prevalence in Australia will follow the simple product life cycle and decline to zero in the next fifteen years.

The preliminary analysis indicated that smoking prevalence among people 18 years and over has not, over the last ten years at least, maintained this steady decline. There was a significant decline between the 1990 and 1995 surveys followed by no significant change between the remaining three surveys. Smoking prevalence stabilized at about 24 percent of the population, 18 years and over between the 1995 and 2005 surveys. Logistic

regression confirmed that there is no clear relationship between survey year and the odds of a person being a smoker compared with the odds of being in either of the other two smoking status categories. While the odds of being a current smoker were lower in 2005 than they were in 1990, they are higher than they were in 1995 and only lower than the 2000 odds by the smallest margin. When compared with the odds of being a never smoker, the odds of being a current smoker showed literally no change except for a small decrease in the 1995 survey which was undone in the two remaining surveys. Binary and multinomial models with interaction factors confirmed this overall lack of progress but indicated that there were groups where the odds had declined (for example, the odds of being a current smoker in all four gender and country of birth groups were generally lower in the 2005 survey than they were in the three previous surveys) and groups where they had actually increased (for example, in all occupation and income groups).

In this first measure of their achievements against the behaviour change "bottom line", the campaigns do not appear to be associated with a continued decline in smoking prevalence in the community in the period under examination. In fact, changing from steady decline to stability in smoking prevalence levels could be regarded as an undesirable change in behaviour compared with the objective of reducing smoking prevalence in Australia. As was shown in 2.10.1, maintained or worse, increased, levels of smoking prevalence in the community results in maintained (or increased) damage and loss to the community. As was also mentioned earlier, failure to curb smoking prevalence in Australia has consequences around the world as strategies employed in Australia and the other Stage IV countries are recommended to countries in earlier stages of the smoking trajectory.

Projecting future prevalence by extrapolating past levels alone ignores the underlying drivers of the level of smoking prevalence at any time and the possibility that smoking prevalence might exhibit a trajectory other than the simple Product Life Cycle. Depending on the interaction of the underlying drivers, the trajectory of smoking prevalence might resemble that of a cyclical product (growth followed by maturity followed by decline, then renewed growth, maturity, growth etc in a predictable cycle) or Levitt's alternative, "hypothetical" life cycle for a product that has renewed growth after

a period of maturity, thereby extending the life cycle many years beyond the simple, unimodal trajectory. This would be even worse than simply maintaining current smoking prevalence levels.

6.2.2 Smoking cessation

The percentage of the population who are smoking at any time is determined by the percentage of respondents who were smokers in the previous period, minus those who quit smoking plus those who took it up. While current prevalence data is readily available for many countries and historical data for fifty years or more in a large proportion of those countries, data on ex-smokers is not as widely available. Ex-smoker data in each of the surveys included here has been examined but the sort of historical data needed to put changes in the period 1990 to 2005 into a broader context (as was possible with current smoker data) was not. It is therefore not possible to compare changes in ex-smoker statistics with trends in previous years the way current smoker statistics and there is no ex-smoker equivalent of the Lopez model.

Preliminary analysis indicated that, between the four surveys, changes in the odds of person being an ex-smoker (that is, a person who previously took up smoking but has successfully quit the habit and is not a smoker at the time of the survey), have moved in the opposite direction to and largely explain any changes in the odds of being a current smoker – when the odds of being a smoker decreased, the odds of being an ex-smoker increased and when the odds of being a smoker were stable, the odds of being an ex-smoker were stable. Between the first two surveys and the last two, there is a significant increase in the odds of being an ex-smoker suggesting success at persuading smokers to give up smoking. This is especially true between the last two surveys and there is a very significant increase between the first (1990) and last (2005) surveys. Logistic regression indicates a more complex pattern. When compared with the odds of belonging to either of the other smoking status categories, the odds of being an ex-smoker first increased, then decreased and finally increased again. Overall, the odds in 2005 were higher than in any previous survey, but only by a small margin over the 1995 odds. When compared

with the odds of never having taken up smoking, the odds in 2005 were higher than in 1990 but almost exactly the same as the odds in 1995. Progress between the last two surveys only made up the ground lost between the two previous surveys. An increase in the odds of being an ex-smoker is a positive achievement in relation to the objective of changing smokers' behaviour in a way that contributes to a reduction in smoking prevalence. It indicates the real strength of this strategy, which is persuading smokers to quit. This is entirely consistent with the message strategy. When a person is shown in the ads, it is usually a smoker and the message focuses on the damage that "every cigarette" is doing to them. In alternative executions, the people shown are long-term smokers, suffering the consequences of a "lifetime of smoking." The Quit logo and a telephone number to get help are featured prominently in the ads.

