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Investigating the role of cultural and material influences in the persistence of socio-economic inequalities in smoking in England

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Abstract

Background and aims

Differential consumption patterns in health related behaviours such as smoking and drinking play an important role in contributing to health inequalities. It is therefore important to understand the underlying mechanisms that contribute to these behaviours, in order to reduce social inequalities in health. Since the early 1970's, there has been a dramatic reduction in smoking in the UK and a noticeable decline in alcohol consumption from 2008, however, social inequalities in smoking and drinking have widened, with smoking and heavy drinking disproportionately concentrated amongst adults in the most disadvantaged socio-economic groups. Existing research on the relationship between SEP and smoking and drinking in the UK has tended to use SEP as a generic or interchangeable measure and has not investigated the different mechanisms that underlie different measures of SEP. This project was designed to address this gap in the literature through two specific aims. These were, a) to provide sociological explanations about long-term trends in the social patterning of smoking behaviour, and b) to determine how far social inequalities in drinking behaviour are similar to or distinctive from social inequalities in smoking behaviour.

Methods

These aims were examined through analysis of data from the General Household and General Lifestyle Surveys from 1973 to 2011. The relationship between smoking and drinking and three socio-economic indicators (education level, occupation, equivalized household income) was analysed to assess the relative explanatory power of cultural and material explanations for the different elements of smoking and drinking behaviour.

Results

The results found that when all socio-economic indicators were mutually adjusted, education appeared to have the strongest relationship with most smoking outcomes, whilst income appeared to have the strongest relationship with most drinking outcomes. The results for whether the gaps between the lowest and highest socio-economic groups strengthened or weakened over time for smoking and drinking behaviour was mixed.

Discussion

The findings suggest that cultural factors appeared to have the strongest influence on smoking behaviours whilst material factors appeared to have the strongest influence on drinking behaviours. These findings can help inform the wider debate about social inequalities in health and the relative influences of consumption-related factors such as smoking and drinking.

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Chapter 1: Introduction

1.1   Social inequalities in health

The UK has one of the highest levels of social inequalities in health amongst high-income countries and yet despite commitments by the UK government to prioritise and reduce inequalities since 1997, evidence suggests that interventions have had a limited effect (Bambra, 2012) and that health inequalities have continued to widen (Mackenbach, 2011). Health inequalities are systematic differences in health and longevity, whereby people in different socio-economic groups experience differences in health, disease and premature death. For example, in England, people who live in the poorest neighbourhoods will die, on average, seven years earlier than those who live in the richest neighbourhoods, whilst people who live in poorer neighbourhoods have a greater risk of living with a disability, with an average difference in disability-free life expectancy of 17 years (Marmot, 2010). Health inequalities are important because they are socially produced and therefore are considered to be avoidable, unfair and generally unacceptable (Whitehead & Dahlgren, 2007). In high-income societies such as the UK, the opportunity to live a long and healthy life is extremely unequal with those who have less access to social and economic resources at a greater risk of experiencing poor health and premature mortality compared to those higher up the social scale (Graham, 2007).

According to Graham (2004), social inequalities in health can be defined in three different ways and can be situated along a continuum. At one end are 'health disadvantages' which capture the health status of a group defined as 'poor', where some social groups are worse off than others. At the mid-point are the 'health gaps', which exist between the poor health of the poorer groups relative to the health of other more affluent groups. Further along the continuum is the 'health gradient' where health status runs from the poorest groups through to the most affluent groups and is related to a person's position in the social hierarchy.

In the UK, health inequalities tend to be measured using mortality rates or life expectancy, with indicators such as income, education and occupation used as proxies for a person's socio-economic position. However, there are many different ways to measure a person's social position including 'social class', 'social status' and 'socio-economic status'. Although these terms are often used interchangeably in the literature, they reflect different concepts and are historically situated within different theoretical bases.

'Socio-economic position' (SEP) is a commonly used term in health research and is used throughout this thesis to refer to the social and economic factors that influence what position(s) individuals or groups hold within the structure of a society (Krieger, et al., 1997; Lynch & Kaplan, 2000). The association

between socio-economic position and health status is well established in the UK, with a wealth of empirical studies documenting the differences in mortality and morbidity between different socio-economic groups. Since the 19th century, life expectancy in England and Wales has significantly increased (see Figure 1.1) for both men and women, mainly due to the decline and relative disappearance of infectious diseases but also due to improvements in living conditions, nutrition and advances in public health and hygiene (Graham, 2007). For men born in 1920, life expectancy at birth was 55 years, whilst for women it was 59 years. Throughout the 20th century life expectancy has continued to increase and by 2012 life expectancy at birth was 79 years for men and 82.8 years for women.
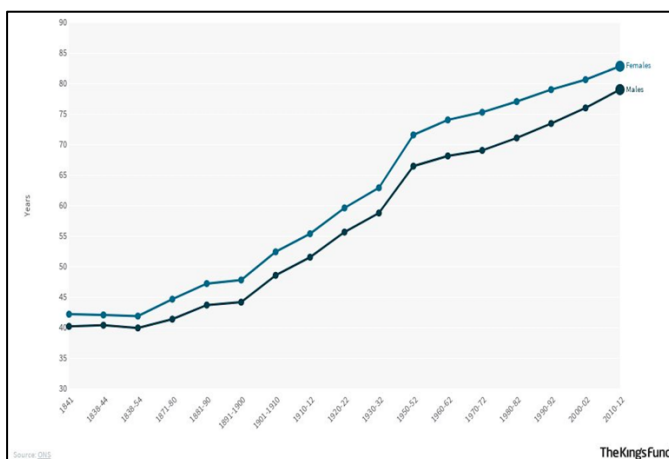
Figure 1.1: Life expectancy at birth in England and Wales by gender, 1841-2012.
Figure taken from The Kings Fund (Raleigh, 2020).

However, since 2011, the increase in life expectancy in England has slowed (see Figure 1.2), with more recent evidence suggesting that it stalled between 2014 - 2018 (Marshall, et al., 2019) before increasing in 2019 and then falling in 2020 during the COVID-19 pandemic.
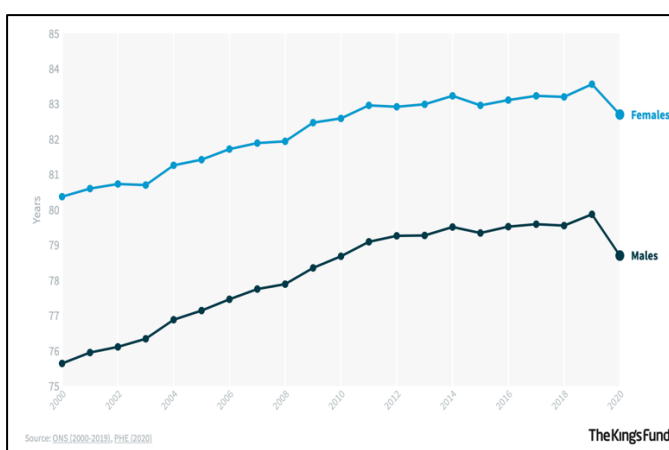
Figure 1.2: Life expectancy at birth in England by gender, 2000-2020.
Figure taken from The Kings Fund (Raleigh, 2020).

Although life expectancy has generally increased, at least until 2019, the increase has been greater for those in the most advantaged socio-economic groups (Marshall, et al., 2019). Consequently, this has

resulted in an increase in health inequalities and a widening of the gap between the most disadvantaged and the least disadvantaged socio-economic groups. For example, life expectancy at birth, in England and Wales, in 1982-86 was 71.4 years for men and 77.8 years for women in routine and manual occupations compared to 74.9 years for men and 80 years for women in managerial and professional occupations. By 2007-2011, life expectancy at birth was 77.7 years for men and 81.4 years for women in routine and manual occupations compared to 81.5 years for men and 84.7 years for women in managerial and professional occupations. Across this period, life expectancy gaps between the highest and lowest occupational groups widened by 0.3 years for men and 1.1 years for women (ONS, 2015). Much of the inequality in life expectancy is due to greater mortality from heart and respiratory disease and lung cancer in the most disadvantaged socio-economic groups (Raleigh, 2020). Gender differences in life expectancy also exist between men and women and whilst women tend to live longer than men, mortality rates have fallen more quickly for men, since the 1970s, as a result of declines in smoking prevalence and mortality from cardiovascular diseases amongst men (Raleigh, 2020).

Social inequalities can also be found in long-term health conditions in England with those in the most disadvantaged socio-economic groups more likely to experience long-term health conditions and often at a greater level of severity than those in the least disadvantaged socio-economic groups. For example, people in the lowest occupational groups were reported to have a 60% higher prevalence of long-term health conditions with a 30% higher severity compared to those in the highest occupational groups, although prevalence and severity varied significantly depending on the condition (DH, 2012). Deprivation has also been found to be linked to a greater risk of having more than one long-term condition concurrently. For example, approximately 28% of people living in the most deprived areas of England were reported to have four or more conditions, compared to 16% living in the least-deprived areas. In addition, those living in the most deprived areas in England were more likely to have the same number of multiple conditions as those approximately 10 years older, who were living in the least-deprived areas (Stafford, et al., 2018). The increased prevalence and severity of long-term health conditions amongst the poorest not only affects their quality of life but can also affect their ability to work. This in turn can lead to loss of work and an increase in financial hardship, which further exacerbates social inequalities and can lead to further declines in health.

1.2   Explaining social inequalities in health

The Black Report in 1980, was generally considered to have been the catalyst that started the debate on health inequalities although since that time, an extensive literature has evolved which has sought to explain the relationship between SEP and health. A number of different explanations for social inequalities in health have been put forward in the literature over the last 40 years, however, the focus of this thesis is on two particular explanations and how they influence health-related behaviour and so these will be discussed here. The first explanation is the 'materialist' explanation which highlights the

direct effects of material circumstances on health by reducing the financial means by which a person can maintain or promote good health and longevity through a healthy diet, or participation in physical activities and sports. Material circumstances can also directly influence health through the adoption of risky health-related behaviours such as smoking, overeating and excessive drinking as a way of coping with the stresses associated with material deprivation (Mackenbach, 2019).

The second explanation is the 'cultural' explanation. There are at least three possible ways in which cultural factors can influence health-related behaviour and contribute to health inequalities. The first suggests that health-related behaviours and lifestyles are a way in which socio-economic groups can establish and reinforce 'social distinction' from other socio-economic groups. For example, those in more advantaged socio-economic groups may adopt healthy behaviours such as not smoking, a healthy diet, moderate alcohol consumption and physical activity as a means to preserve class position, which in turn is likely to promote good health and longevity, whereas less advantaged socio-economic groups are more likely to smoke, have an unhealthy diet, to drink heavily and to be less physically active (Bourdieu, 1984). Second, cultural influences may also work through the diffusion of innovative behaviour, whereby those in more advantaged socio-economic groups are quicker to adopt health promoting behaviours such as quitting smoking or taking up public health messages about healthier lifestyles, perhaps as a form of distinction, before those in less advantaged socio-economic groups (Pampel 2010, 2002). This is related to the previous mechanism because these innovative behaviours may be adopted as a form of social distinction. Finally, cultural influences can also work through social norms and social networks with people such as family members, friends and neighbours influencing the health-related behaviours of those around them. For example, binge or heavy drinking is associated with disadvantage and therefore this behaviour is more likely to be normalized amongst disadvantaged groups (Fone, et al., 2013). Consequently, higher rates of heavy drinking are likely to contribute to higher rates of alcohol-related harm to health amongst these groups.

The discussion thus far has highlighted the relationship between SEP and health-related behaviours and how this contributes to social inequalities in health. Figure 1.3 depicts a conceptual framework which situates the individual within a system of wider determinants and how these determinants influence the distribution of health within a society. This is a broad conceptual framework which is used to bring the discussion together thus far by highlighting the relationship between socio-economic determinants and health inequalities. This framework is refined in Chapters 2 and 3 to illustrate the more specific relationship between SEP and smoking and drinking behaviour and to show the main factors of interest in this project.
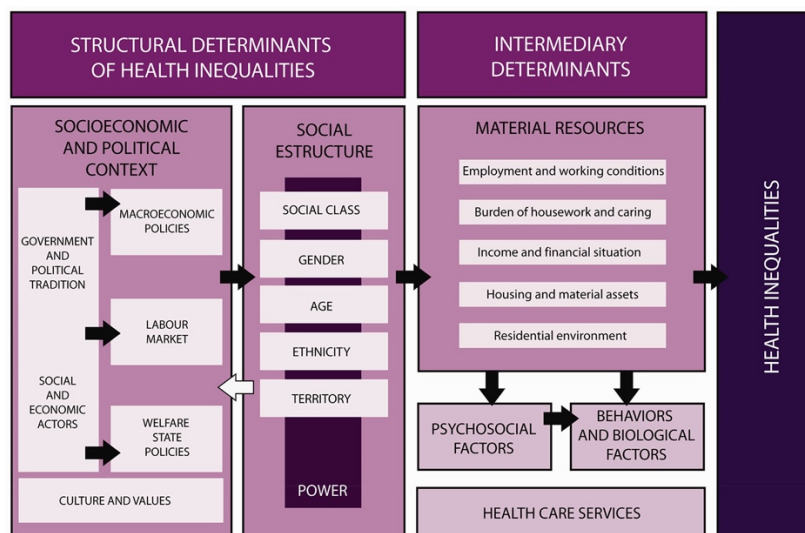
Figure 1.3: Conceptual framework of the determinants of health inequalities.
Figure taken from Borrell, et al., (2016).

On the far left are the macro-level or 'upstream' influences (the socio-economic and political context). These include macroeconomic policies which influence the distribution of material resources within a society; social and health policies and the social and cultural values of a society. These factors have a powerful influence on patterns of social stratification although they have a differential impact across different groups within a population. The unequal distribution of these factors results in a system of social stratification or social hierarchy. Different groups of people are positioned in the social hierarchy according to factors such as their social class but also other factors such as their educational level, occupation and income. A person's position in the social hierarchy influences intermediary determinants of health, such as their access to material and cultural resources which in turn influences health-related behaviours and it is the impact of these behaviours which contribute to inequalities in health (Borrell et al., 2016; Solar & Irwin, 2010). Whilst it is acknowledged that psychosocial factors, biological factors and health care services are also linked to a person's SEP and contribute to health inequalities, these factors are not the focus of this project and so are not discussed here.

Mackenbach (2012) posits that despite modern welfare systems in high-income countries such as England, "the persistence of socioeconomic inequalities in health is one of the great disappointments in public health" (p.761). Although the welfare state has to an extent, reduced inequalities in material living conditions, it has not eradicated them and social inequalities in health have continued to increase. Mackenbach suggests there are three possible reasons for this. The first is that despite the welfare state, those in the lower socio-economic groups have less access to material, non-material and cultural resources which are important for their health. The second is that due to a lack of social mobility, the composition of the lower socio-economic groups has become more similar in relation to personal characteristics associated with ill-health. The third is that consumption behaviour has become a major

determinant of poor health, therefore the benefits that the non-material and cultural resources give to those in the higher socio-economic groups has increased.

Whilst the focus in this section has been to explain socio-economic inequalities in health, it is important to highlight that gender is also an important contributor to health inequalities. Men and women's lives are not the same and this subjects them to different exposures both in terms of material and cultural influences, which has implications for their health and life expectancy (see section 1.1). Gender differences in health are well documented although the interactions between gender and socio-economic inequalities in health are complex and responsive to social context and social change (Hunt & Batty, 2009; Annandale, 2014).

1.3   The contribution of health-related behaviour to social inequalities in health

People's health-related behaviour is a significant determinant of how healthy they are and a wealth of literature highlights the significant role that health-related behaviours such as smoking, excessive alcohol consumption, lack of physical activity and an unhealthy diet make to inequalities in health (Petrovic, et al., 2018; Stait & Calnan, 2016; Stringhini, et al., 2010). These health-related behaviours are generally found to be more prevalent amongst disadvantaged socio-economic groups and are considered to be the four greatest risks to people's health in England (PHE, 2019).

Smoking is recognized as being the single largest cause of preventable morbidity and premature mortality in the UK with approximately one half of regular cigarette smokers dying from a smoking-related disease and with persistent smokers dying on average about ten years younger than non-smokers (Doll, et al., 2004). Smoking is associated with many diseases including lung cancer, heart disease, respiratory diseases and cancer and as smoking rates are highest amongst disadvantaged socio-economic groups, the burden of smoking-related disease and mortality falls most heavily on these groups (DH, 2011). Smoking is the biggest contributor to health inequalities and it has been estimated that the use of tobacco accounts for around half of the difference in life expectancy between the richest and poorest groups (Marmot, 2010). Since the 1970s, smoking rates have significantly declined, however, despite an overall reduction in cigarette consumption, smoking rates have not fallen evenly across the different socio-economic groups. Higher rates of smoking prevalence and a slower reduction in cessation amongst the most disadvantaged socio-economic groups has contributed to an increase in and a widening of social inequalities in health (Petrovic, et al., 2018).

Excessive alcohol consumption is also widely recognized as being one of the leading risk factors that contributes to the burden of disease in the UK through death, poor health and disability (Murray, et al., 2013). Alcohol misuse is associated with a range of health conditions such as liver disease, cardiovascular disease and cancer as well as psychiatric conditions such as depression and alcohol use

disorder (Collins, 2016; Parkin, 2010). Research investigating the relationship between alcohol consumption and harm to health in the UK, has shown that the burden of alcohol-related mortality and morbidity consistently falls most heavily on those in the most disadvantaged socio-economic groups, thereby making this a key contributor to inequalities in health (e.g. Beard*, et al.,* 2019; Katikireddi, *et al.,* 2017; Bellis, *et al.,* 2016; Erskine *et al.,* 2010). Although overall alcohol consumption at the population level has fallen in England since 2008, inequalities in alcohol-related mortality are still marked and were estimated to have widened slightly between 2001 and 2016 (Angus, et al., 2020).

Other health-related behaviours such as an unhealthy diet and lack of physical activity have also been found to contribute to health inequalities (Farrell, et al., 2014; Dowler, et al., 2007) but as the focus of this thesis is on smoking and drinking, these will not be discussed here. However, these behaviours have some relevance to this project because they tend to cluster or co-occur along with smoking and excessive alcohol consumption and are briefly discussed in Chapter 7 in light of the project research findings.

During the last two decades, differential consumption patterns in health-related behaviours have increasingly been highlighted as playing an important role in explaining persistent and widening inequalities in health in high-income countries such as England (Mackenbach, et al., 2003; Thomas, et al., 2010). For example, Mackenbach (2012) suggests that this may have occurred through differences in the diffusion of innovations such as behaviour change, largely brought about through health promotion policies, with those in the most advantaged socio-economic groups taking-up new behaviours and interventions before those in the least advantaged socio-economic groups. This is likely to have become more important following the 'epidemiological transition' from infectious disease to chronic disease and where improvements in health largely depend on changes to health-related practices (Hinote & Cockerham, 2015). The relevance and importance of non-material factors such as 'cultural capital' may have increased in terms of the need for 'social distinction', with differences in health-related behaviours between socio-economic groups signifying social position. Non-material factors may also have become more important as opportunities to distinguish groups through visible indicators of material prosperity have declined (Abel, 2008). This might also be a reflection of the more general socio-economic changes that have taken place with a shift in the locus of self-identity from being tied to mechanisms of production to patterns of consumption (Hinote & Cockerham, 2015).

1.4   Policy approaches to tackling social inequalities in health

This section considers policy approaches that have been taken by the English government to address health inequalities from the late 1970s through to the change of government in 2010 and which mostly covers the period of analysis for this project. A discussion on policy approaches to tackling health inequalities are important in setting the context of this research project as they have played a role in

shaping health-related behaviour across this period. Policy approaches to health inequalities can take different forms, including those designed to bring about changes to the social and economic structure at the macro level to strengthening and empowering individuals at the micro level (Whitehead, 2007).

By the 1970s it was becoming evident that social inequalities in health were increasing rather than narrowing, despite the introduction of the NHS in 1948, which had been established to help reduce health inequalities. The Labour government responded by commissioning the Black Report to investigate the issue and to make policy recommendations. Black was strongly in favour of materialist explanations for health inequalities and recommended that priority should be given to reducing differences in material and economic circumstances between socio-economic groups. The report was published in 1980, however, it was not well received by the newly elected Conservative government who did not acknowledge the existence of health inequalities until much later, although they were described as 'variations' in health rather than inequalities (Bambra, 2012; Baggott, 2011). Despite rejecting Black's recommendations, the report is widely considered to have ignited research and campaigning on social inequalities in health.

New Labour came into power in 1997 with an explicit commitment to prioritise and reduce health inequalities. Shortly after coming into power, an independent inquiry into health inequalities known as the Acheson Inquiry was commissioned (Acheson, 1998). The report found that inequalities in health were still increasing and reinforced the materialist explanations put forward in the Black Report. In addition, the report highlighted the contribution of the psychosocial and life course explanations to health inequalities and made recommendations that income inequalities were reduced and that child poverty was addressed (Bambra, 2012). In response to the report, the government launched a number of different measures that were designed to address health inequalities and reduce the health gap. These included the introduction of the Sure Start programme to support disadvantaged families and improve the education and emotional development of young children; introduction of the minimum wage; area-based initiatives to improve the health of the most disadvantaged including Health Action Zones, healthy living centres and health improvement programmes (Bambra, 2012). In addition, targets were set to reduce the gap in infant mortality between manual groups and the population as a whole by at least 10% by 2010, and to reduce the gap between the fifth of areas with the lowest life expectancy at birth and the population as a whole by at least 10% by 2010 (DH, 2003).

Despite New Labour's commitment to reduce health inequalities through attempts to reduce absolute and relative deprivation, publication of the public health White Paper 'Choosing Health in 2004 (DH, 2004) signalled a shift of focus in tackling health inequalities towards policies designed to change consumption patterns in health-related behaviours such as smoking, excess alcohol consumption and poor diet, with an emphasis on individual responsibility and 'informed' choice. It is possible that this

shift into consumerism was influenced by the Wanless Report (HM Treasury, 2004) which was commissioned to report on the costs of ill health to the nation and which emphasised individual responsibility for health in order to reduce the use and demand of health services (Calnan, 2020). It has also been suggested that this 'consumerist' approach may be linked to an increase in the dominance of neoliberal ideology in policy discourse which emphasizes rational choice and individual responsibility (Clarke, et al., 2006).

Evidence suggested that despite some limited success, the targets the government had set were not being met and that socio-economic inequalities were continuing to increase (Dorling, et al., 2007). In response to this the Marmot Review (2010) into health inequalities in England was commissioned in 2008 and concluded that the policies were partly wrong, poorly implemented and the targets were inappropriate. Marmot recommended that action be targeted across all social determinants of health as health inequalities resulted from social inequalities. Therefore, measures needed to reduce the social gradient in health as "focusing solely on the most disadvantaged will not reduce health inequalities sufficiently" (Marmot, 2010, p.15).

There are concerns that the UK government has focused on addressing health inequalities at the local and individual level rather than tackling the social and economic influences at the macro level and that only so much can be achieved through behavioural change (Bambra, 2012). This individual-level approach has also been evident since the change to the coalition government in 2010, who were particularly interested in the behaviourist approach of 'nudging' people to make 'healthy choices', to change behaviours such as smoking, drinking, diet and exercise to improve health (Annandale, 2014: DH 2010). This approach has been described as a form of libertarian paternalism (Brown, 2012) and has manifested itself in English government policy, which has promoted health and welfare through paternalism, whilst ensuring freedom of choice and libertarianism (Calnan, 2020).

Since the change of government in 2010, the responsibility for reducing social inequalities in health in England has been devolved from central government to local government authorities (Bambra, 2012). In addition, a range of austerity policies involving deep spending cuts have been introduced to reduce the national deficit but these are thought to have contributed to a slowing down in health improvements and a widening of health inequalities, with far-reaching impacts on the poorest people in the UK (Marmot, et al., 2020a). The implications of more recent policies are discussed in the final chapter of the thesis, in light of the project research findings.

1.5   Rationale for the project and original contribution to the academic field

Since the 1970s there has been a dramatic and substantial reduction in smoking in the UK and a noticeable decline in alcohol consumption from 2008, however, social inequalities in smoking and

drinking have persisted and are thought to have widened, thereby contributing to health inequalities. Whilst an extensive body of research exists on the relationship between SEP and smoking and drinking behaviour, SEP is often used generically or interchangeably in studies that investigate this relationship, however, this implies that SEP is measuring the same underlying factors. SEP is neither easily defined nor measured by one single factor but is formed along a range of dimensions, with different indicators capturing different factors and picking up different mechanisms (Annandale, 2014). It has been argued that measures of SEP such as education, income and occupation should not be used interchangeably for this reason (Geyer, et al., 2006). By investigating the independent effects of different SEP indicators on smoking and drinking behaviour, it is possible to separate the different dimensions of SEP and to gain a better understanding of the potentially different underlying mechanisms that might influence social inequalities in health-related behaviour.

A substantial body of evidence exists which supports the idea that people's material circumstances and cultural context play important roles in determining, constraining or facilitating health-related behaviours (Blaxter, 1990; Calnan and Williams, 1991; Williams, 1995), therefore the overall aim of this study was to explore the relative importance of the contribution of material and cultural factors on smoking and drinking inequalities between 1973 and 2011. Time is an important factor in this project as there have been dramatic changes to smoking prevalence over the last 40 years and more recent changes to alcohol consumption. In addition, the last 40 years has seen some significant changes to smoking and health policies in England, including the introduction of more stringent tobacco control measures and an increasing policy emphasis on individuals taking responsibility for their own health-related behaviour. Wider social and cultural changes have also taken place during the latter half of the last century, which have included a greater emphasis on health-related behaviour as explaining social inequalities in health and an increasing stigmatization of smokers and smoking behaviour.

This project makes two principal contributions to the existing literature. First, it compares different socio-economic indicators to investigate the different mechanisms that underpin inequalities in smoking and drinking. Second, it conducts this comparison over a substantial period of time during which there have been dramatic reductions in smoking prevalence and more recent reductions in alcohol consumption as well as a widening of inequalities in smoking and drinking. This is important as the relative importance of material and cultural factors might have changed across this period which would have implications for the types of policies that could be designed to address social inequalities in health. To my knowledge, this is the first British study to conduct such a comparison over such a long historical period and therefore, this project makes a significant and important contribution to the existing literature on social inequalities in smoking and drinking behaviour and to social inequalities in health.

1.6   Structure of thesis

The focus of this thesis is to gain a better understanding about the links between SEP and inequalities in smoking and drinking behaviour and how this relationship has changed over time. Chapter One (Introduction) has set the context by situating the project within the broader literature of health inequalities, including defining social inequalities in health and highlighting two of the dominant explanations that have been put forward in the literature. The chapter has discussed the contribution that health-related behaviours make to health inequalities and the policy approaches that the English government have taken in order to address social inequalities in health. The chapter has concluded with a rationale for the research project and explains the contribution that this study makes to the existing academic literature.

Chapter Two situates the smoking element of the project within the broader field of cigarette smoking research and reviews and discusses some of the existing literature on the relationship between SEP and smoking behaviour. A number of different explanations for socio-economic differences in smoking behaviour are considered and English policy approaches to reduce smoking behaviour are discussed. The chapter highlights a gap in the literature which this project was designed to address and concludes with a description of the conceptual framework and the aim and research question for the smoking element of the project.

Similar to Chapter Two, Chapter Three situates the alcohol element of the study within the wider field of alcohol studies, with a particular focus on reviewing existing studies on the relationship between SEP and harmful alcohol consumption. Explanations for inequalities in alcohol consumption are discussed and English policy approaches to tackling harmful drinking are reviewed. The chapter identifies the same gap in the existing literature as identified in Chapter Two and concludes with a description of the conceptual framework and the aim and research question for the alcohol element of the project.

Chapter Four gives a detailed explanation of the data and methods that were used for the smoking and drinking elements of the project analyses, including the rationale for selecting the datasets, variables and methods of analyses used. The chapter concludes with a description of the different procedures used for the statistical analyses. Chapters Five and Six provide a detailed description of the findings for the relationship between the different indicators of SEP and smoking, and SEP and alcohol consumption. The final chapter (Chapter Seven) summarises the key findings from the analyses and discusses the possible explanations for these findings and how they relate to the existing literature on smoking and drinking behaviour. The findings for smoking and drinking are compared and the conceptual frameworks for the different elements of the project are assessed and revised in light of the results from the analyses. The chapter also considers the contribution the project findings make to understanding

inequalities in health and discusses the strengths and limitations of the project and the implications for policy. The chapter concludes by proposing a future research agenda.

Chapter 2: The Relationship Between Cigarette Smoking and Socio-economic Position

2.1   Introduction

The aim of this chapter is to situate the smoking element of the project within the wider field of literature on smoking studies, with a particular focus on reviewing existing literature on the relationship between cigarette smoking and socio-economic position (SEP) and identifying the gap in the literature which this project was designed to address. However, the amount of research that exists within the field of smoking studies that is potentially relevant, is considerable. Therefore, the literature discussed is not designed to be exhaustive but to provide context to the project's research question for the smoking element of the study, by linking it to relevant and ongoing debates within the smoking inequalities arena.

The chapter begins by looking at the public health burden of smoking in relation to morbidity and mortality and the more general patterns of smoking behaviour in England and the UK before moving on to section 2.3 to look more specifically at the relationship between cigarette smoking and SEP. Section 2.4 considers explanations for the socio-economic patterning of smoking, whilst in section 2.5, smoking interventions and policies in England are discussed, including the extent to which they were designed to address smoking inequalities and health inequalities. Finally, in section 2.6, the conceptual framework is described and the research question for the smoking element of this project is stated.

The examples of data given on smoking in this chapter relate to adult smoking behaviour in either England, Great Britain or the UK, depending on what data was available to highlight particular patterns. Occupation is widely used as a measure of SEP in the UK and is one of the indicators used in this chapter to highlight smoking inequalities. However, from 2001, the National Statistics Socio-economic Classification (NS-Sec) was introduced to replace earlier indicators of occupational social class and therefore data in this chapter that uses NS-Sec are not directly comparable to earlier data which uses other occupational indicators such as the Registrar General's Social Classes (RGSC). Data and policies used in this chapter, reflect the period of analysis covered by this project (1973-2011), although more recent data and policies are included where relevant, to highlight any important changes. Whilst there has been an increase in research on vaping and electronic cigarettes during recent years, the focus of this project was on cigarette smoking, therefore, the discussion in this chapter relates to tobacco smoking predominantly in the form of cigarettes but with reference to roll-your-own-tobacco (RYO), where relevant.

2.2 Adult cigarette smoking in England and the UK

2.2.1 The public health burden of smoking

Smoking is one of the largest avoidable causes of preventable illness and premature death in England (and the UK) and is associated with many diseases including lung cancer, cardiovascular disease, chronic obstructive pulmonary disease and a range of other cancers and medical conditions (DH, 2017; Murray *et al.,* 2013; RCP, 2012). Figure 2.1 illustrates smoking-attributed deaths in the UK for men and women aged 35-69[1] between 1950 and 2010, which peaked for men in the mid-1960s but did not peak for women until the mid-1990s. By 2010, the gender gap in terms of smoking-attributable mortality converged, with similar rates of smoking-attributed deaths for both men and women.
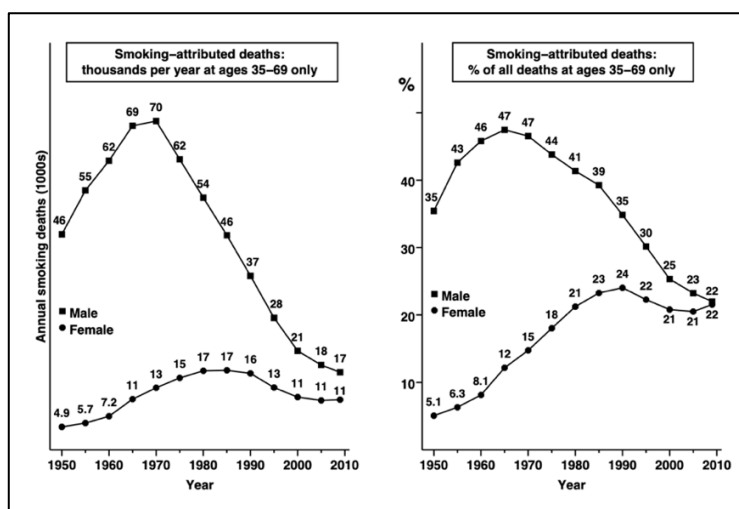
Figure 2.1: Smoking-attributed deaths in the UK for men and women (ages 35-69), 1950 to 2010. Figure taken from (Peto, et al., 2012).

Whilst not directly comparable, recent estimates of smoking-attributed deaths in England for men and women aged 35 and over in 2019, were 45,700 and 28,900 respectively and were estimated to have represented 19% of all deaths in men and 12% of all deaths in women (NHS Digital, 2015).

As well as being associated with premature mortality, smoking can also cause serious harm to health with many smokers living in poor health due to their habit. For example, in 2010/11, 459,900 hospital admissions were estimated to be attributable to smoking for adults aged 35 and over, with a higher proportion of admissions for men (285,900) than for women (174,000) (NHS Digital, 2012a). Most of the harm from smoking comes from the inhalation of tobacco smoke, therefore smoking is not only harmful to those who smoke, but presents a significant risk to the health of others through passive smoking and to the health of children, both before and after birth (DH, 1998).

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[1] The figures presented relate to people aged 35-69 years as this is the age group most likely to be affected by smoking-related mortality.

Studies that have investigated the harmful effects of smoking have shown that those in the most disadvantaged socio-economic groups experience the greatest burden of smoking-related morbidity and mortality, with smoking considered to be one of the largest contributors to health inequalities in England (DH, 2011; Marmot, 2010). For example, a number of studies in the UK have found that smoking significantly contributed to a higher risk of coronary heart disease (CHD) for those in the most disadvantaged socio-economic groups (as measured by a variety of socio-economic measures) compared to those in the least disadvantaged socio-economic groups (Floud, et al., 2016; Singh-Manoux, et al., 2008; Woodward, et al., 2003). A more recent systematic review of the contribution of health-related behaviours to socioeconomic inequalities in health found that of the four health-related behaviours analysed (smoking, alcohol consumption, diet and physical activity), smoking was found to contribute the most to social inequalities in health (Petrovic, et al., 2018).

Further evidence to support the link between smoking and health inequalities comes from research that has attempted to measure the contribution that smoking makes to socio-economic inequalities in mortality using data from longitudinal studies over significant periods of time. For example, one study that used data from 1996 on national death rates in England, Wales, Poland and North America, estimated that among 600,000 men aged 35-69, smoking-attributed mortality, accounted for approximately half of the difference in total male mortality between those in the lowest socio-economic groups compared to those in the highest socio-economic groups in each country. The contribution of smoking to adult mortality was particularly strong for men in England and Wales, with those in unskilled manual occupations estimated to have had a 43% risk of dying before reaching 70, including a 19% risk due to smoking, compared to men in professional occupations who had a 21% risk of dying before reaching 70, including a 4% risk due to smoking (Jha, et al., 2006). A later study that examined cohort data from the Whitehall II study, on 10,000 male and female civil servants in London, found that between 1985 and 2009, smoking accounted for approximately one third (from 32% to 35%) of the difference in rates of mortality between the lowest and highest socio-economic groups (as measured by employment grade) (Stringhini, et al., 2010).

Differences in levels of mortality (and smoking-related illness) between socio-economic groups are predominantly driven by differences in smoking prevalence. Higher rates of smoking amongst the most disadvantaged socio-economic groups are considered to be a major contributor to health inequalities related to SEP and whilst a much smaller proportion of those in the least disadvantaged groups smoke, those higher up the social hierarchy are generally considered to be in better health. However, one particular study in Scotland that used a large cohort of men and women to examine the effects of smoking on survival rates across all social positions over 28 years, found that smokers in the highest social classes (as measured by RGSC) were more likely to die than never smokers in the lowest social classes (Gruer, et al., 2009). In fact, the study found that smokers in all social classes had poorer rates of

survival when compared to never smokers, including never smokers in the lowest social classes (see Figure 2.2).
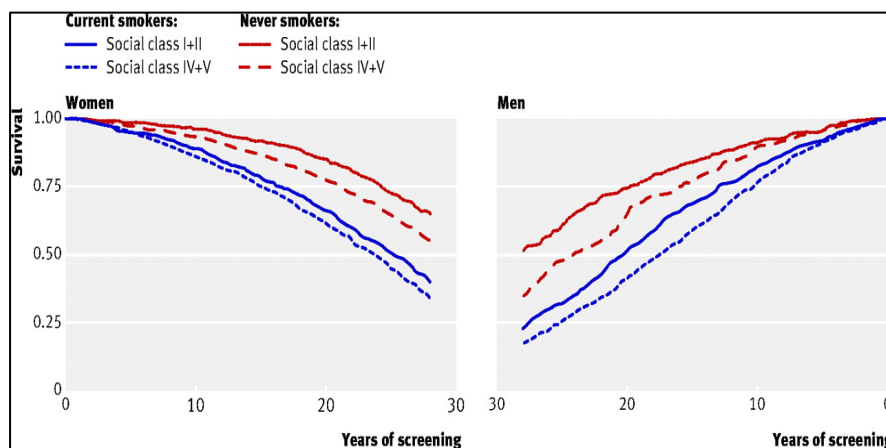
Figure 2.2: Age adjusted survival over 28 years follow-up for women and men aged 45-64 years by smoking status and social class.
Figure taken from (Gruer, et al., 2009).

Furthermore, it was found that the differences in terms of survival between never smokers and smokers were greater than the survival rates between smokers in different social positions. The study authors concluded that smoking behaviour made a greater contribution to health inequalities than a person's social position and that if health inequalities were to be reduced, smokers in disadvantaged socio-economic groups would need to stop smoking.

A dose response relationship exists between the amount smoked and the risk of smoking-related harm and whilst there is much evidence on the causal relationship between smoking and mortality, it is not clear from many studies whether the harm associated with smoking differs by SEP. One of the difficulties with looking at rates of mortality from smoking-related disease between different socio-economic groups, is that by comparing the relative risk of smoking between groups, it is not possible to capture the absolute risk of smoking due to the higher rates of prevalence and the risk of smoking-related disease in the most disadvantaged socio-economic groups (Sidorchuk, et al., 2009). However, a more recent study by Lewer *et al.* (2017), which used a cohort of 18,500 adults from the English Longitudinal Study of Ageing (ELSA), found that smoking was associated with a greater absolute mortality risk for adults in lower socio-economic groups (as measured by education, occupation, income and wealth), even after adjusting for higher rates of smoking within these groups. For example, smoking 20 cigarettes a day over a 40-year period, was associated with 898 smoking-related deaths per 100,000 person-years in the bottom income tertile, compared to 327 smoking-related deaths in the top income tertile.

The discussion above highlights that the burden of smoking-related disease falls much more heavily on those who are most socio-economically disadvantaged due to the higher rates of smoking amongst these groups. The next section looks at general patterns of smoking in England/UK.

2.2.2   Smoking prevalence and trends

Figure 2.3 illustrates cigarette smoking prevalence in Great Britain for men and women between 1970 and 2019. Since 1970, smoking rates have fallen considerably with the fastest decline seen through the 1970s and the 1980s. For example, the proportion of men and women who smoked in 1970 was 55% and 44% respectively, however, by 1992, smoking prevalence had declined to 29% for men and 28% for women. Since that time, smoking rates have continued to fall, albeit at a slower rate. The most recent data shows that in 2019, 18% of men and 14% of women were cigarette smokers. In terms of gender differences, smoking prevalence was higher among men than among women, although over time the gender gap has tended to narrow, with overall rates of prevalence decreasing to a greater extent for men than for women. In general, smoking prevalence tends to be highest amongst adults in the 25-34 year age group and lowest amongst adults aged 60 and over (ONS, 2020).
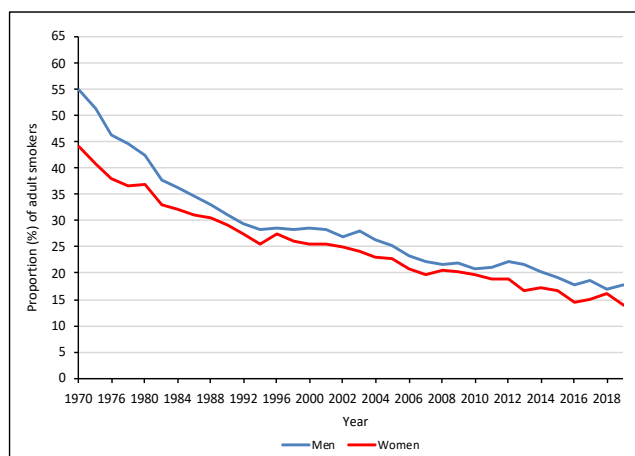
Figure 2.3: Cigarette smoking prevalence for adults (aged 16 and over) in Great Britain, 1970 to 2019, by gender.
Sources: Smoking habits in Great Britain (ONS, 2020) and Wald & Nicolaides-Bouman (1991).

Figure 2.4 illustrates smoking cessation in Great Britain for men and women between 1974 and 2019. Since 1974, smoking cessation has noticeably increased with the greatest rise between 1974 and 1998. For example, the proportion of men and women who quit smoking in 1974 was 32% and 21% respectively, however, by 1998, rates of cessation had increased to 52% for men and 44% for women. Since that time, smoking cessation has continued to increase, although between 2011 and 2014, the proportion of men and women who stopped smoking fell, after which, rates of cessation started to rise again. The most recent data shows that in 2019, the proportion of men and women who had given up smoking was 61% and 65% respectively. In terms of gender differences, rates of quitting were higher for men between 1974 and 2012 than for women, although, since that time, the gender gap has converged,

at least until 2018. Overall, rates of cessation have increased to a noticeably greater extent for women than for men, over time. In general, smoking cessation tends to be lowest for adults in the 16-24 year age group and highest for adults aged 60 and over (ONS, 2020).
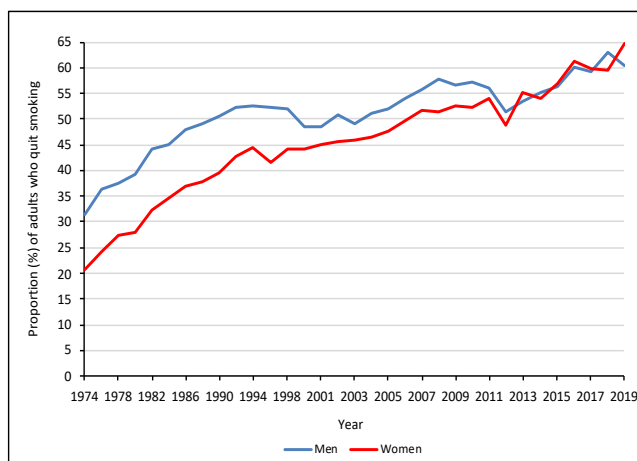
Figure 2.4: Cigarette smoking cessation for adults (age 16 and over) in Great Britain, 1974 to 2019, by gender.

Source: Smoking habits in Great Britain (ONS, 2020).
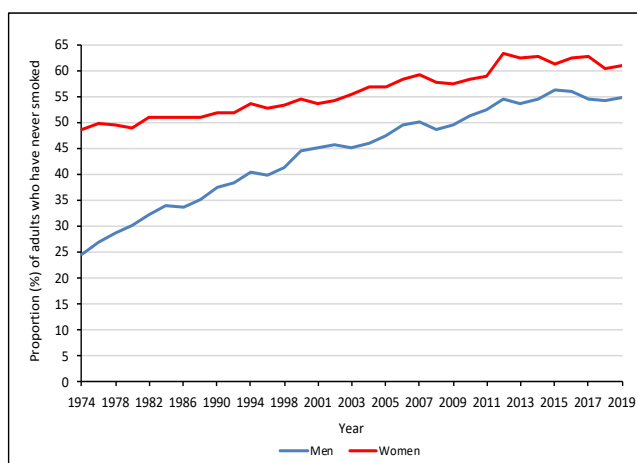
Figure 2.5: Never smoking for adults (age 16 and over) in Great Britain, 1974 to 2019, by gender.
Source: Smoking habits in Great Britain (ONS, 2020).

Figure 2.5 illustrates never smoking in Great Britain for men and women between 1974 and 2019. Since 1974, rates of never smoking have increased with the fastest rise between 1974 and 2001 for men but with a slower rise for women, across the same period. For example, the proportion of men and women who had never smoked in 1974 was 24% and 49% respectively, however, by 2001, never smoking had increased to 45% for men and 54% for women. Since that time, rates of never smoking have continued to increase, albeit at a slightly faster rate for men than for women. The most recent data shows that in 2019, the proportion of men and women who were never smokers was 55% and 61% respectively. In terms of gender differences, never smoking was higher among women than among men, although over time the gender gap has tended to narrow, with overall rates of never smoking increasing to a

noticeably greater extent for men than for women. In terms of age, never smoking tends to be highest amongst adults in the 16-24 year age group and lowest amongst adults aged 60 and over (ONS, 2020).

Figure 2.6 illustrates the average (mean) number of cigarettes smoked per day in Great Britain for men and women between 1974 and 2017 (later estimates were not included as the survey question for amount smoked was revised and was not comparable with earlier estimates). Since 1974, average daily cigarette consumption has fallen at a fairly steady rate for both men and women although the overall decline was greater for men than for women. For example, the mean number of cigarettes smoked a day for men and women in 1974 was 18 and 14 respectively, however, by 2017, mean daily consumption had decreased to 11 for men and 10 for women.
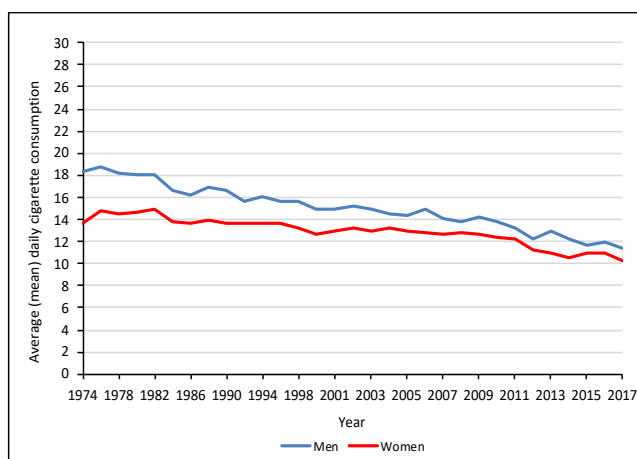
Figure 2.6: Average (mean) number of cigarettes smoked per day for adults (age 16 and over) in Great Britain, 1974 to 2017, by gender.
Source: Smoking habits in Great Britain (ONS, 2020).