Logistic regression models with interaction factors again indicate that this success was not even across all segments. Among the Demographic groups, there is a general increase in odds in the last survey compared with those before it in both binary and multinomial models but the increase is more pronounced when the odds of being an ex-smoker are compared with the odds of being a current smoker. Among the Social groups, the odds were generally lower in the last survey. The decline in the effectiveness of this strategy, despite increasingly graphic depictions of the damage may indicate the "inverted U" response or the wearing out of the message to the point where it is just an irritant, like a malfunctioning alarm (Hastings 2002).

6.2.3 Never smoked

The remaining smoking behaviour category, never-smokers, holds the other half of the answer to sustained decrease in smoking prevalence. Preliminary analysis indicated that the odds of a person never having smoked by the time of the survey remained virtually unchanged in the first three surveys and then decreased significantly in the last survey. A decrease in the odds of never smoking means an increase in the odds of taking it up and counteracts progress made encouraging smokers to quit. Logistic regression showed a less satisfactory pattern; there was an accelerating decline in the odds of being a never-

smoker in the period covered by these surveys. There was no significant change in the odds of being a never-smoker between the first two surveys followed by a small (not significant) decrease in the 2000 survey and then a significant decrease in the 2005. The cumulative effect of these decreases is that the odds of being a never-smoker in the 2005 survey are significantly lower than those in the previous three surveys. This suggests that not only is the campaign strategy not associated with lower rates of smoking initiation, the situation is getting worse. Adding interaction factors to the models indicated that the problem seems greatest among the Social groups. The data confirms that while the rates at which people take up smoking and successfully give it up are in balance, smoking prevalence will remain stable. The objective however, is not stability in smoking prevalence; it is a reduction in prevalence. Prevalence will only decline while cessation exceeds initiation. Any trend towards increased smoking initiation will undermine programs to lower smoking prevalence.

Again, this finding is consistent with the message strategy. It was shown above that most smoking initiation occurs in mid-teenage years and that very few people take up smoking after their twentieth birthday. As mentioned above, the people in the antismoking ads are usually much older than that and are suffering consequences that may be well over the horizon for younger people. The threats may not seem to apply to them, are not reflected in the people they see around them, especially their peers and increasing the intrusiveness and graphic nature of an irrelevant message might significantly undermine its impact. Furthermore, as mentioned above, repeated exposure to the message may have dulled its effectiveness.

These findings indicate that the current antismoking strategy is not measuring up to Andreasen's benchmark. In some segments, targeted behaviour change has been achieved, but overall, it has not. As explained above, the first hypothesis cannot be entirely rejected, there has not been a sustained, significant decline in smoking prevalence in Australia in the period covered by the four NHS surveys.

6.3 The use of audience research

Audience research has a number of roles in the process of developing, executing and evaluating a social marketing program such as this. The key is to understand and to focus on the audience. Andreasen's other phrase, to be "fanatically customer-driven," sums up the idea and reflects the customer focus developed in commercial marketing and adopted by social marketers, as explained in Chapter 2. Audience research is used to identify audience members, to describe their important characteristics, to quantify the size of the audience and above all, to identify important segments in the audience (see the next section on segmentation). An understanding of the audience's needs and their perspective is needed so that attractive exchanges can be created – see the discussion of exchanges below.

When looking at the background to social marketing, a *marketing* orientation was contrasted with the earlier *selling* orientation. A marketing orientation involves understanding the customer's perspective and identifying their important needs. The marketer then sets out to satisfy those needs by way of a mutually satisfying exchange between the marketer and the customer. A selling orientation however, aims to persuade the customer to buy a product, regardless of the customer's needs. If the customer's needs are considered by the seller at all, it is often only to find clues that can be used to manipulate the customer into buying the product. The focus is on the customer only in so far as they are the object to be manipulated to satisfy the seller's need for a sale. There are parallels between the selling orientation and the antismoking strategy discussed here.

The seller chooses what they believe to be the most powerful arguments they can muster to persuade the target to buy the product. The most powerful arguments are those which they judge will demonstrate the greatest superiority of the seller's product over the alternative. Arguments are selected primarily on the basis of their ability to "prove" this superiority, not necessarily on their relevance or importance to the buyer. In this case, the "product" is a behaviour change – if you are smoking already, then quit, if you have not started smoking, do not take it up. The argument in the antismoking advertisement has been selected from a medical (that is, the seller's) perspective and it provides a very

strong incentive to "buy" this product. The alternative is to experience unnecessary and very unpleasant morbidity and premature mortality – for both the target themselves and for the whole community. If the audience does not respond to the seller's message, the seller finds more powerful ways to communicate it. There is no recognition of the audience's perspective.

The message strategy must also be grounded in a research-based model of behaviour and behaviour change, the "science of behaviour change." (Lichtenstein, Biglan *et al.* 1990) Most of the models either in social marketing or in commercial marketing, discussed in Chapter 2 are hierarchical. They recognise that a person passes through several stages before adopting a particular behaviour. The models usually recommend appropriate strategies to persuade a person to proceed to the next stage. The antismoking strategy is the same for the entire audience, regardless of the stage they are at in the model. The data suggest that the strategy is much more appropriate and therefore effective, when addressed to smokers who are contemplating or are ready to quit and only need motivation to take the last, usually the hardest, step. The strongest, most persuasive messages are needed to help a smoker overcome the nicotine addiction described above. The relevance of the threats and the nature of the message are unlikely to be appropriate and effective for a teenager contemplating taking up smoking. Further research is recommended to identify the needs and the perspective of the various audiences for antismoking programs. The evidence indicates that while much research has been conducted (see Chapter 2), further research is needed to identify appropriate message strategies to reflect the needs of the target segment within the audience. Further research among ex- and never-smokers is recommended to better understand the origins of successes in persuading smokers to quit and the lack of success at persuading some potential smokers to refrain from taking it up.

6.4 Careful segmentation of the target audience

The data indicates that there are several clearly different segments in the target audience. The key factor differentiating the segments from one another is their different responses

to the same message strategy. In Andreasen's terms, the segments can be identified, after the event, by comparing differences in behaviour change in different groups in a period when they were all exposed to the same message strategy. There are many methods that could be used to identify the different groups but behavioural and demographic data (including both Demographic and Social variables) have been used here to illustrate the process. The following sections discuss the different factors that were found to provide suitable bases on which to segment the audience. This is the first step however. Once the characteristics of the segments have been identified, the segments can be prioritised and appropriate strategies tailored to appeal to them. The objective is to identify the appropriate language, concepts, imagery and themes to use in the communication that will reach the audience. The strategy must reflect, as much as possible, the audience's frame of reference rather than the sender's to increase the likelihood that the message will be interpreted or "decoded" in Schramm's terminology, in the way that the sender intended. The more accurately the message can be tailored to the target audience's frame of reference, the greater the chances of it influencing the target behaviour in the audience. Segmentation is also important when choosing the medium or channel to carry the message to the target audience. Most media have a particular segment as their primary target audience and tailor their programs to appeal to this group. Other groups will be less attracted to the particular medium and avoid watching, listening to or reading it, depending on the nature of the medium. If the communication is placed in the wrong medium, it will not reach the target audience and will not be able to influence their behaviour.

6.4.1 Smoking status

A behavioural basis on which to segment the audience is smoking status. The analysis discussed above showed how trends in the three smoking status groups were quite different in the three status groups despite the fact that the same message was directed at them all. Increases in the odds of being an ex-smoker in the period covered by these surveys indicate that some groups of smokers were persuaded to quit smoking. As mentioned above, addition of the interaction factors to the logistic regression models

enables segments within the ex-smoker status group to be identified. Similarly, the decrease in the odds of remaining a non-smoker indicate that the strategy that was associated with success in persuading smokers to quit was not as effective among potential smokers in persuading them to refrain from taking it up. Again, addition of the interaction factors to the logistic models enables differences between segments in the never-smokers to be identified and contrasted with those who have taken it up. These differences in effectiveness among the different segments suggest that different communication strategies need to be tailored to the needs of these different groups.

6.4.2 Gender

Gender was identified as an important differentiator in responses to antismoking campaigns. Gender is a reliable indicator of smoking status. The preliminary analysis identified different prevalences of current, ex- and never-smokers among males and females. Logistic regression confirmed that gender is a strong predictor of ex-smoker and never-smoker status. Females are significantly more likely to have never smoked than males and conversely, after taking it up, males are significantly more likely to quit, that is, to be an ex-smoker. The combined effect of these two factors is that gender is no longer as strong an indicator of current smoking that is was in the past. The preliminary analysis confirmed these differences in the trends in prevalences over time between the genders. The data suggests that, in addition to tailoring different messages to the different smoking status groups, the impact of tailoring message strategies for males and for females in some of these categories should be explored as the task is different in each case. Among males, the objective should be to reinforce quitting behaviour and among females, the objective should be to reverse the trend towards smoking initiation.

6.4.3 Age group

The research cited in Chapter 2 confirms that smoking initiation occurs before a person reaches the age of twenty. The data discussed here does not include any respondents

under the age of eighteen but the analysis is consistent with this proposition. There is no significant change in the odds of a person never having smoked in the first four age groups, that is those aged between 18 and 54. The cohort analysis also found no significant, consistent change in the prevalence of never-smokers as the cohort aged, except among the oldest cohort, where it was most marked as they entered the oldest age groups. A possible explanation for the increase in odds of being a never-smoker in the older age groups is that the early mortality that is one of the consequences of tobacco smoking has removed smokers from the sample, leaving only those who either never started or have successfully quit smoking. This is also consistent with the findings of Lopez, Doll and the epidemiologists that the damage done by nicotine lags thirty or more years after smoking initiation. This analysis suggests that cessation and prevention strategies should be segmented along age lines. The current cessation (Quit) strategy is appropriate for older audiences and prevention messages are appropriate for younger, especially young teenage audiences. A strategy tailored for either one of these segments is unlikely to be as effective with the other.