In terms of gender differences in daily consumption, men smoked a greater average number of cigarettes per day when compared to women, although over time, the gender gap narrowed. In terms of age, average daily cigarette consumption tended to be highest amongst adults in the 35-49 year age group, between 1974 and 1994, but from 1996 it was highest amongst adults in the 50-59 year age group. Average daily consumption was lowest amongst men aged 60 and over between 1974 and 1984 but from 1986, was lowest amongst men in the 16-24 year age group. For women, the lowest average daily cigarette consumption was amongst those aged 60 and over (ONS, 2020).

The discussion thus far has highlighted the harmful effects of cigarette smoking on health and how those in the most disadvantaged socio-economic groups are more likely to suffer from smoking-related disease and premature death, thereby contributing to inequalities in health. Since the 1970s, there has been a significant and dramatic decline in smoking prevalence in Great Britain which has been driven by a combination of factors including an increase in the proportion of smokers who have quit and a rise in the proportion of people who have never smoked. Cigarette consumption has also fallen since the

1970s. However, these changes have not been equal across the different socio-economic groups and as a result smoking has become disproportionately concentrated amongst those in the most disadvantaged socio-economic groups. The relationship between smoking and SEP is widely acknowledged and the next section looks in more detail at the patterns associated with smoking inequalities.

2.3 The relationship between smoking and socio-economic position

2.3.1 Prevalence of smoking

The inverse relationship between cigarette smoking and SEP is well documented, with data as far back as the late 1950's highlighting socio-economic differences in smoking behaviour (Wald & Nicolaides-Bouman, 1991). However, despite an overall reduction in smoking prevalence during the last four decades, rates have continued to remain highest amongst the most disadvantaged in society, with smoking inequalities persisting. For example, in Great Britain in 1982, 49% of men and 41% of women in unskilled manual occupations smoked compared to 20% of men and 21% of women in professional occupations (Matheson & Summerfield, 2000).
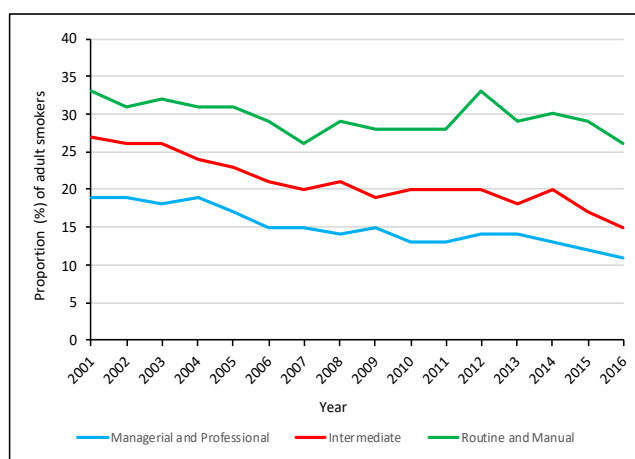
Figure 2.7: Cigarette smoking prevalence for adults (age 16 and over) in Great Britain, 2001 to 2016, by Socio-Economic Classification (NS-Sec).
Sources: Opinions and Lifestyle Survey, General Lifestyle Survey and General Household Survey – Office for National Statistics.

Whilst not directly comparable Figure 2.7 shows cigarette smoking prevalence for adults in Great Britain between 2001 and 2016. Marked differences in smoking prevalence can be seen between those in managerial and professional occupations and those in routine and manual occupations and whilst smoking prevalence declined across the period for all occupational groups, rates of smoking were still disproportionately concentrated amongst those who were most socio-economically disadvantaged. Smoking inequalities also widened slightly between the lowest and highest socio-economic groups across the period, for example, in 2001, 33% of adults in routine and manual occupations smoked compared to 19% of adults in managerial and professional occupations, however by 2016, 26% of adults

in the routine and manual occupational groups smoked compared to 11% of adults in the managerial and professional occupational groups.

However, it is not just occupational measures of SEP where inequalities in smoking can be seen, other indicators of SEP show that smoking is disproportionately concentrated amongst those who are socio-economically disadvantaged, with the highest rates of smoking found amongst those who are most disadvantaged. For example, in 2011, the proportion of unemployed adults who smoked in England, was 35% compared to 19% of adults who were employed (ONS, 2018). Similarly, the proportion of smokers is highest amongst those with lower or no educational qualifications and those living in households with low incomes. For example, in 2013, in Great Britain, adults with no qualifications were more than twice as likely to be cigarette smokers (23%) than adults with a degree or equivalent (10%) (ONS, 2014), whilst in 2009, in England, men and women living in the lowest income households were more likely to be cigarette smokers (40% and 34% respectively) than men and women living in the highest income households (14% and 11% respectively) (NHS Digital, 2010). However, SEP indicators such as occupation, employment status, educational qualifications and income are related and therefore those with low educational qualifications are at a greater risk of being unemployed or more likely to work in routine and manual jobs and to have less income (ONS, 2014).

2.3.2 Smoking cessation and never smoking

Rates of smoking prevalence are influenced by both rates of cessation and rates of never smoking and it has been suggested that much of the inequality in smoking can be attributed to variations in both quitting and uptake or never smoking between different socio-economic groups. For example, the examination of generational trends in smoking inequalities in Great Britain suggested that those born during the first half of the 20th century (1926–1950) were more likely to smoke if living in manual households compared to those living in non-manual households, although quit rates were found to be similar for both of these groups (Davy, 2007). However, those born during the latter half of the 20th century (1956-85) were less likely to smoke but also less likely to give up smoking compared to those born earlier in the century. Although cessation rates for later birth cohorts decreased slightly amongst those living in non-manual households, for those living in manual households, the majority who started to smoke, remained smokers. A similar study using different data from a British birth cohort born in 1958, also found that smokers from manual and unskilled backgrounds were less likely to quit smoking compared to smokers from non-manual and professional backgrounds and that the difference between these groups in terms of quitting, increased across the period of analysis (between 1981 and 2000) (Jefferis, et al., 2004).

However, a more recent study, suggests that decreases in smoking rates in England, might be due to an increase in never smoking rather than quitting, although decreases in never smoking were not experienced equally between the least disadvantaged and the most disadvantaged socio-economic groups. Hiscock et al., (2012) used cross-sectional data and a composite measure of SEP to investigate the relationship between levels of disadvantage and smoking prevalence, quitting and never smoking in England between 2001 and 2008. The authors found that smoking prevalence was four times higher amongst more disadvantaged groups compared to less disadvantaged groups and although overall smoking prevalence declined across the period, the decline was greater for those who were less disadvantaged (from 22.8% in 2001-03 to 19.4% in 2006-08) compared to those who were more disadvantaged (from 42.6% in 2001-03 to 42.4% in 2006-08). Rates of quitting were found to have decreased the most amongst those who were more disadvantaged (from 20% in 2001-03 to 17.3% in 2006-08) compared to those who were less disadvantaged (from 25.9% in 2001-03 to 25.4% in 2006-08), although, there was a higher proportion of ex-smokers in the sample who were classified as being less disadvantaged (approximately one quarter) compared to a lower proportion of ex-smokers who were classified as being more disadvantaged (approximately one fifth). However, the authors concluded that the overall decline in smoking prevalence between 2001 and 2008 was due to an increase in never smoking rather than quitting, with the highest rates amongst those who were less disadvantaged (from 51.3% in 2001-03 to 55.2% in 2006-08) compared to those who were more disadvantaged (from 37.4% in 2001-03 to 40.3% in 2006-08).

The discussion above suggests that differences in smoking prevalence between socio-economic groups are due, at least in part, to differences in rates of cessation, therefore it is possible that variations in quit rates between more and less disadvantaged socio-economic groups may be due to disadvantaged smokers being less likely to want to give up smoking. Whilst some evidence suggests that smokers with lower levels of education and income are less likely to be motivated to quit smoking than smokers with higher levels of education and income (Reid, et al., 2010), other studies have shown that smokers in more disadvantaged socio-economic groups have a similar level of desire to quit as those in less disadvantaged socio-economic groups (ONS, 2012). It has also been shown that disadvantaged smokers are just as likely to attempt to stop smoking as smokers who are less disadvantaged, however, disadvantaged smokers are less likely to succeed in quitting (Caleyachetty, et al., 2012; Hiscock, et al., 2010; Kotz & West, 2009).

One of the difficulties with trying to measure a person's desire to quit is that motivation can vary depending on time and circumstances, therefore, whilst the motivation to quit smoking may be higher when, for example, being asked by a medical professional, the motivation to stop smoking may be lower when surrounded by friends or family members, who may also be smokers (Jarvis & Wardle, 2006). However, motivation to quit smoking is not the only factor that influences how successful attempts at

stopping are likely to be. One of the biggest challenges associated with quitting smoking is that the more a person smokes, the more likely they are to have higher levels of nicotine dependency and this can make quitting more difficult.

2.3.3   Nicotine intake and dependency

Nicotine intake and nicotine dependency are strongly associated with disadvantage with the most disadvantaged smokers likely to smoke more cigarettes, to smoke their first cigarette of the day soon after waking and to experience difficulty in not smoking for a day. For example, in 2010, nicotine intake was higher for men and women in routine and manual occupations, who smoked an average (mean) 15 and 13 cigarettes a day respectively compared to men and women in managerial and professional occupations, who both smoked 11 cigarettes a day. Those in routine and manual occupations were also more likely to smoke their first cigarette within five minutes of waking (14% for men and 16% for women) compared to those in managerial and professional occupations (9% for men and 12% for women), while 62% of men and 64% of women in routine and manual occupations said they would find it difficult to go without smoking for one day compared to 50% of men and 53% of women in managerial and professional occupations (ONS, 2012). It has also been found that those in a lower SEP are likely to smoke more heavily compared to those in a higher SEP (Amos, et al., 2011).

Studies have shown that the use of self-reported measures of cigarette consumption to determine levels of nicotine intake may be subject to some inaccuracy (West, et al., 2007) as there may be differences in terms of varying levels of smoking intensity between different smokers (Patterson, et al., 2003). However, objective measures of nicotine intake such as cotinine levels (cotinine is a derivative of nicotine and can be detected in serum or saliva samples) are a more accurate way of measuring cigarette consumption and provide further evidence to support the association between nicotine dependence and socio-economic disadvantage. For example, data on saliva cotinine taken from a representative sample of 6,423 adult cigarette smokers in England between 1998 and 2003, found that higher concentrations of cotinine were associated with greater socio-economic deprivation (as measured by occupation, car ownership, housing tenure and social class) even after adjusting for daily cigarette consumption (Fidler, et al., 2008).

Nicotine intake and nicotine dependence are important factors in quitting smoking and as evidence suggests that these factors are greatest amongst those who are most disadvantaged, this is likely to have implications for smoking cessation amongst these groups. Smoking-related disease bears a dose response relationship to the number of cigarettes smoked, with the higher the dose of tobacco, the greater the risk of smoking-related illness. Therefore, if disadvantaged smokers are more likely to smoke

more cigarettes and to smoke them more intensively, they are at a greater risk of experiencing smoking-related harm to health (Jarvis & Wardle, 1999).

2.3.4 Smoking uptake

Smoking often starts during early adolescence with initiation largely influenced by a variety of factors such as exposure to parental and sibling smoking, social norms including peer pressure to smoke and access to cigarettes, particularly in the home (East, et al., 2021; Alves, et al., 2016; Leonardi-Bee, et al., 2011; RCP, 2010; Amos, et al., 2009). Whilst concentrations of smoking are higher amongst disadvantaged socio-economic groups, SEP is widely acknowledged to be an important determinant of smoking uptake in young people, with those in a disadvantaged SEP more likely to start smoking at a younger age than those in a less disadvantaged SEP. For example, in 2002, 47% of men and 39% of women in routine and manual occupations started to smoke regularly before age 16 compared to 34% of men and 25% of women in managerial and professional occupations (Rickards, et al., 2004). By 2011, smoking uptake before age 16 had increased with 48% of men and 43% of women in routine and manual groups starting to smoke regularly compared to 35% of men and 27% of women in managerial and professional groups (ONS, 2013). Although smoking uptake increased for men and women in both occupational groups between 2002 and 2011, this increase was more marked for women in the routine and manual groups.

Data on smoking uptake by SEP can be obtained by asking adults what age they started to smoke regularly, however, it may be difficult for respondents to recall this accurately, particularly as it has been found that young people tend to move in and out of smoking throughout adolescence (Amos, et al., 2009). Although children and adolescents can be asked what age they started to smoke, it can be difficult to determine their SEP as measures such as level of educational qualifications, income and occupation are not relevant. However, other measures such as parental SEP and entitlement to free school meals are often used and have shown that smoking uptake is higher amongst adolescents in disadvantaged socio-economic groups (Amos et al., 2009; Taulbut & Gordon, 2009).

Smoking uptake, particularly at a young age is an important factor in relation to both smoking and health inequalities as those who start smoking at an early age are more likely to smoke for a longer period of time compared to other smokers (DH, 1998). In addition, it has also been suggested that the earlier a person starts to smoke regularly, the more likely they are to be dependent on nicotine and to experience difficulty quitting (Caponnetto & Polosa, 2008; Khuder, et al., 1999).

2.3.5 Smoking, SEP and gender

The discussion on smoking patterns thus far has focused on the association between SEP and smoking behaviour, however, gender is also an important determinant of smoking behaviour. The discussion in section 2.2.2 highlighted some of the more general trends in terms of gender and smoking behaviour and suggested that men are more likely to smoke and to consume more cigarettes but are less likely to be never smokers and (since 2012) to quit smoking compared to women, although the gender gap in terms of these behaviours has noticeably narrowed over time. However, gender also intersects with SEP to produce further variations in smoking behaviour, although the relationship between smoking, SEP and gender is complex (Hunt & Batty, 2009).

Smoking increases the risk of mortality and morbidity but is influenced by gender and also by SEP to produce further inequalities. For example, smoking uptake and smoking cessation has generally diffused through the population, with men in the higher socio-economic groups initially taking up smoking and then quitting before men in the lower socio-economic groups and with women generally adopting smoking behaviour and then quitting smoking at a later stage than men. Consequently, the decline in smoking has occurred at different times and at different rates by gender and SEP (Lopez, et al., 1994). Therefore, if as the evidence suggests smoking prevalence has fallen faster for men than for women, smoking will be disproportionately concentrated among the most disadvantaged women in society which is likely to increase the burden of smoking-related mortality and morbidity for women in the most disadvantaged socio-economic groups.

From the discussion thus far, it is concluded that despite a significant decline in smoking during the last four decades, marked disparities in smoking behaviours between socio-economic groups still exist in England and the UK, with those who are disadvantaged, more likely to smoke, to smoke more and to be less likely to quit. These disparities are thought to have contributed to a widening of socio-economic inequalities in smoking, thereby contributing to inequalities in health. A number of different explanations have been put forward to explain socio-economic differences in smoking and some of these will be discussed in the next section.

2.4   Explanations for socio-economic differences in smoking

Smoking is a complex behaviour that involves the dynamic interplay of physiological and psychological factors that draw people to take up smoking and then influence them to maintain the habit. However, a variety of wider sociological influences play an important role in shaping the relationship between smoking behaviour and SEP. These include the broader socio-economic and socio-cultural contexts in which a person is situated and include more indirect influences such as the socio-political context via national tobacco control policies. This section discusses some of the different explanations that have

been put forward to explain socio-economic inequalities in smoking behaviour, with a particular focus on material and cultural influences as these are the explanations of interest in this project.

2.4.1   Materialist explanation

Whilst there has been a significant decrease in smoking prevalence in high income countries such as the UK, it might be argued that the decision to smoke or not to smoke implies an element of personal choice. However, the fact that systematic differences are found between socio-economic groups (as measured by indicators such as education, income and occupation) in terms of smoking behaviour would suggest that smoking is not necessarily a choice that is completely independent of material influences (Cockerham, 2013). The materialist explanation for the social patterning of smoking therefore emphasizes the direct effects of material circumstances such as unfavourable living and working conditions and material deprivation in influencing and shaping smoking behaviour. A number of authoritative reports (e.g. Black and Acheson) have broadly supported the idea that the material conditions of people's lives influence health-related behaviour such as smoking (Acheson, 1998; Townsend, et al., 1988). There are two possible pathways through which material factors potentially work to influence smoking behaviour. The first pathway suggests that people use smoking as a way of coping with the stresses associated with living in disadvantaged circumstances including poverty, debt, a lack of basic resources, inadequate or overcrowded living conditions or caring responsibilities. In this sense, smoking may be used as a way to manage stressful living and/or working conditions or it can provide simple pleasures in difficult and stressful circumstances.

A number of studies have provided evidence to support the role that disadvantaged material circumstances play in influencing and maintaining smoking behaviour with perhaps the work of Hilary Graham, providing some well-illustrated examples of this. For example, one study that explored the experience of smoking in the context of poverty and caring for pre-school children in low-income households in the UK, found that smoking provided a way of coping with day-to-day activities and the demands of full-time caring responsibilities alongside the struggle of 'making ends meet' (Graham, 1989, 1987). For many of the women interviewed, having a cigarette provided a break from caring and "an excuse to stop for five minutes" (Graham, 1987, p.52), giving them the opportunity to rest and refuel. Cigarette breaks were also found to be a particularly important strategy when the demands of caring for children became too much to cope with and a short cigarette break was used as a way of regaining some semblance of calmness and composure prior to resuming caring responsibilities.

In the context where the women were trying to make ends meet, expenditure on items such as rent and rates were protected, but when costs needed to be cut, these were often on 'luxury items' for the women themselves such as clothes, shoes, haircuts or going out to socialise with friends. However, the

one important exception to these personal sacrifices were cigarettes, when the women felt they could buy something for themselves which might be regarded as a luxury but also as a necessity. Smoking posed a threat to the women's health, which they were well aware of due to the health promotion messages about the dangers of smoking, however, the competing demands of their material circumstances and caring responsibilities meant that health was not an overriding concern. Therefore, smoking was seen to be a way in which the women could facilitate a sense of well-being and formed a fundamental role in helping them to cope with their caring responsibilities by providing a luxury or a simple pleasure when access to material and human resources were limited (Graham, 1987).

Graham's work provides some strong evidence of the relationship between social structure and smoking inequalities and in particular of the role that caring responsibilities and material deprivation play in the maintenance of smoking behaviour. Further evidence that supports the association between relative material disadvantage and smoking status comes from Marsh and McKay's (1994) research into the effects of smoking on low-income families in the UK. This study explored the relationship between income, smoking and hardship (hardship included being unable to afford 'essential' items such as food, clothing, social activities, unable to meet debt repayments, experiencing financial anxiety) in low-income households with children, and found that greater levels of disadvantage were associated with higher levels of smoking prevalence. In addition, the authors found that there were five characteristics that consistently and independently increased the levels of smoking prevalence. These were: being a single parent; a social tenant; claiming income support; having no educational qualifications and doing a manual job.

Whilst smoking was related to greater levels of disadvantage within different socio-economic groups, Graham (1995, 1994) also found that there was a gradient of smoking inequalities within groups who had broadly similar gender and socio-economic positions but had notable differences in their caring responsibilities and the material resources they had available to meet these responsibilities. Using a survey of women from manual households in England who were caring for young children, mostly on a full-time basis, Graham found that there was a clear and systematic relationship between greater levels of caring responsibilities and fewer material resources and higher rates of smoking prevalence and cigarette consumption and lower rates of cessation.

Other studies provide further support for the idea that material factors contribute to higher smoking prevalence amongst those in lower socio-economic groups. For example, a Dutch study which used longitudinal data from a large sample of adults aged 25-74 years to investigate the importance of cultural, material and psychosocial factors on educational differences in smoking found that adverse material circumstances accounted for between 20-40% of the increased risk of being a smoker compared to being a never or an ex-smoker, amongst adults with lower levels of education, while

cultural influences accounted for approximately 30% of the increased risk of being a smoker compared to being an ex-smoker. However, psychosocial factors were found to account for less of the increased risk of smoking than the material and cultural factors (Stronks, et al., 1997). Similarly, a Helsinki study that investigated socio-economic differences in smoking amongst a large sample of adults aged 40-60 years using a number of different indicators that reflected different dimensions of SEP found that smoking prevalence was associated with material disadvantage as measured by household income and housing tenure (Laaksonen, et al., 2005).

The materialist explanation proposes that the direct effects of material disadvantage influence and shape smoking behaviour and can help to explain socio-economic differences in smoking. However, much of the research in this field (and indeed for other explanations) has tended to focus on the links between current SEP, as measured in adulthood. However, the more recent stream of life course research adds a further dimension to the materialist explanation by highlighting how disadvantaged childhood socio-economic circumstances can influence smoking behaviour in adulthood, independent of adult SEP (Spencer, 2007). For example, Graham and Der (1999) explored the influence of adolescent and adult socioeconomic environment on the smoking status of a representative sample of adult women in Britain and found that factors such as leaving school before age 16 and having no educational qualifications significantly increased the likelihood of being an adult smoker, independent of adult SEP. The study also found that additional material disadvantage experienced in adulthood such as living in rented housing, not having a car and living on benefits further added to the risk of smoking in adulthood and appeared to suggest that adult smoking status was influenced by both past and current socio-economic circumstances and appeared to have a cumulative effect on smoking behaviour.

Other studies have also highlighted the cumulative effect of life course SEP on smoking in adulthood, although it has been suggested that whilst disadvantaged socio-economic circumstances in childhood were an important predictor of smoking amongst women, adult socio-economic circumstances have been found to be more a more important predictor of smoking amongst men (Jefferis *et al.,* 2004; Power *et al.,* 2005). Research within the smoking and life course field has also investigated whether associations exist between life course SEP and different stages of the smoking career (e.g. initiation, regular smoking and cessation). For example, data analysis of a cohort of US adults aged 30-39 years, found that lower socio-economic circumstances in childhood (as measured by maternal education, parental occupation and household poverty status) were significantly associated with an increased risk of smoking uptake, becoming a regular smoker and a reduced risk of quitting whilst lower adult socio-economic circumstances were significantly associated with an increased risk of becoming a regular smoker but a reduced risk of quitting smoking (Gilman, et al., 2003).

Research by Graham *et al.* (2006) extends the concept of the influence of life course SEP on smoking beyond its focus on childhood socio-economic circumstances, education and SEP, by suggesting that there is an additional independent effect of domestic lifecourse factors on smoking behaviour for women. The study investigated socio-economic influences on women's smoking status in early adulthood and found that domestic lifecourse factors such as early motherhood (late teens and early 20s), not living with a partner and lone motherhood were independently associated with higher odds of being a smoker in early adulthood whilst early motherhood and not living with a partner were associated with lower odds of quitting (Graham, et al., 2006).