6.4.4 Country of birth

Country of birth is not a strong indicator of smoking status. Small differences were found, especially in the models that included the interactions, but they are not great. This might be a function of the data. It is possible that including all people born overseas into one category obscures important differences between people born in different countries. Further research is recommended to test whether smoking status is influenced by whether a person comes from a country with high or low smoking prevalence. Techniques for tailoring a strategy to work in a particular country of birth community are well established and might address particular problem groups where smoking prevalence is high.

6.4.5 Occupation group

The preliminary and the logistic regression analyses found a strong relationship between occupation group and smoking status. The odds of a person employed in a "blue collar" occupation such as labouring or machine operator being a current smoker are significantly higher than the odds of a person in a higher social status, "white collar" occupation. The gap is the widest between the two groups furthest apart on a notional social status scale, that is, professionals and managers compared with labourers and machine operators. Occupation is a strong predictor of current smoking status. Problem occupations (those with higher current smoking prevalence) can be readily identified and appropriate smoking cessation programs could be tailored to appeal to them.

Occupation is also a strong indicator of never having smoked. Further research is needed to determine whether this is just coincidence or to explain the connection between occupation and success in avoiding taking up smoking. Occupation is not an indicator of ex-smoker status.

6.4.6 Income group

In the preliminary analysis, data was grouped into equivalent income deciles, as it is in the NHS reports. To reduce the number of values and therefore, variables, the data was regrouped into quintiles for the logistic regression analysis. This change does not appear to have affected the analysis as important trends found in the preliminary analysis were also present in the logistic regression analysis.

Both the preliminary and the logistic regression analyses found that income is a strong indicator of current smoking status. There is a clear inverse relationship; as income increases, the odds of being a current smoker decrease. When the interaction between income and occupation group is included in the models, the gradient is quite different. In these models, there is the same pattern among the managers and the mid-ranking, paraprofessionals and tradespeople; odds are significantly lower among the managers

than among the paraprofessionals and they decline in both groups as income decreases. Among the remaining groups, labourers and clerical groups, there is no clear income gradient. These findings indicate that in general, occupation group is a more effective segmentation tool than income in Australia. In the case of managers and professionals, the model was improved by including both income and occupation.

6.4.7 Summary of segmentation issues

The analysis identified segments in the audience that are significantly different from each other with respect to their smoking behaviour. It was shown above that the current antismoking strategy has been associated with decreasing success in lowering smoking prevalence in Australia. In this section, it was also shown that success (or lack of it) has not been even across the population; there are important differences between trends in different segments. Smoking status, gender, age group and occupation were all identified as potential segmentation variables. Using all values of all these variables generates 180 possible segments. The next step should be to identify the most important ones and tailor a program for them. At the very least, there is a need to differentiate a cessation program aimed at encouraging smokers to quit from a prevention program encouraging never-smokers to avoid taking it up. The age analysis suggests that the prevention campaigns need to be tailored to younger people with a special focus on early- to mid-teenage. The cessation strategy should continue to focus on older people. Gender analysis suggests that smoking initiation is a more urgent problem among young women than among young men, so greater priority should be given to them when developing a program. Gender analysis also indicates that females are less likely to be ex-smokers. Further research is necessary to determine whether the current cessation strategy is appealing to females and how to bring quitting levels among females up to that among males. Occupation analysis indicates that cessation strategies should focus particularly on lower social status occupations as this is the area of greatest concentration of current smokers. If antismoking programs are to measure up to Andreasen's benchmarks, this type of attention must be paid to audience segmentation. At the moment, it is not.

6.5 Creation of attractive and motivational exchanges

6.5.1 Attractive exchanges

This benchmark begins to draw on the insights gained in the ones that precede it. Andreasen's earlier benchmark, "fanatically customer-driven" indicates that the audience will engage in exchanges that are attractive *from their perspective*. The nature of the exchange was discussed in Chapter 2 but the key factor here is the need to understand the audience's needs rather than attempting to impose a change that the marketer knows is "in the best interests of the customer." This latter approach is referred to as a selling orientation not the marketing orientation recommended by Andreasen. The exchange will be attractive to the customer if, according to their estimation, it offers good value, again, as explained in Chapter 2. That is, the sum of the perceived benefits outweighs the sum of the perceived costs. The antismoking strategy discussed here does not address the problem of exchange. The message is a simple, medical one: "We know what is best for you because we are doctors. Do not smoke because this will happen to you." While the benefits are possibly clear to an observer (especially a medically trained one), more research is needed to understand the target audiences' perceptions of this exchange. The consumer behaviour, communication and health behaviour models described in Chapter 2 provide guidance on how the stimulus contained in an antismoking program is likely to be interpreted by the target audience and the likely impact on their smoking behaviour.