The second pathway through which material factors might work to influence smoking behaviour and produce smoking inequalities is via the cost of smoking. It might be assumed that because smoking is an expensive habit, those who are poorer would smoke less or there would be a lower proportion of poor smokers relative to rich smokers due to the expense incurred from buying tobacco. However, whilst having access to limited material resources such as income might limit a person's ability to participate in healthy behaviours, this idea does not seem to apply to smoking, even though to not smoke would be the cheapest and the healthiest option (Bartley, 2017; Stronks et al.,1997). The inverse relationship between smoking and material circumstances where smoking rates are highest amongst the poorest socio-economic groups is evident from the wider literature and the studies discussed thus far, therefore because smoking is an expensive habit, it can place a burden on household expenditure and is likely to increase financial hardship for low-income families and may drive households further into poverty (Belvin, et al., 2015).

Despite the cost of smoking, it has been shown that low-income households tend to spend relatively more on tobacco compared to households on higher incomes (Graham, 1989). In addition, low-income families are more likely to suffer increased hardship as a result of their expenditure on tobacco, even when their hardship is compared to the hardship experienced by the most disadvantaged families, who do not smoke. It has also been found that the greater the disadvantage and the lower the income, the greater the impact of tobacco expenditure on hardship (Marsh & McKay, 1994). A recent study that estimated the financial effects of tobacco (and alcohol) expenditure on low income households in the UK, found that spending on tobacco was highest amongst the lowest income households (24%) and lowest amongst the highest income households (8%) and that 23% of households in relative poverty were estimated to have spent a median of £12.50 on tobacco per week (Nyakutsikwa, et al., 2021). The authors concluded that tobacco expenditure was likely to exacerbate the poverty already experienced by low income households, although it was possible that people were using smoking as a way of dealing with the stress caused by the financial strain of smoking, which in turn could add further to the financial strain they were already experiencing.

The cost pathway may have become more important over time in England as the price of tobacco has significantly increased, largely through taxation, as a tobacco control measure designed to reduce overall rates of smoking. Figure 2.8 illustrates changes to the affordability of tobacco between 1980 and 2014, with 1980 taken as the base year. The relative affordability of tobacco is calculated by comparing relative changes in the price of tobacco with changes in households' disposable income (allowing for inflation). If the affordability index is above 100, tobacco is relatively more affordable than in 1980 and if it is below 100, it is relatively less affordable than in 1980. Between 1980 and 2014, the price of tobacco increased by 92%, which made it 41% less affordable across the period (NHS Digital, 2015). The rising cost of cigarettes is likely to increase the hardship on smokers in low income households as they spend a greater proportion of their low income on maintaining their smoking behaviour (Marsh & McKay, 1994).
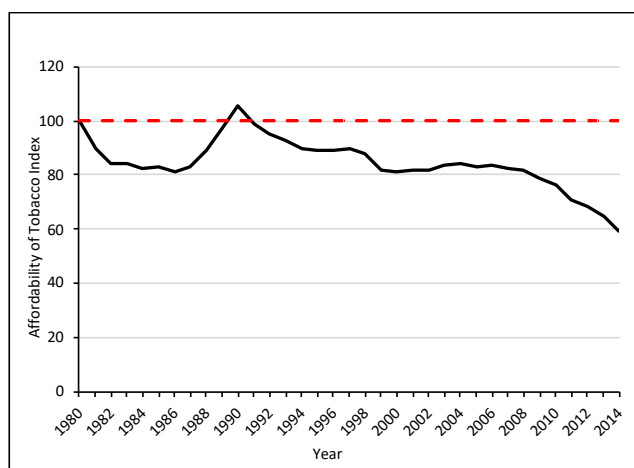
Figure 2.8: Tobacco revised affordability index from 1980 to 2014.

Source: Statistics on Smoking England 2015 – HSCIC.

Studies have generally shown that smokers in the lowest socio-economic groups are more responsive to increases in the price of cigarettes (Thomas *et al.*, 2008; Townsend, *et al.,* 1994) and that the cost of cigarettes has been reported to be one of the most common 'triggers' for quit attempts amongst disadvantaged smokers (Vangeli & West, 2008). However, the cost pathway does not appear to explain why the poorest smokers consume more cigarettes than the most affluent smokers and why smoking is disproportionately concentrated amongst the poorest socio-economic groups. One possible explanation for this might be that those who are poor are not overly concerned about the costs associated with smoking as the benefits of using smoking as a way of coping with the stresses associated with material deprivation and difficult lives, over-rides the financial impact of smoking. It is also possible that poorer smokers may re-prioritise their household expenditure in order to accommodate their smoking habit. For example, one qualitative study in Australia that investigated how socio-economically disadvantaged smokers managed the cost of smoking (including increasing cigarette prices) on a restricted budget, found that cigarettes were a 'protected purchase' and that smokers managed the cost of buying tobacco by reducing essential household spending (Guillaumier, et al., 2015). This included going without meals, paying bills late and substituting food choices, although sometimes the stress of not having enough

money to pay for household essentials and cigarettes led smokers to buy cigarettes as a way of coping with the stress of not having enough money. The study also found that other strategies were used to maintain smoking behaviour and manage the rising cost of tobacco such as switching to cheaper brands of cigarettes or smoking roll-your-own tobacco and sharing, swapping or borrowing cigarettes within social networks.

One other possible explanation for higher smoking rates amongst disadvantaged socio-economic groups is that poor smokers may use other ways to minimize their tobacco expenditure such as obtaining cigarettes by illicit means including counterfeit and smuggled tobacco or by buying cheaper tobacco including discounted cigarettes and roll your own tobacco (RYO). A recent UK study that explored trends in the use of cheaper forms of tobacco (e.g. economy and ultra-low price (ULP) cigarettes and RYO) between 2001 and 2008, found that the use of these products had significantly increased over time and that the odds of smoking economy, ULP and RYO were highest amongst the most socio-economically disadvantaged smokers (Gilmore, et al., 2015).

The evidence for a materialist explanation for smoking as discussed above suggests that adults in poorer socio-economic groups use smoking as a way of coping with the stresses associated with the direct effects of material deprivation, whilst the cost pathway suggests that the poorest smokers are unable to afford the cost of smoking and therefore their smoking habit is likely to lead to continued or further material deprivation. It is suggested that the stress and cost pathways are linked and work in a cyclical manner with poorer socio-economic groups using smoking to cope with the stress associated with material deprivation but with the cost of smoking increasing material hardship, which in turn creates more stress for poorer smokers to cope with.

Whilst a number of studies have explored the relationship between material circumstances and smoking behaviour, overall there appears to be less research on the contribution of material factors to smoking inequalities when compared to other explanations such as cultural influences. It is possible that material explanations may have become less important over time due to the shift in the locus of identity from being tied to mechanisms of production to patterns of consumption (Hinote & Cockerham, 2015), however, the strong links between social structure and smoking would suggest that a material explanation for smoking is still an important explanation to consider.

2.4.2   Psychosocial explanation

The materialist explanation for smoking inequalities discussed above proposes that the direct effects of absolute material deprivation influence smoking behaviour, however, this explanation is closely linked to the psychosocial explanation for smoking inequalities, which suggests that the indirect effects of

relative material deprivation influence smoking behaviour. The effects of relative deprivation are mediated in the form of stress or anxiety, which arise in response to having less income and lower status (Marmot, 2004) or from being in a lower social position than others (Wilkinson, 1992). Therefore, the 'status anxiety' that people feel from comparing themselves with others leads to risk taking health-related behaviour such as smoking (Wilkinson, 1996; Wilkinson & Pickett, 2009).

There is some evidence for a psychosocial explanation for smoking behaviour from Marsh and MacKay (1994) who showed that although smoking declined between 1976 and 1990, the decline was found to be highest amongst the wealthiest three-quarters of the British population and lowest amongst the poorest quarter of the population. During this period, income differences in real terms were found to have widened between those in the least affluent and those in the most affluent socio-economic groups. However, despite the fact that the poorest got relatively poorer and less able to afford to smoke, rates of smoking amongst this group were found to have increased. In response to Marsh and MacKay's findings, Wilkinson (1996) suggested that although the cost of smoking might be a powerful disincentive for the poorest not to smoke, "increased relative poverty and unchanged absolute incomes led the poor, against the national trend, to smoke more" with smoking becoming "a marker of socio-economic stress" (p.185).

Further evidence of an association between psychosocial factors and smoking behaviour comes from a study by Stronks *et al.,* (1997) who explored the contribution of cultural, material and psychosocial factors on the socio-economic patterning of smoking rates among Dutch adults. Using an extensive number of psychosocial factors, they found that neuroticism, coping style and exposure to life events increased the risk of smoking amongst lower educational groups. However, when compared to material or cultural influences, the psychosocial factors appeared to be less important in contributing to smoking. However, the material factors which included income, employment status and housing conditions were found to overlap with the psychosocial factors, which the authors suggested, supported the idea that smoking might be a way of coping with the stresses associated with relative material disadvantage.

Whilst there appears to be some evidence for the indirect effect of relative deprivation on smoking behaviour, the relative deprivation explanation has been subject to much debate with evidence disputed (Goldthorpe, 2010; Saunders, 2010; Snowdon, 2010; Lynch, et al., 2000). The psychosocial explanation was not a focus of this project however, it is widely acknowledged that cultural factors play an important role in influencing smoking behaviour and contributing to smoking inequalities and are discussed in the next section.

2.4.3   Cultural explanation

There are three possible theories associated with a cultural explanation for smoking inequalities: social identity/social distinction; the diffusion of innovative behaviours and the effects of social norms/social networks.

2.4.3.1 Social identity/social distinction

This theory is based on concepts derived from Bourdieu (Williams, 1995; Bourdieu, 1984) and proposes that smoking behaviour is a way for individuals to express their social identity and position in the social hierarchy. People's choice of lifestyle behaviours such as smoking or not smoking vary between different socio-economic groups and are not just a result of conscious decisions but are linked to 'habitus', which is an internalized disposition comprised of a person's living conditions and which generates certain practices, 'tastes' or preferences. These practices or habits are shaped through the cultural context in which people are embedded and guide them towards particular behaviours that are considered to be the norm of a particular social group. These behaviours are learned and conform to social group norms which also impose boundaries on what forms of behaviour are possible. Therefore, people who live in similar social contexts tend to develop similar habitus' and are more likely to share similar lifestyles, which influences whether or not they smoke.

The choice of particular health-related behaviours such as smoking or not smoking may also be used as a way of expressing and reinforcing 'social distinction' so that relationships of superiority and inferiority can be established or reinforced between different social groups (Bourdieu, 1984). For example, those in more socially advantaged groups might not smoke both as an indicator of their higher social position and to distinguish themselves from more disadvantaged groups who are more likely to smoke. Different social groups have different amounts of 'cultural capital', which include symbolic elements such as particular tastes and preferences (e.g. not smoking or smoking) acquired by belonging to a particular social class. Therefore, cultural capital is a key component which links choices of health-related behaviour to people's social position (Abel, 2008). Some evidence for the link between smoking, cultural resources and social distinction comes from a study by Pampel (Pampel, 2006) who found that preferences for classical music were associated with lower rates of smoking and preferences for jazz and heavy metal music were associated with higher rates of smoking.

Whilst the concepts of habitus and cultural capital can help to explain why those higher up the social hierarchy are less likely to smoke and to use not smoking as a form of social distinction, these concepts can also help to explain why those lower down the social hierarchy are more likely to be smokers. For example, smoking behaviour amongst more disadvantaged groups may be deeply embedded in their social context. Therefore, rather than making a conscious decision to smoke, this behaviour is influenced

and guided by daily routines and social practices (Williams, 1995) and by what is considered to be appropriate behaviour for 'people like us' (Lynch, et al., 1997). Research by Katainen (2010) explored social class differences in qualitative accounts of smoking and found that for smokers in manual occupations, smoking was regarded as a habit that was rooted in daily life and associated with particular situations (e.g. after a meal, when driving or on breaks at work) but also "just happened without being consciously desired" (p.1098). The majority of manual employees interviewed in the study were smokers, therefore, smoking behaviour was likely to be deeply embedded in routines at work as well as at home. Katainen (2010) concluded that smoking was a cultural practice which was embedded in a working-class habitus and which was rarely questioned within a working-class context.

Whilst more advantaged groups might use not smoking as a means of distinguishing themselves from other socio-economic groups, less disadvantaged groups might use smoking to also distinguish themselves, with smoking behaviour used as an indicator of rebelliousness or "independence, toughness and freedom from convention" (Pampel, et al., 2010, p.7). Other qualitative studies provide evidence of the cultural and social meaning of smoking in the everyday lives of those who are socially disadvantaged and highlight how smoking is linked to social context and woven into the routine of daily lives (Bancroft, et al., 2003; Stead, et al., 2001; Laurier, et al., 2000).

It has been suggested that the need for 'social distinction' may have increased in contemporary society today, due to a reduction in the opportunities for social groups to differentiate themselves from others on the basis of visible signs of material prosperity (Abel, 2008). The possible significance of social distinction might also reflect more general socio-economic changes that have seen a shift towards the idea that social identity is tied to one's position in the consumption process, rather than in the production process and with health-related behaviour becoming an important marker of social position (Hinote & Cockerham, 2015).

Habitus may also be important in explaining how smoking behaviour gets taken for granted and routinized in the form of habits which are then passed down through different generations, possibly through education (Bartley, 2004). For example, children raised in an advantaged social context are more likely to experience an upbringing where education is considered important and given a greater emphasis and are therefore more likely to develop a particular disposition towards certain behaviours such as working harder at school. As a result, they are more likely to stay in the same social position as an adult and have a healthy lifestyle, which forms part of the 'habitus' of this social group (Lynch, et al., 1997). Therefore, not smoking is underpinned by a certain set of habits that an individual acquires over time and that link social position to health-related behaviour. Similarly, children growing up in a disadvantaged social context where family members smoke are more likely to be influenced by their habitus and are more likely to become smokers themselves. Evidence for a link between the home

habitus and smoking behaviour comes from a meta-analysis that looked at the influence of smoking by parents, siblings and other household members and found that contact with other smokers within the household increased the likelihood of smoking uptake (Leonardi-Bee, et al., 2011).

Bourdieu's concept of habitus has been criticised for being too deterministic (Katainen, 2010) with choice underplayed and practice and habit largely operating unknowingly on the individual. However, Williams (1995) suggests that even though the logic of practices falls outside the boundaries of conscious choice, it does not mean that individuals cannot be consciously motivated. Choice and change may occur but this is likely to be constrained by whatever actions are possible within a person's social context and habitus.

2.4.3.2 Diffusion of innovative behaviours

The second theory relates to the differential penetration of the adoption and diffusion of innovative behaviours. This theory proposes that those in more socially advantaged groups adopt new behaviours or take up new interventions (e.g. health-promoting behaviour such as not smoking) before those in more socially disadvantaged groups. In addition, men are quicker to adopt new behaviours before women, within these different socio-economic groups (Rogers, 1995). This theory has been used to describe how smoking diffuses through a population in stages, with more advantaged socio-economic groups being the first to take up smoking but who are also the first to quit, and with men taking up smoking within different socio-economic groups before women (Lopez, et al., 1994). This theory is linked to the theory of social distinction (as discussed in the previous section) as it emphasizes the importance of symbolic boundaries which can be used to reinforce differences in status between groups, through the adoption and diffusion of innovative behaviours such as not smoking and may be used by more advantaged groups to distinguish themselves from less advantaged groups (Pampel, 2002; Cockerham, 2005). The lag in the adoption and diffusion of innovative behaviours such as quitting smoking between socio-economic groups can also help to explain inequalities in smoking, which are often found to widen due to differences in the uptake and quitting between different socio-economic groups (Lopez, et al., 1994).

Whilst the progression of the smoking epidemic can help to explain inequalities in smoking. It has also been suggested that government policies may have played a part in the increase in smoking inequalities through the differential penetration of tobacco control and health promotion policies, which are designed to change health-related behaviour (Mackenbach, 2012). These types of policies were introduced by the UK government from the early 2000's (DH 2010, 2004) to address smoking and health inequalities, although it has been suggested that they may have been more effective at influencing the health-related behaviour of those in the most advantaged groups compared to those in the least

advantaged groups (Graham, 2012), thereby contributing to a further widening of inequalities in smoking behaviour (Stait & Calnan, 2016).

If, as has been suggested, there are differences in the take-up of health promotion policies, how could this be explained? One particular study (Lindbladh & Lyttkens, 2002) suggested that making deliberate decisions is energy-demanding and therefore, those in a higher social position are more likely to have more resources and to be more comfortable with consciously changing their behaviour. On the other hand, those in lower social positions who are more likely to rely on habits, which are more routinized and require less effort and are therefore less likely to change their behaviour (for a more detailed discussion on this see Chapter 3, section 3.4.2.2). Whilst it has been suggested that policies designed to change behaviour have been adopted more quickly by those in more advantaged groups (Bauld, et al., 2011), evidence for the differential effects of tobacco control policies on different socio-economic groups appears to be less clear (Mackenbach, 2019; Hill, et al., 2014; Hiscock, et al., 2012).

One of the problems that has arisen from policies designed to protect public health, is that they have been designed to signal the unacceptability of smoking. This in turn, has led to an increase in the stigmatisation of smoking behaviour and of those who smoke. There is certainly evidence of the stigmatization of smoking behaviour and how this has affected socio-economic groups differently. For example, Farrimond and Joffe (2006) used thematic analysis to explore the stigmatization of British smokers from different socio-economic groups and found that smokers in less disadvantaged socio-economic groups tended to challenge and distance themselves from the stigmatization from smoking but were also more likely to conceal their own smoking behaviour. However, those in more disadvantaged socio-economic groups appeared to experience more stigma but were more likely to internalise it rather than challenge it or change their behaviour to avoid it. The authors concluded that that the use of stigmatization as a policy tool may not be equally motivating for all groups because although the stigmatization of smokers and smoking behaviour might have motivated those in less disadvantaged groups to quit, smoking prevalence was still high amongst more disadvantaged groups. Therefore, the health promotion policies and campaigns designed to reduce smoking were failing to "engage the already stigmatised disadvantaged smoker", which could perpetuate smoking inequalities further (Farrimond and Joffe, 2006, p.489).

Other research provides evidence to suggest that smoking appears to be more stigmatised amongst those in more advantaged socio-economic groups compared to those in less advantaged socio-economic groups (Stuber, et al., 2008) and that as a result those in more advantaged groups were more likely to feel pressure to change their behaviour accordingly. One particular qualitative study found that smokers in a high SEP were aware of social pressures linked to not smoking and had noticed a decrease in smoking prevalence within their particular social circle and community over time. However, smokers in

a low SEP did not report feeling some of the social pressures linked to smoking and had not noticed any decreases in smoking prevalence amongst their social circle or community. (Paul, et al., 2010).

As smoking has become more stigmatized amongst more advantaged groups, this is likely to have contributed to an increase in smoking cessation amongst these groups. However, as smoking has become more synonymous with disadvantage, this has led to smoking identities becoming inextricably linked to class identities, with smoking behaviour seen to be a signifier of social class (Graham, 2012). Skeggs (2005) describes this problem as the negative labelling of working-class identities with white working-class women represented and interpreted by visual 'moral subject formation' where "to smoke, drink, be fat and publicly fight......is a national sin" (p.967).

2.4.3.3 Social norms/social networks

The third theory proposes that social norms influence smoking with individuals following or being influenced by the behaviour of those in their social networks such as family members, friends and neighbours. For example, smoking is more likely to be considered normal or acceptable in the most disadvantaged groups as a high proportion of people in this group are smokers, whereas, smoking is more likely to be de-normalized and stigmatized for those in the least disadvantaged groups, as a high proportion of people in this group are non-smokers.

Children who grow up in disadvantaged households are more likely to become smokers as they are more likely to live in a household where one or both parents smoke. In this sense smoking is modelled as being normal behaviour with easy access to cigarettes in the home for children to experiment with (Jarvis & Wardle, 1999). Smoking often starts during the early teenage years with exposure to parental and sibling smoking increasing the risk of smoking initiation (RCP, 2010). Studies have also shown that parental smoking status is a determinant of smoking uptake amongst young people (East et al, 2021; Alves, 2016; Amos, et al., 2009). For example, one study found that if children lived with one parent who smoked, they were nearly twice as likely to start smoking themselves (Leonardi-Bee, et al., 2011). However, if both parents who smoked, they were nearly three times more likely to start smoking themselves. The study also found that the likelihood of children taking up smoking increased by nearly two and a half times if a sibling smoked and by nearly two times if any household member smoked.

However, it is not just the influence of parental or sibling smoking that is likely to increase smoking uptake amongst disadvantaged socio-economic groups, research also highlights the importance of peers and close friends in the uptake and maintenance of smoking behaviour. For example, one study that explored the effects of social norms on youth smoking uptake found that smoking initiation was consistently predicted by close friends smoking with young people aged 24 years or younger, two and a half times more likely to start smoking if close friends smoked (East, et al., 2021). Longitudinal research

has also found that the influence of friends' smoking behaviour is an important influencing factor on smoking uptake and appears to be particularly important between mid-adolescence (15 years) and early adulthood (23 years). For example, the effect of having friends who smoked had a particularly strong influence on smoking uptake between 15 and 16 years and increased the likelihood of taking up smoking by up to 10 times more than those with friends who didn't smoke. Although the effect appeared to decline over time, the likelihood of taking up smoking was still three times greater for those with friends who smoked, between the ages of 18 and 21, than for those with friends who didn't smoke (West, et al., 1999). However, the study did not find any effect of parental smoking on uptake between 15 and 23 years and concluded that the effect of parental influences on smoking uptake was likely to occur at younger ages.

The discussion above suggests that as smokers are more likely to have contact with a greater number of other smokers both at home and within their social networks, this is likely to contribute to the maintenance of smoking behaviour. However, the influence of being within a social network where smoking prevalence is higher is also likely to make it more difficult for individuals to quit. Research that has explored the influence of social norms on elements of smoking behaviour such as quitting have suggested that smokers who inhabit social contexts where there are a higher proportion of smokers, are less likely to succeed in their attempts to quit (Hitchman, et al., 2014). However, it has been suggested that because smoking tends to spread across social networks, network phenomena may also be relevant to quitting. For example, one study that explored the collective dynamics of smoking behaviour in a large social network found evidence to suggest that quitting seemed to occur amongst groups of inter-connected individuals around similar times. The decision to stop smoking did not appear to be made just by individuals but appeared to reflect a collective choice to quit, made by groups of people who were inter-connected. As these groups quit, those who still smoked appeared to become an increasingly marginalized group (Christakis & Fowler, 2008). This can help to explain why higher rates of smoking cessation have been found amongst those in the most socially advantaged groups but it can also help to explain why smokers are less likely to succeed in quitting, as they inhabit social contexts where there are a higher proportion of smokers, which is likely to sustain their smoking behaviour.

Although the social norms theory appears to be similar to the social identity/social distinction theory discussed in section 3.4.3.1, these theories are different. Habitus is related to the effects of structural factors on habits of thought and on patterns of thought and actions, therefore, being in a disadvantaged socio-economic group encourages a particular way of seeing and reacting to the world around us. Social norms theory, however, suggests that behaviours that have been encouraged by a particular habitus are reinforced.