The segmentation analysis indicates that there are three different sorts of exchange being promoted. Asking an addicted smoker to give up smoking is quite a different matter from asking a person who has never smoked to continue to not smoke and different from asking a person who has successfully quit smoking to continue to not smoke. There is a much greater cost to the smoker than there is to the non-smoker and to the never-smoker. In marketing terms, one is being asked to change their behaviour in a dramatic way. The others are being reinforced in their current behaviour. It is unlikely that the benefits will be perceived in the same way and be equally attractive to all groups. The segmentation analysis also indicates the presence of groups who are likely to have quite different

frames of reference (see Chapter 2) and who are therefore very likely to decode (interpret) the antismoking message differently. Different interpretations make it unlikely that the message will be equally effective across the segments. Analysis of the NHS data suggests that different segments are evaluating the message in a different way and they do not all find it equally attractive.

Chapter 2 includes a description of the various models marketers, including social marketers, use to identify the factors that influence behaviour and to understand their impact. Models such as those of Ajzen, Fishbein and others indicate that behaviour is, in part, influenced by *attitude towards the behaviour* and that attitude is influenced by an evaluation of the consequences of the action. If the consequences are attractive, this motivates action. The other models discussed in Chapter 2 all include some sort of evaluation of consequences leading to an attitude which, in turn, influences behaviour. The characteristics of the individual impact on this process in two ways, the gathering and the processing of information. In many cases, the characteristics of the person will influence the information sources or communication channels that they consult when gathering the information needed to decide whether to act or not. The segmentation analysis suggests that different segments might consult different sources and give them different weighting in their evaluations. Furthermore, as mentioned above, individuals with different characteristics may well interpret or evaluate the same consequences in quite different ways, so a consequence that is attractive to one is irrelevant or even unattractive to another.

Assael (1995) lists four limitations on the use of these models, including: "A model may vary among individuals in the same market." In other words, it is important to segment the target audience because, as the NHS data shows, different segments make quite different evaluations of the same information and may respond in quite different ways.

6.5.2 Motivational exchanges

The objective of social marketing programs is to motivate behaviour of a particular sort. Most of the current behaviour models discussed in Chapter 2 include an affective stage (attractive) and a behavioural stage (motivation, action or behaviour change). Motivation refers to the process of converting thought into action. Maslow suggested that motivation originates from the need to satisfy a particular need. He states that these needs are common to all humans and they act in a predetermined hierarchy. Maslow's model can be used to segment an audience according to their unsatisfied needs and to develop an appropriate strategy to link the product with the appropriate need. The "don't smoke, it is bad for you" message appeals directly to the audience's need for safety. If the audience feels safe from this particular threat, Maslow's model suggests, the audience will not be motivated to take action to deal with it. The NHS data suggests that some segments in the audience have not been convinced that the threat to their safety is such that they need to take action, while others have been convinced and have quit smoking. The persuasive communication models and models of behaviour change discussed in the Literature Review incorporate stages where attitudes are converted into action. For example integrated models such as those by Lavidge and Steiner and by Rossiter and Bellman all show the consumer passing through information-processing and behavioural stages as knowledge becomes attitude or preference, which in turn, leads to action. Hall's Perception/Experience/Memory model shows how people might process communication and experience to influence future behaviour. In all of these models, important steps take place inside the consumer's psyche and are influenced by the consumer's characteristics and accumulated knowledge and experience. Differences in audience characteristics will lead to different results from this processing and consequent behaviour. Analysis of the NHS data suggests that these models must be taken into account when developing antismoking programs.

In the social marketing context, models such as Prochaska's Transtheoretical Model show that a person passes through a sequence of stages covering the period from before they are ready to change their behaviour, through to making the change. The Health Belief Model also examines how individuals process information. In each case, differences

between individuals result in differences in the outcomes of this processing. At different stages in the model, the individual also needs different sorts of stimuli. A campaign to bring about positive changes in behaviour needs to take into account individual differences and differences in stages within the model. The NHS data indicates that one segment, potential smokers, have reacted in a very different way to antismoking messages when compared to another segment, smokers, who are at different stage in the process and whose needs are quite different. Other analysis also shows how different segments based on gender or occupation group have responded differently. Once the different segments have been identified, further research is needed to identify the appropriate communication strategy to motivate the desirable behaviour change.

A common motivation strategy is a fear appeal of the type used in the antismoking commercial. The motivation for not smoking is to avoid the very unpleasant health consequences of tobacco smoking. As explained above, the precise relationship between the level of fear aroused and the effectiveness of the message is not resolved, each successive version of the antismoking campaign is designed to arouse increased levels of fear. The Health Belief Model (HBM) uses logic that is similar to the fear appeal, stating that "individuals will take action to ward off . . . ill-health." The fear appeal and HBM models describe processes within the person involved and the HBM specifies four conditions that must be met for the model to apply. All the conditions refer to the individual's evaluation of such issues as "that they are susceptible to the condition." Different characteristics could result in different evaluations of susceptibility to a particular condition and the relevance of a particular threat. The NHS data demonstrate that different segments make quite different evaluations of the relevance of the threat of smoking-related illness to them and therefore, the need to change their behaviour to avoid it.