Section 2.4 has emphasized the importance of an individual's material circumstances and cultural context in determining, constraining and facilitating smoking behaviour and explaining why smoking inequalities exist. The next section considers the government's approach to tobacco control since the early 1970s and the extent to which policies were designed to address smoking and health inequalities

2.5   Smoking policy in England

The health consequences of smoking have been evident for some considerable time (Doll & Hill 1950, 1956). However, government action to control and reduce smoking was cautious and rather slow until the beginning of the 21st Century and was largely characterised by a non-interventionist approach of persuasion and industry self-regulation rather than direct intervention through fiscal policy or control over tobacco production, sales and restricting smoking in public places. The approach adopted by the English government during the 1970s, 1980s and 1990s was to try to persuade smokers to change their behaviour so as to reduce the risks and limit the harms associated with smoking through education, pricing and regulatory measures, which were mainly in the form of voluntary agreements with the tobacco industry and were mostly related to advertising and packaging (Calnan, 1991). Despite a series of reports from elite medical groups highlighting the health problems associated with smoking (RCP 1962, 1971, 1977, 1983), there was a lack of momentum in the introduction of smoking control policies during the 1970s and 1980s. This was largely due to concern by the government of the potential impact of smoking control policies on tobacco manufacturing and promotion, exports and tax revenues and from the powerful influence of the tobacco industry in shaping smoking policies (Baggott, 2011).

However, a new activist policy agenda in public health emerged during the 1970s, largely driven by the anti-smoking pressure group ASH (Action on Smoking and Health), which emphasized abstention from smoking rather than the government's approach of reducing the risks of smoking by placing responsibility for a person's health onto the individual (Berridge, 2003). The anti-smoking campaign was further reinforced in the 1980s by the British Medical Association, which attempted to put pressure on the government and the tobacco industry to introduce stronger smoking control policies. Although measures such as increasing tobacco taxes, the adoption of stronger health warnings on tobacco packaging and an increase in resources for health education programmes were introduced, the anti-smoking lobby argued that stronger policies were needed (Baggott, 2011).

It wasn't until the 1990s, when New Labour came into power, that a more robust approach to smoking policy was taken which was largely driven by the Party's commitment to address and end inequalities in health. The Acheson Report (Acheson, 1998) into health inequalities, commissioned by the Labour government, made a number of recommendations in relation to tobacco policy measures, which focused on reducing the material and structural factors that promoted inequalities in smoking (Spencer, 2007). Publication of the 1998 White Paper 'Smoking Kills' (DH, 1998) outlined the government's

strategy to reduce smoking amongst adults, children and pregnant women. The policy document included proposals such as reducing exposure to environmental tobacco smoke; a ban on tobacco advertising; additional funding for stop smoking services with wider availability of nicotine replacement therapy (NRT), increasing tobacco tax above inflation; reducing availability and supply of tobacco and further health education campaigns on the risks of smoking. During the 1980s and 1990s, a stream of evidence began to emerge on the risks associated with passive smoking (US Department of Health and Human Services, 1986; UK Scientific Committee on Tobacco and Health, 1988; Law, et al., 1997), which saw a shift in the emphasis of smoking-related harm from self-regulation and individual choice to one which presented harm and health risks to others (Berridge, 2003). Therefore, the 2004 White Paper 'Choosing Health' (DH, 2004) included further commitments to existing smoking policies, including a ban on smoking in public places and workplaces (except those specifically exempt) by the end of 2008. An initial proposal for a partial ban on smoking in public places was eventually rejected in favour of a comprehensive ban on smoking in all public places and work places, following public support and a strong anti-smoking lobby, amongst other key influences, which was introduced in England in July 2007. Shortly thereafter, the government increased the minimum legal age for buying tobacco from 16 to 18 years (ASH, 2016).

Whilst the government White papers ('Smoking Kills' and 'Choosing Health') highlighted the need to reduce smoking and health inequalities, they increasingly put more emphasis on individual choice and less emphasis on tackling inequalities. These policy documents adopted a behavioural approach (rather than the materialist/structuralist approach proposed by Acheson), which encouraged people to lead heathier lifestyles and assume responsibility for health-related behaviours, such as smoking, through informed choices and 'nudges' in the right direction (DH, 2004; 2010; Spencer, 2007).

Evidence suggests that tobacco control measures at the population level are effective in reducing smoking prevalence (Joosens & Raw, 2011). However, evidence of the effectiveness of policies in reducing smoking inequalities suggests that whilst price and taxation can be an effective way to reduce tobacco use amongst poorer socio-economic groups (WHO, 2015; Thomas, et al., 2008; Townsend, et al., 1994), other interventions such as smoke-free policies, advertising bans, health warnings or education and media campaigns show mixed or little evidence, unless particular efforts are made to reach disadvantaged smokers (e.g. smoking cessation support) (Hill, et al., 2014).

As well as being designed to reduce smoking prevalence, tobacco control and health promotion policies in England were designed to change public attitudes towards smoking by conveying the social unacceptability of such a behaviour and de-normalising smoking. However, whilst these policies were considered to have been largely successful in reducing smoking prevalence among adults in England (and the UK), it has been suggested that they have been more effective in reducing smoking prevalence

amongst more advantaged groups compared to disadvantaged groups and therefore may have increased smoking inequalities even further (Graham, 2012). There is certainly evidence that smoking has become a stigmatized behaviour (Stuber, et al., 2008; Farrimond & Joffe, 2006). In this sense, smoking is not just considered to be a health problem, but has become a social and moral problem, which has seen the social context change to one that has become very anti-smoking. However, as Jarvis and Wardle (1999) argue, the 'victim-blaming' approach is not helpful as it does not address the underlying reasons for why disadvantaged socio-economic groups are more likely to smoke and why cultural and material factors influence people to maintain smoking behaviour. In addition, the 'choice' agenda adopted by the government White Papers discussed above, makes the assumption that everyone has the same opportunities in making choices but fails to take into account the material and cultural influences that facilitate or constrain smoking behaviour (Spencer, 2007).

Since 2011, a number of other smoking policies have been introduced in England. These include a ban on tobacco displays at the point of sale and on the sale of tobacco products from vending machines; the introduction of standardized tobacco packaging; a ban on smoking in private cars carrying children under 18 years and the sale of cigarettes in the minimum pack size of 20 cigarettes (ASH, 2016). However, these measures were largely designed to reduce smoking prevalence overall rather than to address smoking inequalities more directly. Although the government's latest tobacco control policy plan for England (DH, 2017) highlights a commitment to reducing smoking inequalities, this appears to be through the transference of action from a national to a local level and through the provision of services designed to help support disadvantaged smokers to quit, thereby emphasizing inequalities in access to and use of stop smoking services.

2.6   Conceptual framework, research question and hypotheses

Since the early 1970s there has been a dramatic and substantial reduction in smoking in the UK but this decline has not been equal across the different socio-economic groups. This has resulted in smoking becoming disproportionately concentrated amongst the most disadvantaged socio-economic groups and has seen smoking inequalities widen over time, which in turn contributes to inequalities in health. This chapter has discussed inequalities in smoking behaviour, which are characterized by higher rates of smoking and cigarette consumption but lower rates of cessation and never smoking amongst the most disadvantaged socio-economic groups and by lower rates of smoking and cigarette consumption but higher rates of cessation and never smoking amongst the least disadvantaged socio-economic groups. Two main theories explain why smoking is more prevalent amongst those who are more disadvantaged compared to those who are less disadvantaged. These are the materialist explanation, which proposes that the direct effects of disadvantaged material circumstances influence smoking behaviour and the cultural explanation, which proposes that a person's cultural context influences whether they smoke or not.

Whilst there is a wealth of literature on the relationship between SEP and smoking behaviour, it is not known how different SEP indicators such as education, income and occupation differentially relate to the socio-economic patterning of smoking. SEP is often used generically or interchangeably in research studies on smoking inequalities and has not investigated the different mechanisms that underpin these measures of SEP. This is important as different SEP indicators capture different factors and pick up different mechanisms. Therefore, the value of investigating the separate effects of these different indicators, is that it can help to explain what mechanisms might be involved in smoking inequalities and how they might have changed over time. Therefore, the aim of the smoking element of the project is to investigate the relative importance of the contribution of material and cultural factors to smoking inequalities between 1973 and 2011. By conducting the analysis over a significant period of time, it is possible to gain a better understanding of the relative importance of material and cultural factors and how these might have changed between 1973 and 2011. This is important as it has implications for the types of policies that could be designed to address smoking inequalities.

The primary research aim for the smoking element of this project was to:

Provide sociological explanations about long-term trends in the social patterning of smoking behaviour.

The research question for the smoking element of this project was as follows:

To what extent has the relationship between different indicators of socio-economic position and cigarette smoking behaviour changed between 1973 and 2011.

The conceptual framework in Figure 2.9 illustrates the relationship between SEP and cigarette smoking and represents the main factors of interest in this project. Whilst it is acknowledged that there are many different influences on smoking behaviour, the main focus of this study was on the influence of material and cultural factors and their relative importance on adult cigarette smoking behaviour. Smoking is a complex behaviour that is influenced by a person's position in the social hierarchy. SEP can be measured using a variety of different socio-economic indicators such as education, occupation and income. For example, lower levels of education, occupation and income are associated with higher rates of smoking, greater cigarette consumption and lower levels of cessation. However, different socio-economic indicators have different characteristics and work through different pathways to link SEP with smoking behaviour (Galobardes, et al., 2006) (Chapter 4 section 4.3 discusses these pathways in more detail).
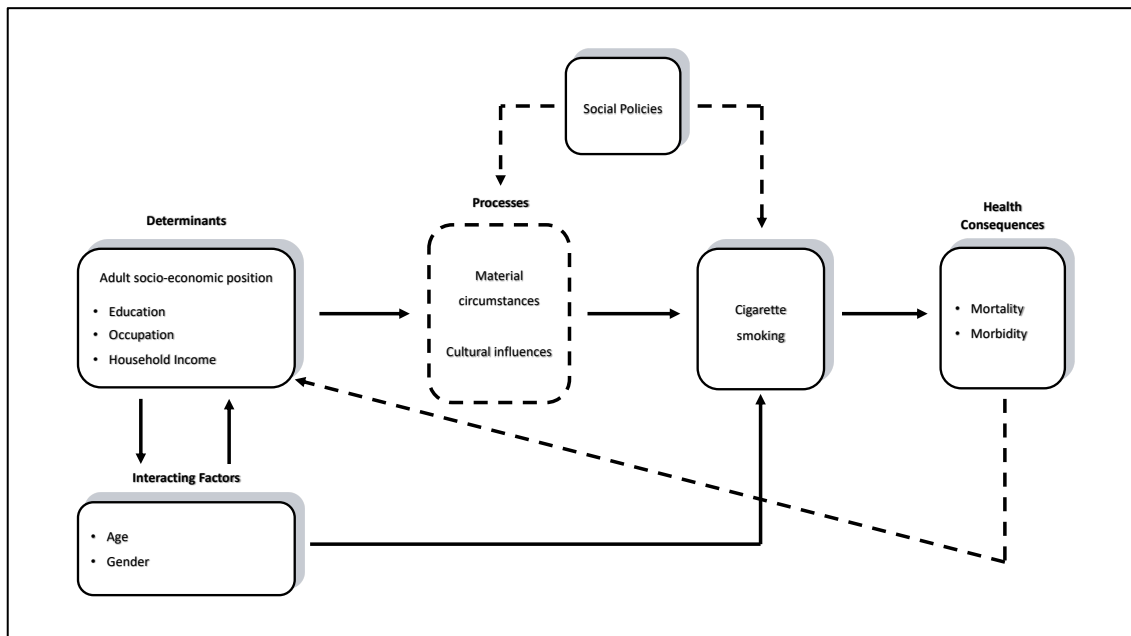
Figure 2.9: Conceptual framework explaining the relationship between socio-economic position and cigarette smoking

The relationship between SEP and cigarette smoking is linked by two main factors: material circumstances and cultural influences. There are two possible pathways that are associated with a material explanation for smoking. The first pathway proposes that disadvantaged material circumstances directly influence and shape smoking behaviour, with people using smoking as a means of coping with stressful and disadvantaged circumstances. Smoking is an expensive habit and therefore the second pathway proposes that those who are poor might smoke less or there would be a lower proportion of poor smokers relative to affluent smokers, due to the expense incurred from smoking. However, smoking is disproportionately concentrated amongst those in the lowest socio-economic groups. The stress and cost pathways work in a self-perpetuating cycle with poorer groups using smoking to manage the stress associated with disadvantaged material circumstances, however, the cost of buying cigarettes increases financial hardship, which in turn creates more stress for poorer smokers to cope with.

Three possible theories are associated with a cultural explanation for smoking behaviour. The first proposes that smoking behaviour is influenced by social identity with the choice of smoking or not smoking guided by certain 'tastes' or preferences shared by particular socio-economic groups. It is also possible that social groups use smoking or not smoking as a way of establishing or expressing 'social distinction' between different social groups. The second theory is linked to the diffusion of innovations whereby those in more socially advantaged groups are quicker to adopt new behaviours such as quitting smoking before those in less socially advantaged groups. The third theory proposes that social norms influence smoking behaviour with people being influenced by the behaviour of those around them. For example, smoking is more likely to be considered normal or acceptable in the most disadvantaged socio-

economic groups due to the high proportion of smokers in this group, whereas, smoking is more likely to be de-normalized and stigmatized for those in the least disadvantaged socio-economic groups, due to the high proportion of non-smokers in this group.

Gender and age are also important determinants of cigarette smoking and produce different patterns of smoking behaviour between men and women and between different age groups. For example, smoking prevalence generally declines as people get older and a higher proportion of men are smokers compared to women. In addition, gender interacts with SEP to produce further variations in smoking behaviour between different socio-economic groups. For example, although smoking behaviour is associated with those who are most disadvantaged, rates of prevalence have declined least amongst women when compared to men in disadvantaged socio-economic groups.

Social policies may indirectly influence smoking behaviour and material circumstances in the following ways. Firstly, policies on tobacco control are often designed to make tobacco less affordable with the aim of helping smokers to quit or they may be designed to stop the promotion of tobacco with the indirect aim of making smoking more socially unacceptable. Health policies may be designed to change public attitudes towards smoking and to de-normalize smoking behaviour by 'nudging' or changing health-related behaviour so that people are more likely to choose the healthier option. In this sense health policies are discouraging people from smoking rather than forbidding smoking behaviour. Tobacco control interventions that increase the cost of smoking could also be argued to work in a similar way by discouraging smoking rather than forbidding it. Social policies can also indirectly affect cultural processes and material circumstances. For example, tobacco control policies may have unintentionally increased smoking inequalities, rather than reducing them, through the stigmatization of smokers and smoking behaviour. If the effects of stigmatization are not experienced in the same way across different socio-economic groups, disadvantaged smokers may be less motivated to change their behaviour and quit smoking compared to smokers who are less disadvantaged. Consequently, the most disadvantaged smokers continue to bear the greatest burden of the costs of smoking which are likely to rise due to tobacco control policies which increase the cost of tobacco.

Finally, cigarette smoking is particularly harmful to health and is strongly linked to morbidity and mortality. Because smoking is disproportionately concentrated amongst the lowest socio-economic groups, it is these individuals who are at a significant risk of experiencing the greatest burden of smoking-related morbidity and mortality, thereby contributing to inequalities in health. The health consequences of smoking are indirectly linked to an individual's position in the social hierarchy, as health problems and the severity of long-term health conditions associated with smoking can affect a person's quality of life as well as their ability to work. This in turn can lead to loss of work and an increase in financial hardship and can result in downward social mobility.

Following the review of the literature on smoking behaviour discussed in this chapter, three hypotheses are proposed for the smoking element of this study:

Hypothesis 1: Cultural factors have a bigger influence than material factors on smoking behaviour due to social identity, social distinction and social norms.

Hypothesis 2: Material factors have a bigger influence than cultural factors on smoking behaviour due to disadvantaged material circumstances.

Hypothesis 3: The relative importance of cultural factors compared to material factors on smoking behaviour will have increased between 1973 and 2011.

Two different approaches have been taken for Hypothesis 1/Hypothesis 2 and Hypothesis 3. Whilst Hypotheses 1 and 2 are contradictory, both of these hypotheses can be derived from the existing literature. However, whilst Hypothesis 3 implies one idea, there is no competing hypothesis stating that the relative importance of material factors will have increased over time.

Chapter 3: The Relationship Between Alcohol Consumption and Socio-economic Position

3.1   Introduction

As discussed in the introduction, this research project was designed to compare the social patterning of cigarette smoking and alcohol consumption, with a particular focus on the influence of different socio-economic indicators on these behaviours over a significant period of time. The literature review on the relationship between smoking and socio-economic position (SEP), in Chapter 2, stressed the dramatic and significant reduction in smoking in the UK from the 1970s onwards but that the decline had not been equal across the different socio-economic groups. The slower decline amongst least advantaged groups resulted in smoking becoming disproportionately concentrated in this population and contributed to an increase in smoking inequalities. The discussion emphasized the importance of an individual's material circumstances and cultural context in influencing smoking behaviour and identified a gap in the literature that had not investigated the changing effects of different socio-economic indicators on smoking behaviour, to assess the relative importance of material circumstances and cultural influences on smoking inequalities in England, over time. Like smoking, alcohol consumption is also known to significantly contribute to health inequalities, therefore, by comparing the extent to which the relationship between different SEP measures and smoking and drinking has changed over time, can help us to understand the contribution these behaviours make to inequalities in health.

The aim of this chapter is to situate the alcohol element of the project within the wider field of literature on alcohol studies, with a particular focus on reviewing existing literature on the relationship between alcohol consumption and socio-economic position (SEP). A substantial body of evidence exists which identifies strong links between smoking and drinking and health inequalities, however, whilst both behaviours contribute to poorer health, important differences exist between these behaviours. The chapter begins by briefly outlining some of the key differences between cigarette smoking and alcohol consumption before moving on in section 3.2 to highlight the public health burden of alcohol in relation to morbidity and mortality and more general patterns associated with alcohol consumption in England and the UK. Section 3.3 looks more specifically at the relationship between drinking and SEP, whilst Section 3.4 discusses explanations for the socio-economic patterning of drinking. Section 3.5 reviews policy approaches to tackling alcohol misuse in England and whether these policies were designed to address inequalities in alcohol consumption and health inequalities. Finally, in Section 3.6, the conceptual framework is described and the research question for the alcohol element of this project is stated.

The amount of research that exists within the field of alcohol consumption that is potentially relevant, is considerable, therefore the literature discussed in this chapter is not designed to be exhaustive but to link the alcohol research question to relevant studies within the topic area of the relationship between SEP and alcohol consumption. Where possible, the examples of data given on drinking habits in this chapter relate to consumption by adults in England, however, where these data were not available, data for Great Britain or the UK were used. The data and policies discussed, focus on the period of analysis covered in this project (1978-2011), although more recent data and policies are included, where relevant, to highlight any important changes. It is important to note that the survey methodology used to calculate alcohol consumption in UK surveys was revised between 2006 and 2008, to reflect changes in the strength of drinks and differing wine glass sizes (see Goddard (2007) for further information), therefore this should be taken into account when looking at data on trends of the amount of alcohol consumed and interpreted with caution.

Alcohol is very much a part of modern life with the majority of adults in England consuming alcohol either occasionally or on a regular basis each week. For many adults, the consumption of alcohol is an enjoyable activity which is associated with a variety of benefits including socialising, relaxing and celebrating. Alcohol, like tobacco, is a legal and widely available drug, however, alcohol is considerably more popular than smoking, with recent data showing that approximately 82% of adults in England had consumed alcohol within 12 months of being interviewed compared to 17% of adults in England who were classified as current cigarette smokers (NHS Digital, 2019). The attitude towards these behaviours is also different. Whilst alcohol consumption is generally considered to be a socially acceptable lifestyle behaviour, smoking has, over time, become an increasingly stigmatized and unacceptable habit. This is likely to be a contributing factor to the difference between the proportion of adults who drink and the proportion of adults who smoke. In terms of key differences between smoking and drinking and the associated health effects, it is widely acknowledged that regardless of how little a person smokes, cigarettes are damaging to health. Light or moderate levels of drinking are not usually considered to be harmful and may confer some beneficial effects such as a reduced risk of coronary heart disease, stroke and diabetes amongst older adults (Room*, et al.,* 2005; Rehm, et al., 2003) although there is some debate around this (Chikritzhs, et al., 2009). However, when consumed at heavy or hazardous levels, alcohol is known to be harmful to health and increases the risk of disease, injuries and death.

3.2   Adult alcohol consumption in England and the UK

3.2.1   The public health burden of alcohol

In the UK, the use of alcohol is considered to be one of the leading risk factors that contributes to the burden of disease through death, poor health and disability (Williams *et al.,* 2014; Murray, et al., 2013), with recent estimates suggesting that 1.6 million adults in England may have some level of alcohol

dependency (PHE, 2016). Alcohol consumption increases the risk of injuries, road traffic accidents, suicide, interpersonal violence and alcohol poisoning, while longer-term effects of drinking are directly related to a range of health conditions including liver disease, stroke, cardiovascular disease and cancer as well as psychiatric illnesses such as depression, anxiety and alcohol use disorder (Collins, 2016; Ronksley *et al*., 2011; Parkin, 2010). Figure 3.1 illustrates alcohol-related deaths[2] in England for adults between 1994 and 2015, which increased for men and women until 2006/07 and then declined to a small degree for men whilst remaining relatively steady for women. Across the period, the gender gap in terms of alcohol-related deaths widened (ONS, 2017).
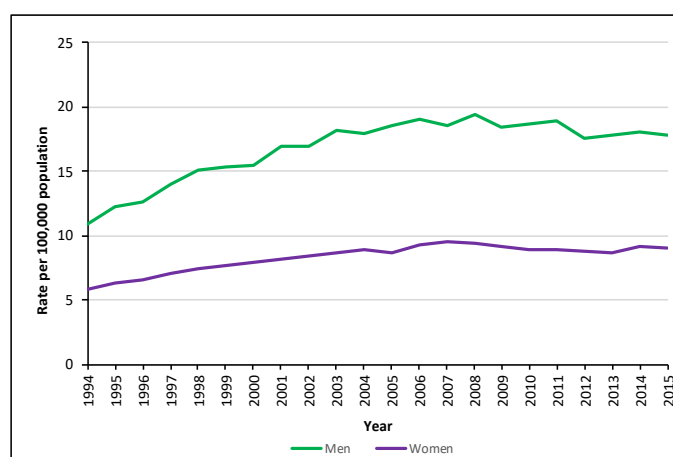
Figure 3.1: Age-standardised alcohol-related death rates (per 100,000) in England, 1994 to 2015, by gender.

Source: Alcohol-related deaths in the UK and constituent countries (ONS, 2017).

As well as being linked to mortality, alcohol consumption is also responsible for a significant number of hospital admissions. For example, in 2010/11, it was estimated that 1,168,300 hospital admissions were alcohol-related, based on primary and secondary diagnoses, with a higher proportion of admissions for men (731,000) than for women (437,200) (NHS Digital, 2012b). In addition to the health risks associated with drinking, alcohol consumption can also have wider social and economic consequences (e.g. violent crime, domestic violence, reduced work performance and unemployment) which can affect individuals other than the drinker and society more widely (PHE, 2016).