The data shows that the same fear-arousing message has been associated with quite different changes in different groups. Many smokers have been persuaded to quit smoking but fewer young women have been persuaded to refrain from taking up smoking. The segmentation data segment the target audience into groups with quite different characteristics. Further developmental research is needed among these groups

to understand their evaluation of the antismoking message and to develop appropriate message strategies for the most important segments.

Finally, there is the motivational power of the message itself. The impact of fear-appeal messages and the effect of changing the level of fear aroused was discussed above. The decrease in the rate at which smoking prevalence is declining suggests that the effectiveness of this message strategy across the board might be waning. The analysis indicates that it may well be effective in particular segments (male smokers, for example) and less effective in others (female never-smokers, for example). Further research is needed to tailor appropriate antismoking programs to achieve specific objectives in specific segments.

6.5.3 Summary of exchange issues

The antismoking programs discussed here do not properly address the exchange being proposed to the audience (see the discussion below for the "costs" aspects of the exchange). Different sorts of exchanges are proposed. One group is being asked to quit smoking and in return, there is the promise of better health in the future than would have been the case if the person continued to smoke. The same message is addressed to other groups who are being asked to remain non-smokers. There appears to be no recognition of how the audiences evaluate this benefit, that is, how attractive and motivating it is. It seems that, where it is judged to be less effective, the response is to increase the intensity of the message not a review of the strategy.

6.6 Attempts to use all four Ps of the traditional marketing mix

The first step when developing a marketing strategy is to determine the objectives to be achieved by the strategy. Andreasen states that a social marketing strategy must have as its objective, a specific behaviour change. In this case, the change is a reduction in smoking prevalence which will result in a reduction in the smoking-related damage

suffered by the community. The elements of the marketing mix are then developed to achieve this objective. As was explained in Chapter 2, there are difficulties in directly applying McCarthy's four Ps (Product, Price, Place and Promotion) from the traditional to the social marketing situation. Promotion, the communication element in the mix, is the most readily applicable. The key elements in a marketing communication strategy are the definition of the target audience, that is, the people whose behaviour is to be influenced. The target audience is broken into segments and each segment is addressed with a tailored communication messages. As explained above, this message strategy is likely to be more effective the more it is based on an understanding of the needs of the target audience and the important characteristics that will influence how they decode the message and react to it.

The analysis discussed above shows how differently segments can respond to the same message. The next step is to identify the communication media that will carry the message to the target audience and ensure that it reaches them. Most main media channels regularly publish the demographic characteristics of their audiences (this data is gathered as part of the ratings system which monitors audience viewing practices). The media plan can be developed that best matches the demographic characteristics of the target audience. Again, identifying segments more precisely will minimise the wastage incurred when the message is exposed to the wrong audience.

Analysis of the NHS data and observation in the community suggest that some aspects of the apparent communications strategy have been effective. The data indicates that the programs have been associated with sustained levels of smoking cessation, especially among males. It was noted above how the message strategy may be more appropriate to this group. The media strategy is also appropriate. Smokers are exposed to the message at the most appropriate times in a cost effective way. The messages are carried on posters and are repeated in some form, everywhere that cigarettes are sold. This ensures maximum reach into the target audience with little wastage of reach into audiences not affected by the message. Part of the social marketing environment (see Figure 2.10) complements the social marketing program as legislative initiatives ensure that the messages are also carried in very graphic form on both sides of the cigarette packet, so

the smoker is exposed to the message every time they handle a cigarette packet. The same level of exposure is not possible among non-smokers. They are less likely to buy or handle cigarettes and therefore less likely to encounter the message. Non-smokers and smokers alike are exposed to the messages when they are carried in the mass media, including television and outdoor or transit advertising. This is can be a wasteful strategy in that it reaches a large number of people who are not in the target audience and it reaches every member of the audience with the same message, not necessarily one tailored specifically for them.

6.6.1 Product

The product, the bundle of benefits that the customer purchases from the marketer in the traditional marketing exchange is difficult to identify in the social marketing situation. Obviously, the "customer" does not receive a tangible product manufactured by the marketer nor does the marketer perform a service for the "customer" in exchange for payment. In social marketing literature, the product is often defined as the behaviour change that the social marketer has influenced, such as a reduction in smoking prevalence. In that case however, it is the customer who has made the product; they have changed their behaviour. The customer does not receive the benefit from the marketer, the benefits of better health come from the customer's own efforts. Furthermore, the community, including those who have not changed their behaviour, also receive benefits in terms of a reduction in the costs that smoking inflicts on the community. These community benefits are not directly made by the marketer either, they are the result of a change in behaviour on the part of a member of the community itself. In the case of antismoking strategies, it may be necessary to differentiate between the group who receive the benefit delivered by the marketer's efforts (the community, including smokers and non-smokers) and the target audience for the social marketing program; the group whose behaviour is to be influenced. Then the product acquired by the community is the reduced smoking-related costs imposed on that community.