Research investigating the relationship between alcohol consumption and harm to health in the UK, has shown that the burden of alcohol-related mortality and morbidity consistently falls most heavily on those in the most disadvantaged socio-economic groups, thereby making this a key contributor to inequalities in health (Katikireddi, *et al.,* 2017; Bellis, *et al.,* 2016; Jones *et al.,* 2015; Erskine *et al.,* 2010). For example, between 1999 and 2003, men and women living in the most deprived areas of England and

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[2] The National Statistics definition of alcohol-related deaths only includes those causes as being most directly due to alcohol consumption.

Wales (as measured by the Carstairs Deprivation Index) were 5 and 3 times respectively, more likely to die from an alcohol-related condition than men and women living in the least deprived areas (see Figure 3.2) (Breakwell, et al., 2007).
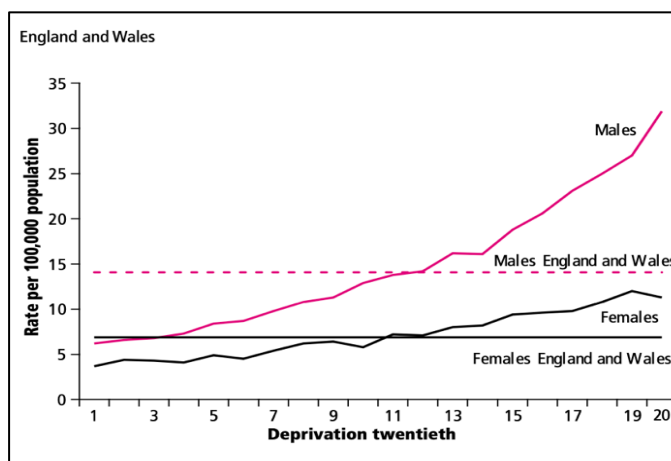
Figure 3.2: Age-standardised alcohol-related death rates by deprivation in England and Wales by deprivation twentieth and gender, 1999-2003.
Figure taken from Breakwell *et al.,* (2007).

A more recent study that looked at the contribution of alcohol-specific causes to inequalities in mortality in England and Wales suggested that inequalities were still marked and that the gap between the most and least deprived socio-economic groups had widened slightly over time (Angus, et al., 2020). For example, in 2001, alcohol was estimated to have reduced life expectancy in the most deprived groups (as measured by the index of multiple deprivation (IMD)) by 0.41 (7.5%) years for men and 0.21 (3.5%) years for women compared to 0.10 (1.6%) years for men and 0.06 (0.9%) years for women in the least deprived groups. By 2016, inequalities in mortality from alcohol-specific causes had widened very slightly with life expectancy estimated to have reduced in the most deprived groups by 0.45 (7.8%) years for men and 0.24 (3.9%) years for women compared to 0.12 (1.9%) years for men and 0.08 (1.2%) years for women in the least deprived groups.

Analysis of hospital admissions data from 1999 to 2003 by levels of deprivation also highlight an association between SEP and alcohol-related morbidity with men and women in the most disadvantaged groups more likely to be admitted to hospital for alcohol-attributable conditions compared to men and women in the least disadvantaged groups (see Figure 3.3) (Marmot, 2010).
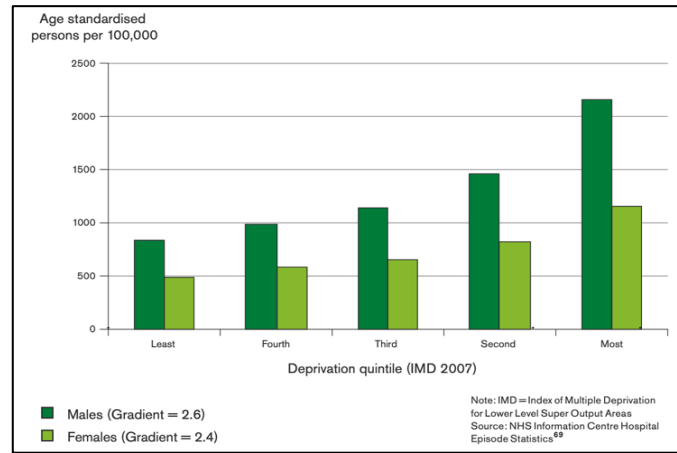
Figure 3.3: Alcohol-attributable hospital admissions by small area deprivation quintile in England, 2006-2007.

Figure taken from (Marmot, 2010).

A more recent study that looked at trends in alcohol-specific and alcohol-related admissions to hospital in England found that while rates of admission had increased for all socio-economic groups between 2005/06 and 2013/14, they were still significantly higher amongst the most deprived fifth of the population although the relative gap between the most and least deprived groups had reduced. For example, in 2005/06, age and gender standardised rates of alcohol-specific emergency admissions (primary or secondary diagnosis) per 100,000 were nearly five times higher for those living in the most deprived areas (151.6) compared to those living in the least deprived areas (30.7), however, by 2013/14, admissions were just over four times higher for those living in the most deprived areas (219) compared to those living in the least deprived areas (51.8). A similar pattern was also found for alcohol-related inpatient admissions (Currie, et al., 2015).

A finding in many of the studies that have explored the link between SEP and alcohol-related mortality and morbidity, is that levels of alcohol-related death and illness generally tend to be higher amongst men than amongst women (Green et al., 2017; Currie et al., 2015; Probst et al*.,* 2014). Figures 3.2 and 3.3 above illustrate the differential effects of alcohol consumption on the health of men compared to women, although this might be a reflection of higher levels of alcohol consumption amongst men (see Section 3.3 for examples).

Whilst the discussion thus far has highlighted the relationship between composite measures of area-level deprivation and alcohol-related mortality and morbidity, other SEP indicators such as education, occupation and income also show that those in the least advantaged socio-economic groups experience significantly higher rates of alcohol-related illness and mortality (Jones et al*.,* 2015; Makela, 1999).

For the majority of alcohol-related deaths, illnesses and injuries, a positive relationship exists between the amount of alcohol consumed and the risk of alcohol-related harm (e.g. alcohol-related cancers), with increasing levels of consumption linked to an increasing risk of harm (PHE, 2016; Bagnardi, et al., 2015). The discussion above highlights how the burden of alcohol-related mortality and morbidity falls most heavily on those who are most disadvantaged which might suggest that levels of alcohol consumption amongst these groups is higher compared to those in more advantaged groups. However, the relationship between alcohol consumption and SEP is complex as despite those in disadvantaged groups reporting similar or lower levels of alcohol consumption than those in more advantaged groups, socio-economically deprived individuals suffer significantly higher levels of alcohol-related mortality and morbidity. This is known as the alcohol harm paradox (Bellis et al*.,* 2016; Lewer et al*.,* 2016; Sadler et al., 2016).

Alcohol-related harm is driven by overall consumption at the population level, which in turn is driven by the volume of alcohol consumed and the frequency of drinking occasions at the individual level (Burton, et al., 2017), therefore, the next section looks at general patterns of alcohol consumption in England and the UK. Different terms are used in the alcohol literature to refer to harmful consumption levels, however, for the purpose of this thesis, unless stated otherwise, the terms risky/harmful/hazardous/heavy are used interchangeably to refer to men and women who exceed daily, weekly and heavy episodic ('binge drinking') limits, as recommended by the UK government and as defined in section 3.2.2 below.

3.2.2 Alcohol consumption and trends

According to data from HMRC duty and tax receipts on alcohol sales, consumption of alcohol at the population level in England and Wales increased from the early 1980s, from approximately 400 million litres in 1981 to 567 million litres in 2008 (about a 42% increase), before falling to 533 million litres in 2013 (see Figure 3.4) (Sheron & Gilmore, 2016). On average, it was estimated that in the UK in 1971, each adult (aged 15 years and over) consumed approximately 5.4 litres of pure alcohol, which rose to 11.2 litres in 2006 before falling to 9.8 litres in 2016 (WHO 2019, 2011). A more recent study that analysed 25 years of national survey data suggested that the overall decline in alcohol consumption in Great Britain was likely to be a result of a decrease in overall consumption levels and an increase in abstinence from drinking, particularly amongst those born after 1985 (Meng, et al., 2014).
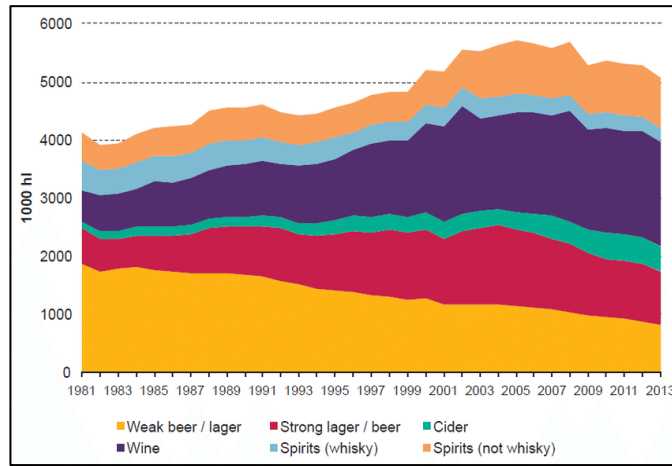
Figure 3.4: Cumulative consumption of alcohol in England and Wales in hectolitres, by alcohol type. Figure taken from Public Heath England (2016).

Between 1981 and 2013, alcohol-related deaths in England and Wales increased and were estimated to have trebled between 1980 and 2008 (See Figure 3.5). Figure 3.5 shows the same data as Figure 3.4 although normalised to 100% in 1980 to show the trend in alcohol-related deaths across the period (Sheron & Gilmore, 2016; Meng, et al., 2014).
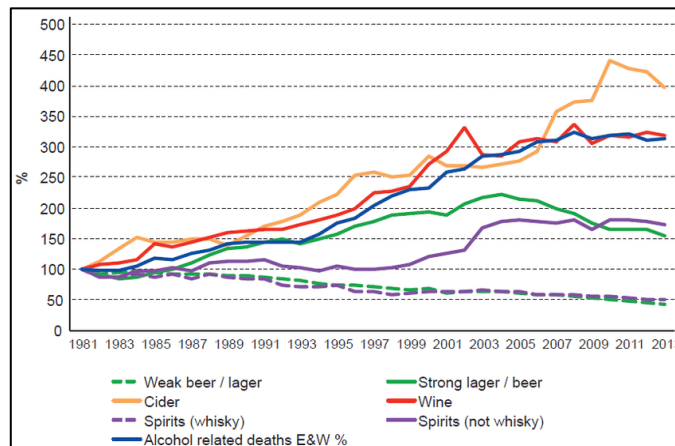
Figure 3.5: Cumulative consumption of alcohol in England and Wales in hectolitres, by alcohol type, normalised to 100% in 1980.
Figure taken from Public Heath England (2016).

In addition to changes in overall consumption levels, Figures 3.4 and 3.5 illustrate significant changes in the levels of consumption of different types of alcoholic drinks across the period. For example, between 1981 and 2013, there appeared to be a shift away from lower strength products such as weak beer/lager towards higher strength products such as wine and cider, with the trend in the consumption of wine and cider following a similar trajectory to the trend in alcohol-related deaths. It should be noted that the population level data above is based on recorded alcohol consumption from tax-paid sales and does not take into account unrecorded alcohol such as that produced at home, imported or sold outside

of government control, therefore this data is likely to underestimate true levels of alcohol consumption (WHO, 2019).

Whilst data at the population level can provide an indication of overall levels of alcohol consumption, data at the individual level can provide a more detailed picture of drinking behaviour within a population by highlighting significant variations in terms of the volume consumed and patterns of consumption between different socio-economic groups and between men and women. This data tends to come from large-scale national surveys which asks individuals about their alcohol use. Although it is acknowledged that data on alcohol consumption is subject to under-reporting and therefore tends to underestimate drinking behaviour (ONS 2013), it is useful for looking at patterns and trends of alcohol consumption between different groups within a population.

3.2.2.1 Patterns of harmful drinking

Many adults in the UK consume alcohol in moderation, however, alcohol consumption data at the individual level shows that a marked proportion of those who drink, consume alcohol above recommended limits, thereby increasing the risk of alcohol-related harm to health. Official guidance on sensible drinking, introduced in England in 1992, recommended that men and women should consume no more than 21 and 14 units a week respectively in order to reduce their risk of alcohol-related harm (DH, 1992). In addition, men and women who regularly consume more that 50 and 35 units a week respectively are considered to be at the highest risk of alcohol-related harm (DH, 2007).
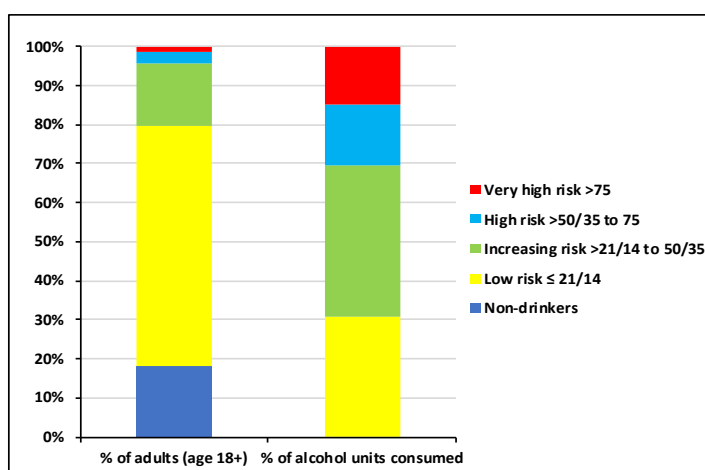
Figure 3.6: The distribution of drinkers by risk group and weekly consumption of alcohol in England using combined data from the Health Survey for England 2011 - 2013.
Adapted from Sheron and Gilmore (2016).

Figure 3.6 shows the distribution of drinkers aged 18 and over in England, by risk group and the corresponding proportion of alcohol units consumed by each group per week between 2011 and 2013 (Sheron & Gilmore, 2016). It can be seen that 18% of the population sample were reported to be non-drinkers, while 62% were considered to be low-risk drinkers (≤ 21 units/week for men and ≤14

units/week for women). However, 16% of men and women were drinking at increasing-risk levels (>21 to 50 units/week for men and >14 to 35 units/week for women), while 3.1% of men and women were drinking at high-risk levels (>50 to 75 units/week for men and >35 to 75 units/week for women). A smaller 1.3% of the population sample were estimated to have consumed alcohol at very high-risk levels by drinking in excess of 75 units each week. However, whilst the very high-risk group, combined with the high-risk group only accounted for 4.4% of the population, it was estimated that these groups together consumed nearly one third (30.3%) of all self-reported alcohol in England. When combining the increasing-risk, high-risk and very high-risk groups, who made up one fifth (20.4%) of the population, it was estimated that these groups consumed over two thirds (69%) of all self-reported weekly alcohol consumption in England.

This section has briefly highlighted some of the patterns of harmful drinking in England however, Section 3.2.1 illustrated how those in the most disadvantaged socio-economic groups are more likely to experience alcohol-related mortality and morbidity. Therefore, the next section looks at the relationship between patterns of harmful drinking and SEP to see how these might link to the patterns of alcohol-related harms to health as described in Section 3.2.1.

3.3   The relationship between alcohol consumption and socio-economic position

3.3.1. Weekly, daily and frequency of drinking

Self-reported alcohol consumption from English household surveys suggests that overall, men and women in the most disadvantaged socio-economic groups are less likely to exceed recommended weekly limits compared to men and women in the least disadvantaged socio-economic groups. For example, in 2011, the proportion of adults who exceeded recommended weekly limits (>21 units a week for men and >14 units a week for women) was highest amongst adults living in the highest income households (28% of men and 27% of women) compared to adults living in the lowest income households (19% of men and 14% of women) (NHS Digital, 2012c). Similarly, higher rates of excessive daily drinking tend to be found amongst more affluent socio-economic groups. For example, in 2007, 65% of men and 56% of women in the highest income households exceeded daily recommended limits (>4 units for men and >3 units for women) compared to 57% of men and 50% of women in the lowest income households (NHS Digital, 2008). Data on the frequency of drinking also suggests that more advantaged adults tend to consume alcohol more frequently than less advantaged adults (Giskes, et al., 2011). For example, in 2003, 28% of men and 18% of women living in managerial and professional households consumed alcohol on five or more days per week compared to 18% of men and 9% of women living in semi-routine and routine households (NatCen/UCL, 2004). Evidence from other studies also supports the finding that those in more disadvantaged socio-economic groups consume less or

similar amounts of alcohol to those in less disadvantaged socio-economic groups (Brown, et al., 2016; Robinson, et al., 2011; Pollack, et al., 2005; Marmot, 1997).

The discussion thus far has highlighted the relationship between SEP and daily and weekly levels of drinking, however, binge and heavy drinking significantly increase the risk of alcohol-related harm to health, therefore the next section considers the social patterning of these types of drinking behaviour.

3.3.2 Binge and heavy drinking

A body of research exists on the relationship between SEP and binge drinking and heavy drinking and suggests that these types of alcohol consumption are more prevalent amongst disadvantaged socio-economic groups (Beard *et al.,* 2019*;* Bellis *et al.,* 2016; Giskes *et al.,* 2011; Van Oers *et al.*, 1999). Whilst binge drinking is commonly defined in the UK as consuming >8 and >6 units in any one day for men and women respectively, definitions of binge and heavy drinking can vary depending on how they are being measured and often these terms are used interchangeably in the literature (Herring, et al., 2008). For the purpose of this discussion, binge drinking refers to the maximum amount of alcohol consumed in any one day, whereas heavy drinking refers to excessive consumption across a longer period of time.

Studies have found that individuals in more disadvantaged groups are more likely to binge drink than individuals in less disadvantaged groups. For example, in a large-scale cross-sectional study of adults in Wales, binge drinking (>8/6 units per day for men/women) was found to be more common amongst adults in the most deprived neighbourhoods compared to adults in the least deprived neighbourhoods (17.5% vs 10.6%). It was also found that in more deprived neighbourhoods, men appeared to have a higher probability of binge drinking than women, although the highest risk of binge drinking appeared to be amongst younger and middle-aged men living in these neighbourhoods (Fone, et al., 2013). A more recent study that used data from the Alcohol Toolkit Study to look at the association between SEP and frequency and levels of alcohol consumption, found that in general, those who were most socially disadvantaged were more likely to drink less frequently but to drink considerably more and to binge drink when they did drink compared to those who were least socially disadvantaged. However, some exceptions were found with those with lower or no educational qualifications and in lower social grades less likely to report binge drinking than those educated to degree level and in higher social grades (Beard, et al., 2019).

Another study that used combined survey data from a large sample of English adults found that being in a lower SEP was associated with a higher likelihood of exceeding more extreme levels of heavy weekly drinking and 'binge' drinking (Lewer, et al., 2016). For example, adults in routine occupations had 2.15 times the odds of exceeding the highest threshold for heavy weekly drinking ($\geq$110/85 units for

men/women) compared to adults in higher managerial occupations, whilst those with no qualifications had 1.63 times the odds of exceeding the highest threshold for binge drinking (≥32/24 units for men/women) compared to adults with a degree. Strong associations were also found between the lowest income, education and neighbourhood deprivation groups and exceeding the highest levels for heavy weekly drinking and between the lowest occupation, education and neighbourhood deprivation groups and exceeding the highest levels for binge drinking. However, no association was found between the lowest income group and exceeding the highest levels for binge drinking.

Whilst the studies discussed above used cross-sectional data to highlight the association between disadvantage and harmful drinking patterns, research using cohort data has shown that sometimes these drinking patterns can change across the lifecourse. For example, research that used data from the 1958 British Cohort Study found that, at each age analysed (23, 33 and 42 years), men in the lowest SEP (as measured by educational qualifications and occupational social class) had higher odds of binge drinking than men in the highest SEP although there were no significant changes to this relationship at 23, 33 and 42 years of age. However, by contrast, women in the lowest SEP were less likely to binge drink at 23 years of age but more likely to binge drink at 33 and 42 years of age, whilst women in the highest SEP were more likely to binge drink at 23 years of age but less likely to binge drink at 33 and 42 years of age (Jefferis, et al., 2007).

Higher rates of binge or heavy drinking amongst socially disadvantaged groups are not just found in the UK, other high-income countries have also reported similar patterns (Paljarvi *et al*., 2013; Grittner *et* al., 2012a; Giskes *et al.,* 2011; Van Oers *et al.,* 1999), although this relationship has been found to vary between different countries in terms of the size and direction of this relationship and by gender (Bloomfield, 2006; Wood and Bellis, 2017). One of the reasons for variations in the relationship between SEP and binge drinking is that different criteria and cut-off points may be used which can influence findings (McAlaney & McMahon, 2006). The different ways in which drinks are defined can also make comparisons between countries more difficult and can contribute to inconsistencies in findings between different studies (Herring, et al., 2008).

The relationship between disadvantage and heavy or binge drinking is generally quite clear for men, although it has been suggested that this relationship can be more mixed for women and has been found to be reversed in some studies (Wood & Bellis, 2017; Probst, et al., 2014; Jefferis, et al., 2007). This might be due to the use of different drinking thresholds or because heavy drinking might be under-reported due to social desirability bias (Boniface, et al., 2014).

3.3.3   Abstinence

The focus of section 3.3 is predominantly on the relationship between SEP and harmful drinking, however, the relationship between SEP and abstaining from alcohol highlights further inequalities in drinking behaviour. Research that has explored the relationship between SEP and non-drinking (or abstaining) has found that a social gradient exists whereby non-drinkers are more likely to be unemployed, have lower levels of educational qualifications and income and live in more deprived areas (Ng Fat, et al., 2017; Caldwell, et al., 2008; Jefferis, et al., 2007; Marmot, 1997). For example, one cohort study found that men and women in the lowest educational and occupational groups had higher odds of being non-drinkers at all time points analysed (23, 33 and 42 years) than men and women in the highest groups and that women were more likely to be non-drinkers than men (Jefferis, et al., 2007).

A more recent study that analysed trends of non-drinking amongst younger adults (aged 16-24 years) in England found that between 2005 and 2015, the highest proportion of non-drinkers were in the most disadvantaged socio-economic groups (as measured by employment and educational status, household social class and area deprivation) compared to the least disadvantaged socio-economic groups. For example, in 2015, 38% of non-drinkers were unemployed compared to 18% of non-drinkers who were employed, whilst 36% of non-drinkers lived in the most deprived areas compared to 23% of non-drinkers who lived in the least deprived areas (Ng Fat, et al., 2018).

Abstinence from alcohol tends to increase with age, often as a result of people experiencing illness as they grow older (Green & Polen, 2001; Pattenden, et al., 2008), therefore, it is possible that as those who are most disadvantaged are more likely to experience poorer health, this may influence their choice of whether to drink or to abstain. One particular study found that self-reported illness amongst adults aged 18-34 years in England was associated with increased odds of being a non-drinker and that the odds were greatest for men and women in the lowest income and education groups compared to men and women in the highest income and education groups (Ng Fat & Shelton, 2012). However, higher levels of non-drinking amongst disadvantaged socio-economic groups do not help to explain why those who are most disadvantaged experience the greatest burden of alcohol-related mortality and morbidity. It is possible that some abstainers who were originally heavy drinkers stopped drinking due to alcohol-related illness, although, one study found that whilst multiple disadvantage was associated with non- or occasional drinking, it did not appear to be linked to problem or heavy drinking earlier in life (Caldwell, et al., 2008). The relationship between abstaining and SEP is an interesting part of the story, however, the focus of this project was on harmful drinking rather than non-drinking as abstainers who were originally heavy drinkers are likely to only be a small group.