However, social marketing aims to bring about exchanges, so what benefit is the target market receiving to motivate an exchange? As explained above, the benefit is the promise of better health in future than would have been experienced if the person continues to smoke. As also discussed in section 2.6, the exchange is driven by the customer's evaluation of the product. The antismoking strategy discussed in this thesis shows no signs of recognising the different evaluations likely to be placed on the promised health benefit by a young person contemplating taking up smoking and an older, addicted smoker who is contemplating quitting.

6.6.2 Price

In traditional marketing terminology, the price of the product is the customer's evaluation of the sum of things of value that the customer parts with to acquire the bundle of benefits called the product. It is important to note that the amount of money that flows to the marketer (in most contexts, this is the price) is only one component in the price from the customer's perspective (the customer is more likely to be looking at the "full cost" to them of acquiring the benefits) but it is usually the only component that the marketer directly manipulates in their strategy. The NHS data suggests that different segments are reaching different evaluations of the balance between benefits and costs associated with smoking or not smoking and are reacting in different ways. Further research among the segments in the target audience is needed to identify the costs of not smoking from the target audience's perspective so that a clearer appreciation of the exchange can be developed. It is unlikely that an addicted smoker evaluates the cost to themselves of quitting in the same way that a ex-smoker evaluates the cost of remaining a non-smoker and that these two will reach a different evaluation from a young person contemplating taking up smoking. The analysis also indicates other segments who are evaluating the benefits of not smoking in different ways.

The cost or the benefits forgone when a person does not smoke can be considered as one aspect of the competition the antismoking program faces in attempting to reduce smoking prevalence in the community. This concept is developed further in section 6.7.

6.6.3 Place

The difficulty of directly applying McCarthy's Place or Distribution marketing mix element to the social marketing situation was discussed in sections 1.7 and 2.7. In commercial or traditional marketing, place refers to the process by which the product is made available to the customer so that they can acquire and consume it. There is no obvious process by which the marketer makes the product (the smoking-related cost savings) available to the community. The benefits (that is, the product) are delivered to the community by the person who refrains from taking up smoking or who quits. In social marketing terminology, this is the target audience, not the marketer. The communication strategy (promotion) distributes the antismoking message among the target audience, not the product. There does not seem to be any clear way for an antismoking campaign to meet this Andreasen benchmark.

6.6.4 Communication

Analysis of the data suggests that the current communication strategy is not associated with success in changing smoking behaviour across the board. The need to segment the audience and to tailor appropriate messages for each segment has been raised above.

The first step is to identify the appropriate frames of reference for each target segment so that a more effective message strategy can be developed. Understanding the frame of reference will help social marketing program developers to more accurately identify appropriate message strategies that will be more relevant and more effective with each target segment. It will also ensure that the message is communicated using appropriate language. Identifying key characteristics of the target segments will assist in developing an appropriate media selection strategy to ensure that the message reaches the audience with optimum efficiency. Research will also confirm the target segment's "position" in relation to models of behaviour change and persuasive communication. This will underpin the development of an appropriate message strategy to influence behaviour in

the desired direction. Specifically, the data suggests that the policy of relying entirely on a fear appeal communication strategy, and increasing the graphic nature of the threat, for all target audienes should be reconsidered and alternative appeals explored for some target segments.

6.6.5 Summary of marketing mix elements

The difficulties associated with applying the Place element in McCarthy's marketing mix in the social marketing situation has been recognised but analysis of the antismoking program discussed in this thesis suggests that the remaining elements of the mix have not been used in the ways that Andreasen recommends. Aspects of communication methodologies (the Promotion element) have been well used and appear to be associated with success in one or more specific segments. This is particularly true of smokers, especially male smokers. The data suggests though, that the same level of success has not been achieved in the other segments studied. The analysis suggests that inadequate consideration has been given to the product and price elements in particular. Further research and development is needed if antismoking programs are to measure up to this benchmark.

6.7 Careful attention is paid to the competition faced by the desired behaviour.

Competition in this context is any element in the marketing environment that represents a barrier to the successful achievement of the marketer's objectives. As discussed in Chapter 2, it is essential to identify all the elements in the marketing environment that will help or hinder the success of the marketer's strategy. In marketing terms, competition refers to any other way of satisfying the customer's need instead of the marketer's product. It is not limited to other brands of the same product class but includes all potential marketing exchanges that would result in the customer's needs being met. Identification of the competition therefore starts with identification of the needs that the customer is actually satisfying with the purchase of the product under

consideration. For example, a person might be a smoker because it gives them a sense of belonging to their peer group, or for the physiological effects of the nicotine, or to avoid withdrawal or some other reason altogether or a combination of reasons. These benefits are in direct competition with the antismoking campaign as they are alternative messages that will undermine the antismoking marketer's strategy. This is because if the target audience regards the benefits as more important or valuable than the health benefit promised by the social marketer, the target audience will take up or continue to smoke. Alternatively, a person might not give up smoking because they are convinced that their addiction is too strong (see 2.10.8). This implies a need for a very powerful intervention, persuading the person to enlist the help of QuitLine counsellors for example, which would be quite inappropriate for a young person contemplating taking up smoking. The social marketing program is unlikely to succeed unless it can directly counter the competition that is relevant for each target segment.

The first step is to identify the various competitors from the perspectives of the people in the various segments. One, standard strategy is rarely equally effective against all competitors, (one size does not fit all) so an appropriate antismoking strategy must be developed to deal with each of the competitors. The only way to overcome the competition is to either offer the same benefits without cigarette smoking or identify a benefit that is more "valuable" to the target audience. The task then is to convince the audience that they can achieve these benefits without smoking. In this way, a social marketer would be creating stronger competition for smoking, providing the target audience with alternative means to achieve smoking's perceived benefits. The NHS data demonstrates that different segments are evaluating different competitors according to their own criteria and responding accordingly. Further research in each of these segments is needed to identify the relevant competition so that an appropriate counter-strategy can be developed. To use a sporting analogy, an overall strategy needs to be defined and then modified to suit the particular situation, that is, the particular competitor on the day and the particular conditions (the environment) in which the game is being played.

6.8 Conclusion

Tobacco smoking in Australia continues to inflict a great cost to the community in the form of avoidable morbidity and unnecessary, early mortality. Because the damage that smoking does lags as much as thirty years after the smoker takes up the habit, it will continue to cause damage long after it is eradicated from the community. It is urgent therefore, that smoking is reduced or even eliminated from the Australian community as quickly as possible. This means continuing to encourage smoking cessation and to attack smoking initiation. Analysis of data from the 1990, 1995, 2000 and 2005 NHS indicates that the steady decline in smoking prevalence that Australia has experienced since the end of the Second World War may not have continued into the last fifteen years. Despite forecasts of a continued decline and a maintenance of the previous campaign strategy of communicating the health-related consequences of tobacco smoking in increasingly graphic form, smoking prevalence appears to have stabilised at a little over twenty percent of the population aged eighteen and over in the period covered by these surveys. Further analysis suggests that while the strategy continues to be successful at helping some smokers quit the habit, it has not been so successful at helping young people avoid taking it up. To a certain extent, smokers who successfully quit are being replaced by new people taking up the habit, leaving overall smoking prevalence relatively unchanged. These overall findings however, conceal important differences in the changes in smoking behaviour in particular segments of the community. When the target audience is divided into segments on the basis of smoking status (current smoker, ex-smoker or never-smoker), gender, age, country of birth, occupation or income, important differences are revealed in changes in smoking behaviour during a period when essentially the same antismoking strategy has been aimed at all segments. Some groups have shown a steady decrease in the odds of being a current smoker and an increase in the odds of being an ex-smoker (someone who was a smoker but who has successfully quit). Others have shown an increase in the odds of being a current smoker or no change, a decrease or changes in different directions between surveys. The same applies to the other smoking category groups; ex-smokers and never-smokers.

The analysis suggests that these uneven results might be due to incomplete attention being paid to Andreasen's six benchmarks that distinguish a social marketing program. The first hypothesis tested (that smoking prevalence has remained unchanged in Australia since 1990) relates to the first benchmark; behaviour change is the objective, the "bottom line." The analysis revealed that while there was a significant decrease in current smoking prevalence in Australia between 1990 and 2005, this obscures the fact that all the change occurred between the 1990 and 1995 surveys and no significant change occurred after that.

The two remaining hypotheses (that there are no differences in the patterns of smoking status or changes in those patterns in different segments of the Australian population since 1990) relate to Andreasen's benchmarks indicating the need to properly research the audience, segment it into appropriate groups and develop appropriate programs tailored to the needs of each group. The analysis found that there are different patterns of smoking status in different groups and that the various segmentation bases listed above can provide strong indicators of smoking status in some groups. The analysis also found that the prevalence of the three smoking status categories has changed in different directions and to different extents in different segments. Neither of these null hypotheses is supported by the data.

The analysis also found that the antismoking program does not consistently measure up to the remaining benchmarks either.

It is recommended that close attention should be paid to Andreasen's benchmarks. Further research should be completed to better understand the needs and perspectives of the segments identified in this analysis and that appropriate programs be developed that will include consideration of at least three of the four Ps (product, price and promotion), and competitors and other helpful or threatening factors in the marketing environment to create exchanges that are attractive and motivating to the target audience and result in the desired behaviour change; a reduction in smoking prevalence in Australia.

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