3.3.4   Alcohol consumption, SEP and gender

The discussion on patterns of drinking thus far have focused on the relationship between SEP and drinking behaviour, however, like smoking behaviour, gender is an important determinant of alcohol consumption. The discussion thus far has suggested that men are more likely to consume alcohol and to consume it more frequently and in greater quantities than women, although the gender gap, in terms of drinking appears to have narrowed over time due to a decrease in consumption for men and an increase in consumption for women (Meng, et al., 2014). However, gender also interacts with SEP to produce further differences in drinking behaviour although the relationship between alcohol, SEP and gender is complex (Hunt & Batty, 2009).

When alcohol is consumed at harmful levels, it increases the risk of mortality and morbidity, however, alcohol consumption is influenced separately by both SEP and gender to produce inequalities. For example, men in a more disadvantaged SEP are more likely to consume larger amounts of alcohol, albeit less frequently, whereas men in a less disadvantaged SEP are more likely to consume smaller amounts of alcohol but more frequently (Probst, et al., 2014). The socio-economic patterns of drinking for women appear to be less consistent, with some research suggesting that women in more advantaged socio-economic groups are more likely to drink more heavily than women in less advantaged socio-economic groups (Probst, et al., 2014). The links between drinking, SEP and gender work together to produce socio-economic inequalities in alcohol-related mortality and morbidity, whereby men appear to experience a greater burden of alcohol-related illness and death. However, some research has suggested that once drinking patterns have been accounted for, men and women in the most socially disadvantaged groups are still more likely to experience greater levels of alcohol-related harm or negative consequences such as dependency (Katikireddi, et al., 2017; Grittner *et al.,* 2012b).

To summarise the discussion in Section 3.3, those in the least disadvantaged groups are more likely to exceed daily and weekly recommended levels for drinking and to consume alcohol more frequently whereas those in the most disadvantaged groups are more likely to drink less frequently or to abstain from drinking, but are more likely to drink heavily or to binge drink when they do drink. The higher likelihood of heavy or binge drinking amongst disadvantaged groups can help to explain why individuals in these groups are more at risk from alcohol-related mortality and morbidity.

In terms of comparing smoking behaviour to drinking behaviour, at the population level, smoking has significantly decreased since the 1970s, whilst alcohol saw a marked increase in overall consumption levels at least until 2008, after which rates of consumption appeared to decline. In terms of the relationship between SEP and smoking and drinking behaviour, the patterning in some respects appears to be different. For example, average alcohol consumption levels appear to be similar or lower for individuals amongst more disadvantaged socio-economic groups compared to less disadvantaged socio-

economic groups, whilst patterns of heavy or binge drinking are similar to smoking in that they are associated with disadvantage, although this appears to be clearer for men as it has been suggested that heavy or binge drinking is higher amongst more socially advantaged groups for women.

Although the processes of smoking and drinking are similar in terms of their contribution to poorer health and health inequalities, the social patterning of alcohol consumption is complex and shows some important deviations from the social patterning of smoking behaviour. For example, smoking prevalence increases with levels of disadvantage while smoking-related harms to health also increase with disadvantage. However, although alcohol-related harms follow a similar social gradient to smoking-related harms, a reverse social gradient is found for alcohol consumption, with those who are socially disadvantaged found to consume lower levels of alcohol, less frequently than those who are socially advantaged. The next section discusses some of the explanations that have been put forward for socio-economic differences in drinking.

3.4 Explanations for socio-economic differences in alcohol consumption

In some respects, drinking is similar to smoking in that it is a complex behaviour that involves a variety of different influences including psychological and physiological factors that guide people to consume alcohol and then influence them to drink regularly or to develop more harmful drinking practices. Alcohol, when consumed in smaller quantities, is not usually associated with harms to health, unlike smoking, which is harmful to health no matter how little a person might smoke. However, alcohol, like smoking, is influenced by the broader socio-economic and socio-cultural contexts in which individuals are embedded and may be subject to more indirect influences such as national alcohol control policies, although these are likely to have had less influence on drinking than national tobacco policies have had on smoking (See Chapter 2 sections 2.4.3.2 and 2.5). This section discusses some of the different explanations that have been put forward to explain socio-economic inequalities in drinking behaviour, with a particular focus on patterns of drinking that are harmful to health and on material and cultural influences, as these are the main focus of this project. This section differs from the smoking explanations section in that there are two different patterns to be explained in terms of alcohol consumption. The first is that adults in less disadvantaged groups consume more alcohol on average than adults in more disadvantaged groups and the second is that adults in more disadvantaged groups are more likely to drink heavily or to binge drink than adults in less disadvantaged groups.

3.4.1 Materialist explanation

The materialist explanation for drinking inequalities is similar to the materialist explanation for smoking inequalities (see Chapter 2 section 2.3.1) in that it suggests that alcohol, like smoking, is used as a way of dealing with the direct effects of disadvantaged material circumstances. This explanation is likely to be

most relevant to poor drinkers as although affluent drinkers are more likely to exceed daily and weekly recommended limits of alcohol intake, they are unlikely to experience material deprivation or harms to health to the same extent as poor drinkers who are more likely to drink harmfully which contributes to the alcohol-related mortality and morbidity.

There are two possible pathways through which material factors could potentially influence drinking behaviour. The first pathway proposes that alcohol consumption is influenced by the material circumstances of people's lives, with drinking used to cope with the stresses associated with material deprivation. These include poverty, a lack of basic resources, inadequate or overcrowded living conditions, financial hardship, unfavourable working conditions or being unemployed. A number of studies provide evidence to support the role that material deprivation plays in influencing drinking behaviour amongst the socio-economically disadvantaged. For example, a longitudinal study in the Netherlands found that factors such as financial problems, unemployment and material deprivation (e.g. not being able to afford at least one of six material assets such as basic food, telephone etc.) were associated with excessive alcohol consumption amongst lower educated men compared to higher educated men. However, for lower educated women, low household income, financial problems and material and social deprivation appeared to be associated with excessive alcohol consumption, although the authors suggested some caution in interpreting the findings as although excessive alcohol consumption was more prevalent amongst lower educated women, this relationship was not statistically significant (Droomers, et al., 1999). Changes to levels of financial strain have also been found to be associated with heavy drinking with increases in financial strain associated with an increase in the odds of heavy drinking (OR=1.27) amongst those with low levels of education compared to those with high levels of education (Shaw, et al., 2011).

Another study that investigated the relationship between social and material deprivation and health-related behaviour amongst French adults found that increasing levels of deprivation were significantly associated with a greater likelihood of alcohol abuse, although this relationship was only found to be statistically significant for men and not for women (Baumann, et al., 2007). In addition, the authors found that alcohol abuse appeared to be related more to poverty and poor living conditions than with work factors such as being a manual worker or being unemployed. Other studies also provide evidence to support the idea that drinking and excessive drinking are used to cope with or reduce the effects of stress directly associated with material deprivation (Abby et al., 1993; Peirce, et al., 1996; Calnan & Johnson, 1985; Kuntsche, et al., 2004; Mulia, et al., 2008). It is possible therefore, that those who are poor, use alcohol and heavy drinking as a way of having time out from the stresses of material deprivation which might give them some pleasure and a feeling of control compared to the stresses and strains of their daily lives.

It has been suggested that individuals in disadvantaged groups are more likely to have fewer coping resources or buffers (e.g. personal and social assets) which could potentially help protect them from problems or stressful events (Thoits, 2010). If poorer individuals have fewer coping resources and are exposed to higher levels of stress in response to material deprivation, it is possible that this stress will accumulate over time which could lead to increased alcohol consumption or heavy/binge drinking as a way of coping. Research from the life course perspective would appear to support this idea and suggests that stress associated with prolonged periods of poverty increases the likelihood of becoming a heavy drinker (Mossakowski, 2008).

The materialist explanation discussed thus far suggests that the direct effects of disadvantaged material circumstances influence alcohol consumption and can help to explain the relationship between SEP and drinking behaviour. However, research from the life course perspective builds on the materialist explanation by highlighting how disadvantage across the life course can contribute to heavy or problem drinking in adulthood. For example, one study found that life course socio-economic disadvantage (across childhood and adulthood) amongst a cohort of British adults was associated with an increased risk of binge drinking during midlife. Respondents were surveyed at seven different time points between 7 and 45 years. Each additional survey report of low SEP during childhood was associated with a 16% increase in the odds of midlife binge drinking. However, only adulthood socio-economic disadvantage (not childhood socio-economic disadvantage) was associated with an increased risk of midlife problem drinking. The study also found that cumulative disadvantage across both childhood and adulthood was associated with an increased risk of midlife problem drinking (using measures from the CAGE questionnaire), although adulthood socio-economic disadvantage alone was not associated with binge or problem drinking (Caldwell, et al., 2008).

Another study that investigated the relationship between problem drinking (as measured by the CAGE questionnaire) and life course socio-economic disadvantage found that disadvantage across the life course amongst a cohort of Scottish men was associated with midlife problem drinking but that indicators of adult SEP had the strongest association. However, the study also found that material indicators of socio-economic disadvantage in adulthood such as car ownership and housing tenure were more strongly related with problem drinking in midlife than SEP indicators such as education, income and occupation (Batty, et al., 2008). A later study examined gender differences in problem drinking and life course socio-economic disadvantage amongst a cohort of Scottish men and women and found that socio-economic disadvantage in adulthood was associated with an increased risk of problem drinking for men but that there did not appear to be a relationship between adulthood or childhood socio-economic disadvantage and problem drinking for women (Batty, et al., 2012).

The second pathway through which material factors could potentially work to influence alcohol consumption is linked to the cost of drinking. A plausible explanation for inequalities in drinking patterns is that those who are affluent consume more alcohol more regularly because they can afford to, whilst those who are poor drink less or are less likely to drink because they are less able to afford alcohol. However, this does not explain why affluent adults are at a much lower risk of alcohol-related harm than poorer adults. It is possible that whilst poorer groups are less able to afford to drink regularly, they may adopt more harmful drinking practices, when they do drink (e.g. heavy or binge drinking). An association between heavy or binge drinking and disadvantaged material circumstances is reported in the wider literature (perhaps more evidently for men) and was discussed in section 3.3.2. Evidence shows that the affordability of alcohol is strongly associated with patterns of consumption although the extent to which affordability influences consumption depends on the price of alcohol and levels of income (Burton, et al., 2017; Rabinovich et al., 2009). In the UK, the affordability of alcohol has significantly risen over the last three decades. Figure 3.7 illustrates this increase in England and Wales, when between 1980 and 2015, alcohol was estimated to have become 60% more affordable (NHS Digital, 2016). Consumption is also influenced by income levels (as measured by real disposable income) which also increased across the period. Therefore, the increase in affordability of alcohol coupled with the increase in real disposable income is likely to have contributed to an increase in overall consumption. It should be noted that the duty escalator introduced in 2008, which ensured that alcohol taxes increased by 2% above inflation each year appeared to have had a relatively large effect on consumption levels (until it was repealed in 2012), although the recession between 2008 and 2013 may also have contributed to a reduction in consumption levels due to a reduction in household incomes (IAS, 2018).
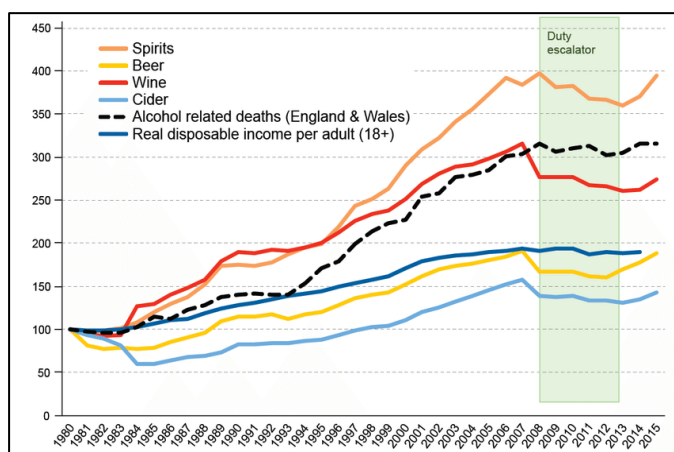
Figure 3.7: Trends in the affordability of alcohol in England and Wales between 1980 and 2015 (indexed to 1980).

Figure taken from Public Health England (2016).

There is strong evidence to suggest that increases in the cost of alcohol (including through taxation) are associated with decreases in levels of consumption (Gallet, 2007; Booth et al., 2008a). It has been

suggested that those in lower income groups may be more responsive to price increases in alcohol (Mackenbach, 2019), although evidence of the impact of interventions across different socio-economic groups appears to be limited (Wood & Bellis, 2017; Booth et al., 2008a). However, a small number of UK studies that have modelled/estimated the potential effects of different pricing policies (e.g. minimum unit pricing, tax increases) have suggested that these types of policies are more likely to have a greater impact amongst poorer groups (Meier, et al., 2016; Holmes, et al., 2014; Crawford, et al., 2012; Ludbrook, et al., 2012). It is possible therefore, that the increase in the affordability of alcohol between 1980 and 2015, may have contributed to an increase in consumption amongst poorer groups. It has been suggested that the increased affordability of alcohol during the last three decades has had the greatest effect on very heavy drinkers (Williams, et al., 2014) who are more likely to be from poorer groups.

One particular factor that is thought to have significantly contributed to the rise in the affordability of alcohol in the UK has been an increase in cheap alcohol in the off-trade sector (particularly supermarkets) (IAS, 2018). Figure 3.8 illustrates trends in the affordability of alcohol in both the off-trade sector (e.g. off-licences, supermarkets, convenience stores) and the on-trade sector (e.g. pubs, restaurants) between 1987 and 2014 and shows a significantly greater increase in the affordability of alcohol in the off-trade sector. An increase (36%) in the number of off-trade outlets selling alcohol in England between 2003 and 2013 has also been found (Angus, et al., 2017).
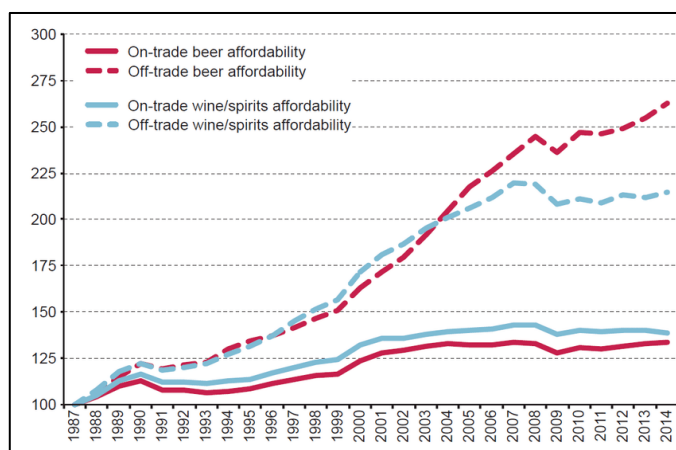
Figure 3.8: Trends in the affordability of alcohol in the UK in the on-trade and off-trade sectors between 1987 and 2014.
Figure taken from Public Health England (2016).

Deprived neighbourhoods are more likely to have a higher density of alcohol outlets and this may further contribute to the risk of alcohol-related harm amongst those who are poorest by making accessibility to alcohol easier and by providing cheaper products due to local competitive markets. One study that looked at the relationship between the density of alcohol outlets in Scotland and neighbourhood deprivation (as measured by the Scottish Index of Multiple Deprivation) found that the density of off-sales alcohol outlets increased as neighbourhood deprivation increased, with the highest

density of off-sales alcohol outlets found in the most deprived neighbourhoods (Shortt, et al., 2015). A higher number of alcohol-related deaths and hospitalisations have also been associated with more income-deprived neighbourhoods, with the gradient in deaths (but not hospitalisations) found to be slightly larger in neighbourhoods with a higher density of off-sales alcohol outlets (Richardson, et al., 2015).

Alcohol can be an expensive commodity, particularly for those with little disposable income and therefore the cost of drinking can further increase financial hardship for those on low-incomes and potentially drive households into poverty. Research into the impact of alcohol expenditure in the UK appears to be limited. However, a recent study found that although spending on alcohol was more common amongst the highest income households (83%) compared to the lowest income households (47%), 49% of households in relative poverty were estimated to have spent a median of £9.55 a week on alcohol. It was also estimated that approximately 320,000 households comprised of 590,000 adults and 175,000 children were living in alcohol expenditure-adjusted poverty once weekly alcohol expenditure had been taken into account. The authors concluded that alcohol expenditure appeared to exacerbate poverty in low income households and that the financial strain of drinking could work in a cyclical process with drinkers consuming alcohol to relive the stress caused by the financial impact of drinking, which in turn could further exacerbate financial strain (Nyakutsikwa, et al., 2021).

One way in which low-income drinkers (and heavy drinkers more generally) might minimise their alcohol expenditure is by purchasing off-trade or cheap alcohol. It has been suggested that drinkers in low-income households are less likely to buy cheap alcohol compared to drinkers in higher income households, but it has been found that if low-income drinkers are categorised as high-risk drinkers or are in the lowest income category and purchasing harmful levels of alcohol, they are more likely to buy cheap alcohol than other drinkers (Crawford, *et al.,* 2012; Ludbrook, *et al.,* 2012). Heavy drinkers in the UK may be more sensitive to increases in the cost of alcohol compared to moderate drinkers and therefore are more likely to switch to cheaper products when the cost of their preferred drink increases (Meier, et al., 2009). Evidence suggests that during the past 30 years there has been an increase in the consumption of strong cheap alcohol which has contributed to a significant increase in mortality from alcohol-related liver disease in the UK. Very heavy drinkers tend to purchase the cheapest alcohol due to the very large quantities they drink and consume a much greater volume of strong cider and spirits (usually vodka) when compared to low-risk drinkers (Sheron, et al., 2014).

The evidence for a materialist explanation for drinking inequalities proposes two pathways. The first is that those who are poor use alcohol to cope with the stresses associated with the direct effects of disadvantaged material circumstances. The second proposes that those who are rich can afford to drink and to drink regularly whilst those who are poor are less able to afford to drink, although the marked

increase in the affordability of alcohol during the last three decades may have contributed to an increase in consumption amongst low-income groups. The coping with stress and cost pathways are linked and work in a self-perpetuating cycle with poorer groups using alcohol to deal with the stress associated with difficult material circumstances but with the cost of drinking increasing financial hardship, which in turn creates more stress for poorer groups to cope with.

Whilst the coping with stress pathway works in the same way for alcohol as it does for smoking, the cost pathway for drinking is slightly different from the cost pathway for smoking as alcohol has become more affordable over time whereas smoking has become considerably less affordable. However, both of these behaviours contribute to the financial hardship already experienced by those who are most disadvantaged, particularly if individuals in these groups smoke as well as drink heavily.

3.4.2   Cultural explanation

There are three possible theories that are associated with a cultural explanation for inequalities in alcohol consumption: social identity/social distinction; the diffusion of innovative behaviours and the effects of social norms/social networks.

3.4.2.1 Social identity/social distinction

This theory works in the same way for drinking behaviour as it does for smoking behaviour (see Chapter 2 Section 2.4.2) and is based on concepts derived from Bourdieu (Williams, 1995; Bourdieu, 1984) and suggests that drinking practices are a way in which individuals can express their social identity or position in the social hierarchy. Drinking practices are not just conscious decisions made by an individual but are guided by particular practices, preferences and tastes (habitus) which are shaped by social structure and the cultural context in which people are embedded. Therefore, people who live in similar social contexts, tend to share similar lifestyles and are likely to develop similar drinking behaviours. Tastes and preferences for particular ways of drinking are also a way in which social groups can express and reinforce 'distinction' from other social groups. For example, those in more advantaged socio-economic groups might consume alcohol more moderately, albeit more frequently both as a signifier of their higher social position and to distinguish themselves from more disadvantaged socio-economic groups, who are more likely to drink heavily or to binge drink. One study that used qualitative analysis to explore middle-class alcohol use in England found that middle-class drinking behaviour was associated with two 'habitus' (Brierley-Jones, et al., 2014). These were a 'home drinking' habitus, which was associated with moderate consumption of alcohol (often wine) during the week and a 'traditional drinking' habitus which was associated with heavier drinking, often in pubs or bars, at weekends. However, although the 'traditional drinking' habitus often involved higher levels of alcohol consumption, it was still considered by respondents to be controlled unlike the "vulgar excesses of the

problem drinker" (Brierley-Jones et al., 2014, p.1061). The consumption of wine in the home drinking habitus was also regarded as a source of cultural capital and a means of distinction.

Qualitative research that has explored the cultural meaning behind harmful alcohol consumption amongst disadvantaged groups appears to be scarce, however, the concepts of habitus can help to explain why those in the most disadvantaged groups are more likely to adopt more harmful drinking practices when they do drink. It is suggested that heavy or binge drinking amongst working class groups are not a conscious choice but are influenced and guided by social practices and what is considered to be normal and culturally acceptable behaviour amongst these groups. In other words, heavy or binge drinking behaviours are a cultural practice that is embedded in a working-class habitus. It is also possible that if middle-class drinkers are motivated to distinguish themselves through their drinking practices that working-class drinkers may also be motivated to set themselves apart in certain contexts with heavy or binge drinking practices used to signal toughness and independence or rebellion against convention (Pampel, et al., 2010).

The concept of habitus might also be important where drinking practices have become taken for granted and routinized in the form of habits which are passed on from one generation to the next. For example, children who grow up in a socially advantaged context where parental use of alcohol is moderate but more frequent, may go on to develop a similar disposition towards alcohol consumption themselves, whereas children growing up in a socially disadvantaged context, where parental use of alcohol may be more harmful (e.g. heavy or binge drinking), may go on to develop similar heavy or binge drinking practices during adolescence and adulthood. It has been suggested that families are an important influencing factor on drinking behaviour with more traditional drinking practices often passed down through generations by fathers, brothers and friends and with heavier drinking associated with pubs, bars and places of work. More moderate home drinking practices have been associated with recollections of parents consuming wine on a regular basis with meals but not getting drunk (Brierley-Jones, et al., 2014). Other studies have also found evidence to suggest that alcohol use amongst parents and family members can influence drinking practices of adolescents and young adults (Kelly, et al., 2016; Bremner, et al., 2011; Yu 2003).

Choices of where to drink and what to drink can also be symbolic and used to convey social position or distinction. For example, Brierley-Jones, *et al*. (2014) found that drinking practices were influenced by locations with the home habitus associated with moderate consumption of wine during the week and the traditional drinking habitus associated with heavier drinking of beer and/or spirits in pubs or bars at weekends. Wine drinking at home was seen to be respectable because it was linked with domestic and familial responsibilities such as childcare and cooking meals. Home drinkers also created a distinction between themselves and more traditional drinkers by drinking wine (as opposed to beer), which was

associated with more 'bourgeois' groups. Wine has long been perceived as a social and cultural marker of distinction and has a tradition of being associated with elite sections of the population (Barr, 1995) although, it has been suggested that its regular but moderate consumption in the home is a more 'emergent contemporary practice', particularly when compared to the more established, traditional practice of consuming large quantities of beer, lager and spirits in pubs and bars (Le Roux, et al., 2008).

3.4.2.2 Diffusion of innovative behaviours

The second theory is linked to the differential adoption and diffusion of innovative behaviours and proposes that those in more advantaged socio-economic groups adopt new behaviours or innovations before those in less advantaged socio-economic groups. Although this theory was used to explain the diffusion of smoking through the social hierarchy (see Chapter 2 section 2.4.3.2), it is used here to explain the diffusion of innovative behaviour in terms of taking up health messages via health-promotion policies (Mackenbach, 2012) and not the diffusion of drinking behaviour. Since the early 2000's, English policies designed to change consumption patterns in health-related behaviours by promoting healthier lifestyles (including not smoking and moderate alcohol consumption) were introduced to tackle preventable mortality and morbidity (DH 2010, 2004). However, evidence suggests that policies directed at behaviour change have been taken up more quickly by those in more advantaged groups as they are more likely to care about health outcomes than those in less advantaged groups (Bauld, et al., 2011). This is related to the previous theory as it is possible that socially advantaged groups adopt public health messages promoting healthier lifestyles (e.g. more moderate drinking) as a form of social distinction (Cockerham, 2005; Pampel, 2002). However, differences in the adoption of health messages and subsequent behaviour changes may contribute to a widening rather than a narrowing of inequalities in health-related behaviour, as was suggested in the case of smoking (see Chapter 2 section 2.4.3. for a discussion on this).

Why are there differences in the take-up of health promotion policies between socio-economic groups? One study that used qualitative interviews to explore the process of decision-making in relation to health-related behaviour, can help to shed some light on this (Lindbladh & Lyttkens, 2002). With a particular focus on habit versus choice, Lindbladh and Lyttkens (2002) found that habits (defined as repetitive, non-reflective behaviour) tended to be associated with lower social positions whereas choices tended to be associated with higher social positions. Individuals in higher social positions were more comfortable with making conscious and deliberate decisions to change their health-related behaviour whereas individuals in lower social positions tended to rely on more routinized behaviour to sustain habits and were therefore less likely to change their behaviour. The authors suggested that when it came to making decisions about health-related behaviour, choices required more effort whereas habits required very little effort. If material, social and educational resources are scarce and there are fewer alternatives to choose from, the likelihood of favouring habit over choice will increase

because changes associated with deliberate choice (e.g. such as changing health-related behaviour) are more energy-demanding. Consequently, the effort involved in decision-making is likely to be smaller for those who are used to making choices (e.g. those in higher social positions), but greater for those who are not used to making choices (e.g. those in lower social positions). In addition, making choices is likely to become more natural and instinctive for those who are regularly required to do so and therefore less effort will be required in decision-making.

The study also found that for those in a lower social position, the importance of habit over choice emerged as a significant habitus disposition that was shaped by experience and linked to everyday behaviour and practices. Therefore, the differential uptake of healthier lifestyle behaviours, particularly in response to public health messages, might be explained by those in more socially advantaged groups being better 'equipped' to deliberately choose to change behaviours such as more moderate drinking due to having better resources and needing less effort to make these decisions compared to those in less socially advantaged groups who are less likely to change behaviours such as heavy or binge drinking due to having fewer resources and who are more likely to rely on their existing habits.

3.4.2.3 Social norms/social networks

The third theory suggests that social norms influence drinking practices with individuals being influenced by the behaviour of those in their social networks such as family members, friends and neighbours. For example, in disadvantaged socio-economic groups, heavy or binge drinking is likely to be considered more normal or acceptable whereas in socially advantaged groups, frequent and more moderate drinking is likely to be more acceptable with heavy or binge drinking more likely to be de-normalized or stigmatized. This theory proposes that perceptions and beliefs about what is considered to be 'normal' behaviour of peers or reference groups, influences an individual's own behaviour (Moreira, et al., 2009). For example, if an individual in a disadvantaged group felt their peers drank heavily or binge drank with friends at the weekend, this would influence an individual's own drinking practices, although factors such as the amount of contact an individual has with their peers or reference group and the extent to which they felt they were similar can also influence an individual's behaviour.

Whilst the social norms/social networks theory appears to be similar to the social identity/social distinction theory discussed in section 3.4.2.1, these theories are different. Habitus is related to the effect of structural factors on habits of thought and patterns of thought and actions, so for example, being in a disadvantaged socio-economic group encourages a particular way of viewing and reacting to the world around us. Social norms however, reinforces a behaviour that has been encouraged by a particular habitus.

Studies have provided evidence to support the idea that the behaviour of those around us influences our own alcohol consumption. For example, one study that looked at the relationship between reasons for drinking and alcohol consumption found that friends' alcohol consumption was a significant predictor of an individual's alcohol consumption and that when friends frequently drank more, individuals drank more (Abbey, et al., 1993). Another study suggested that peer influence is one of the strongest influencing factors on drinking behaviour amongst adolescents and young adults (Sudhinaraset, et al., 2016). Peer influence works in the same way for alcohol as it does for smoking, with peers playing an important role in the initiation and maintenance of drinking and smoking behaviour (See Chapter 2, section 2.4.3.3).

Evidence suggests that certain health-related behaviours such as binge drinking are spread by social exchange and often through social networks of personal friends (Fone, et al., 2013; Ormerod & Wiltshire, 2009; Boardman, et al., 2001). If levels of heavy or binge drinking are more prevalent amongst more disadvantaged groups, this may serve to normalize these behaviours in more disadvantaged contexts. Some studies have found that community or neighbourhood norms about drinking and drunkenness can influence individual drinking practices such as binge drinking (Ahern, et al., 2008) by providing a normative context where these types of drinking practices are not sanctioned as heavily within disadvantaged neighbourhoods compared to if they occurred within less disadvantaged neighbourhoods (Matheson, et al., 2011).

Section 3.4 emphasized the importance of material and cultural factors in influencing and shaping alcohol consumption and explaining why inequalities in alcohol consumption exist. However, these explanations appear unable to account for higher rates of alcohol-related mortality and morbidity amongst more disadvantaged socio-economic groups when alcohol consumption levels are similar between lower and higher socio-economic groups or when levels of consumption are taken into account (Jones et al., 2015; Grittner et al., 2012a; Erskine, et al., 2010; Makela, 1999). Even adults in the most disadvantaged groups who drank moderately and were compared to adults in the least disadvantaged groups who drank heavily, had a greater risk of alcohol-attributable harm (Katikireddi, et al., 2017). One explanation for this phenomenon (alcohol harm paradox) is that those in disadvantaged groups are more likely to under-report alcohol consumption due to a poor recollection of drinking occasions or by underestimating drink sizes or the number of drinks consumed (Bellis, et al., 2016). However, whilst some research has found that alcohol consumption is subject to underestimation (Boniface, et al., 2013; Bellis et al., 2016; Bellis, et al., 2009; Gmel & Rehm, 2004), it is unlikely that any differences in reporting between socio-economic groups are a significant source of bias (Boniface, et al., 2014).

3.5   Alcohol Policy in England

Unlike smoking, alcohol when consumed in moderation is not associated with harms to health. However, excessive drinking is harmful and contributes to health inequalities, therefore the focus of this section is to consider the approach that the English government has taken in tackling excessive alcohol consumption and reducing inequalities in alcohol-related harm to health. Similar to tobacco control, the government's approach to addressing excessive alcohol consumption since the 1970s, has been slow and very cautious. Rising levels of alcohol consumption during the 1970s and 1980s, were met with concerns amongst professional groups such as doctors, the police, criminal justice organizations and from the media who highlighted alcohol-related problems such as public disorder. As a result, the government was pressured into introducing measures to address problem alcohol use (Baggott, 2011). Alcohol control was initially perceived to be an individual issue by the government, who responded by providing services to support people with alcohol problems. However, by the late 1970s, following a series of authoritative reports, the policy approach shifted from supporting problem drinkers at the individual level to a requirement to address increases in overall consumption at the population level (Calnan, 1991).

Despite the need for alcohol control measures at the population-level, the government responded in its 1981 publication, 'Drinking Sensibly', by arguing against the use of taxation and highlighting the importance of the alcohol industry to the UK economy. Instead measures were introduced to tackle alcohol misuse at the individual level through health education programmes and moderation of the way in which alcohol was advertised and presented on radio, television and in films (Baggott, 2011; DHSS, 1981). One of the difficulties with introducing controls and regulating alcohol is that it is politically contentious, which makes it difficult for the government to introduce more direct forms of intervention such as taxation, licensing measures, advertising and promotion and measures designed to tackle the affordability and availability of alcohol. One of the main reasons for this is that the alcohol industry has strong links to the government which are driven by the significant economic contribution that alcohol makes from tax revenues, exports and through employment within the industry. However, despite these strong links, conflicts of interest between different government departments such as the Treasury (in terms of taxation policy), the Home Office (in terms of licensing laws), the Department of Trade and Industry (in terms of trade and commercial interests) and the Department of Health (in terms of the health harms from excessive drinking) which further complicate alcohol control policies (Baggott, 2011).

Throughout the 1980s and the 1990s, policies designed to tackle alcohol misuse were heavily influenced by the alcohol industry and the government feared that if they intervened too strongly there would be a public backlash. A relaxation of licensing hours was agreed in 1988 to try to 'normalise' drinking behaviour by integrating it into everyday life, however, other interventions during the 1980s and 1990s were limited to the self-regulation of marketing and advertising by the alcohol industry and voluntary

agreements to tackle underage drinking (Baggott, 2010; Calnan, 1991). It wasn't until New Labour came into power in the late 1990s, that a stronger approach to alcohol policy appeared to be on the horizon. However, similar to New Labour's approach to tobacco control, the 'Alcohol Harm Reduction Strategy for England' (PMSU, 2004) appeared to be directed at education, individual responsibility and improving existing services for the treatment of problem drinking. Whilst the strategy did propose measures to tackle alcohol-related crime and disorder and to work with the alcohol industry to reduce problem drinking, the latter was self-regulated and voluntary and no targets were included to reduce alcohol consumption or harm or to regulate the price and availability of alcohol (Baggott, 2010).

By 2005, government policy on alcohol misuse began to strengthen although it was largely driven by the anti-alcohol lobby who emphasized alcohol-related harm to health which was supported by evidence designed to influence policy and government decision making. The change of Prime Minister from Tony Blair to Gordon Brown in 2007, was followed by publication of a revised alcohol strategy entitled 'Safe. Sensible. Social.' (HM Government, 2007), which suggested that the government was prepared to take a more robust approach towards alcohol policy. The policy proposed a range of measures including an increase in alcohol taxation above inflation, new licensing regulations to tackle under-age drinking and a stronger stance towards the regulation of the alcohol industry in response to evidence that showed the significant contribution that price and promotions had on alcohol misuse and harm to health (Booth, et al., 2008a, 2008b). By 2010, a mandatory code of practice for the alcohol industry was introduced to tackle alcohol misuse which included banning irresponsible promotion of alcohol and serving practices. This was shortly followed by a report from the Health Committee calling for further measures including minimum unit pricing (MUP), the regulation of alcohol advertising and sponsorship and mandatory labelling of alcoholic drinks (Baggott, 2011).

Since the 1970s and up until 2008, alcohol control policies appear to have done little to reduce overall consumption rates as the availability and affordability of alcohol rose across this period, accompanied by a corresponding increase in overall consumption levels and an increase in inequalities in alcohol-related mortality and morbidity (see section 3.2.2). Whilst government policies have been designed to tackle alcohol misuse, there appears to be little evidence of policies or interventions that have been designed to specifically address inequalities in alcohol consumption and even fewer evaluations of the effectiveness of alcohol control policies on different socio-economic groups (Wood & Bellis, 2017). However, it has been suggested that MUP is likely to reduce alcohol-related inequalities as harmful drinkers on low incomes tend to purchase a greater proportion of cheap alcohol (Holmes, et al., 2014). However, despite recommendations in 2010 for the introduction of a MUP policy, the current conservative government has stated that there are no plans to introduce a MUP policy in England at this time (House of Commons, 2020).

Whilst tobacco control policies appear to have had some success in reducing overall smoking prevalence, alcohol control policies have lagged some way behind with alcohol inequalities or health inequalities rarely flagged. To date, the government still does not appear to have a coherent alcohol control strategy and still relies on voluntary pledges between itself and the alcohol industry who are very financially dependent on heavy and harmful drinkers (Gilmore & Williams, 2019; Bhattacharya, et al., 2018).

3.6   Conceptual framework, research question and hypotheses

This chapter has discussed inequalities in alcohol consumption which are characterized by more moderate but more frequent consumption by those in more advantaged groups but by less frequent but heavier and more harmful consumption by those in more disadvantaged groups. Two main theories explain why individuals drink this way. These are the materialist explanation which proposes that the direct effects of material circumstances influence drinking behaviour and the cultural explanation which proposes that the cultural context within which people are embedded influences their drinking behaviour. Alcohol consumption levels have changed in the UK since the early 1970s including a noticeable decline since 2008. However, inequalities in alcohol consumption have persisted and are thought to have widened, which contributes to health inequalities. Whilst an extensive literature exists on the relationship between SEP and drinking behaviour, it is not known how different SEP indicators such as education, income and occupation relate to these patterns. SEP is often used generically in studies and has not investigated the different mechanisms that underlie the different measures of SEP. Therefore, it is important to separate these different mechanisms to gain a better understanding of the underlying factors that might influence drinking inequalities.

Therefore, the aim of the alcohol element of the project is to explore the relative importance of the contribution of material and cultural factors on drinking inequalities between 1978 and 2011. The value of breaking these indicators down and separating their different effects is that it can help us to gain a better understanding of the different mechanisms that underpin drinking inequalities. By conducting the analysis over a substantial period of time it is possible to gain a better understanding of the relative importance of material and cultural factors and how these might have changed across the period, which is important as it has implications for the types of policies that could be implemented to address inequalities in drinking behaviour.

The primary research aim for the drinking element of this project was to determine:
How far social inequalities in drinking behaviour are similar to or distinctive from social inequalities in smoking behaviour?

The research question for the drinking element of this project was as follows:

To what extent is the relationship between different indicators of socio-economic position and drinking similar to or distinctive from the relationship between different indicators of socio-economic position and smoking?

The conceptual framework in Figure 3.9 illustrates the relationship between SEP and alcohol consumption and represents the main factors of interest in this project. Like smoking, there are a number of different influences on drinking behaviour, however the main focus of this project was on the influence of material and cultural factors and their relative importance on adult drinking behaviour. Similar to smoking, alcohol consumption is a complex behaviour that is influenced by SEP. SEP can be measured in a number of different ways including education, occupation and income. For example, lower levels of education, occupation and income are associated with less frequent drinking but also with heavy and binge drinking whilst higher levels of education, occupation and income are associated with more frequent but more moderate drinking. Different socio-economic indicators have different characteristics and work through different pathways to link SEP with alcohol consumption (Galobardes, et al., 2006) (Chapter 4 section 4.3 discusses these pathways in more detail).

Similar to smoking, SEP and alcohol consumption are linked by two main factors: material circumstances and cultural influences. Two possible pathways are associated with a material explanation for drinking. The first pathway proposes that disadvantaged material circumstances directly influence drinking behaviour, with individuals using drinking as a way of coping with stressful and disadvantaged circumstances. The second pathway proposes that those who are more affluent consume more alcohol more frequently because they can afford to, whilst those who are poor drink less or are less likely to drink because they are less able to afford alcohol. The coping with stress and cost pathways work in a self-perpetuating cycle with poorer groups using alcohol to deal with the stress associated with disadvantaged material circumstances, however, the cost of drinking increases financial hardship, which in turn creates more stress for poorer groups to cope with. Three possible theories are associated with a cultural explanation for drinking behaviour. The first proposes that alcohol consumption is influenced by social identity with drinking practices guided by particular 'tastes' or preferences shared by certain socio-economic groups. Drinking practices can also be used to express or establish 'social distinction' between different socio-economic groups. The second theory is associated with the diffusion of innovative behaviours and proposes that those in more socially advantaged groups are quicker to adopt new health-promoting behaviours such as moderate drinking before those in less socially advantaged groups. The third theory proposes that social norms/social networks influence drinking behaviour with individuals being influenced by the drinking behaviour of those around them. For example, heavy or binge drinking may be considered normal or acceptable in socially disadvantaged groups whereas

frequent but moderate drinking is likely to be considered normal in less disadvantaged groups, with heavy or binge drinking more likely to be de-normalized or stigmatized.
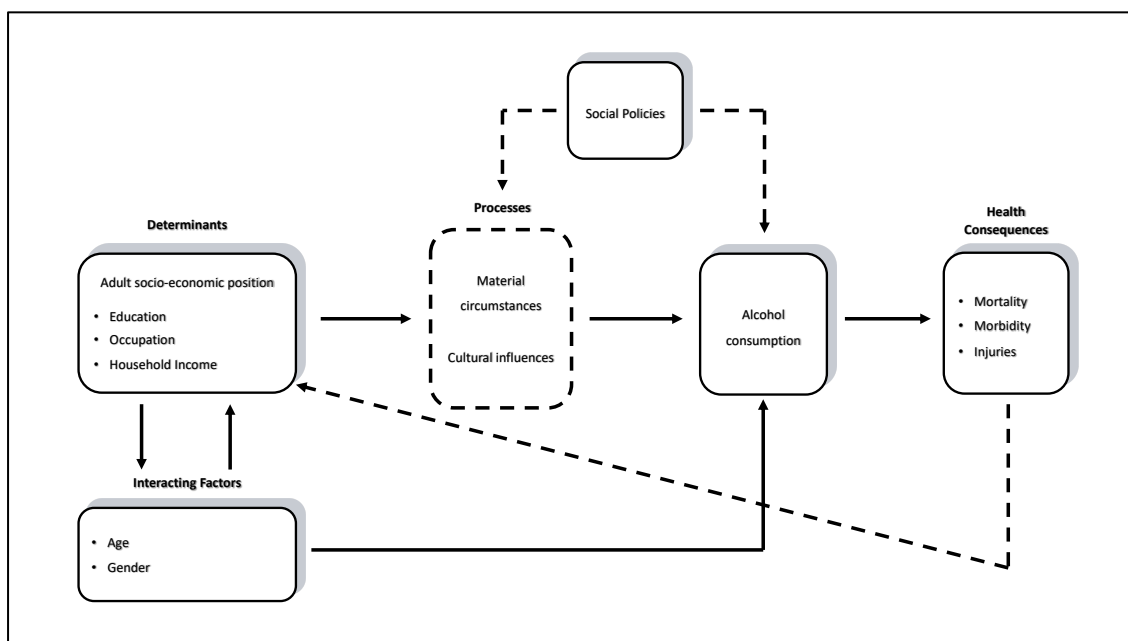
Figure 3.9: Conceptual framework explaining the relationship between socio-economic position and alcohol consumption

Gender and age are also important determinants of drinking behaviour and produce different patterns of drinking practices between men and women and between different age groups. For example, levels of alcohol consumption tend to be highest amongst younger age groups and then start to decline after midlife, whilst men are likely to drink more, to drink more frequently and in greater quantities than women. Gender also interacts with SEP to produce further variations in drinking behaviours although the relationship between alcohol, SEP and gender is complex. For example, men who are most disadvantaged are more likely to drink heavily or to binge drink than men who are least disadvantaged, although this pattern of consumption is more inconsistent amongst women.

Social policies may indirectly influence drinking behaviour through material and cultural circumstances. For example, policies on alcohol consumption may be designed to reduce alcohol misuse and its associated social, economic and health-related harms, through availability, affordability and acceptability. These policies may also be designed to change public attitudes towards certain drinking practices such as binge or heavy drinking, however, they differ from smoking policies in that they are not designed to make drinking more socially unacceptable as alcohol when consumed in moderation is unlikely to cause harm.

Whilst moderate alcohol consumption is not usually associated with harms to health, alcohol can be harmful and is associated with mortality and morbidity, when consumed in excess. Because those in

disadvantaged socio-economic groups are at a greater risk of experiencing alcohol-related mortality and morbidity, this contributes to health inequalities. The health consequences of harmful drinking patterns are indirectly linked to an individual's position in the social hierarchy as alcohol-related health problems can affect a person's quality of life and also their ability to work. This can lead to loss of work which can increase financial hardship and result in downward social mobility.

Following the review of the literature on alcohol consumption discussed in this chapter, three hypotheses are proposed for the drinking element of this study:

Hypothesis 1: Cultural factors have a bigger influence than material factors on drinking behaviour due to social identity, social distinction and social norms.

Hypothesis 2: Material factors have a bigger influence than cultural factors on drinking behaviour due to disadvantaged material circumstances.

Hypothesis 3: The relative importance of cultural factors compared to material factors on drinking behaviour will have increased between 1973 and 2011.

Similar to the hypotheses for the smoking element of the study, two different approaches have been taken for Hypothesis 1/Hypothesis 2 and Hypothesis 3. Whilst Hypotheses 1 and 2 are contradictory, both of these hypotheses can be derived from the existing literature. However, whilst Hypothesis 3 implies one idea, there is no competing hypothesis stating that the relative importance of material factors will have increased over time.

Chapter 4: Methodology

This chapter describes the requirements for the project. It also describes the datasets that were used and how the variables were chosen and operationalised. Basic descriptive statistics are given for these variables, including patterns of missing data. The chapter concludes with a description of the methods used and the specific statistical analyses that were conducted.

4.1   Rationale for data used

Smoking is the single largest cause of preventable morbidity and mortality in the UK and the biggest contributor to health inequalities (DH, 2011). Despite a dramatic and significant reduction in rates of smoking since the early 1970s, inequalities in smoking have persisted and widened, thereby contributing to an increase in health inequalities (Petrovic, et al., 2018). Therefore, in order to answer the project research questions, data was ideally needed that covered as much of the decline of the smoking epidemic as possible. The GHS/GLF is the longest running British survey, spanning 40 years and contains data on smoking and drinking behaviours, as well as a number of different socio-economic indicators (UKDS, 2015a). The project used cross-sectional data from the General Household (GHS) and General Lifestyle (GLF) Surveys between 1973 and 2011, as this covered much of the decline in smoking as well as a period of policy and social change. Unfortunately, it was not possible to include more recent data in the analysis as the GHS/GLF was discontinued in 2011.

Four different types of information were required for the analyses. First, the project was investigating the relationship between socio-economic position (SEP) and smoking and drinking behaviour at the population level, therefore cross-sectional data was required. Longitudinal data would not have been appropriate as it only follows one group of individuals over a period of time. Second, the population of interest was the English adult population, therefore the data needed to come from a nationally representative sample of English adults, to allow for generalisation of the findings. English rather than UK data was used as health policy is devolved to constituent countries in the UK and smoking and health interventions have been introduced at different times in these countries, which might have contributed to inconsistency in the findings. Third, the time element of the project was very important, therefore repeated cross-sectional data collected over a significant period of time was needed. This would allow for analysis of the relationship between SEP and health-related behaviour across a period marked by notable changes in smoking prevalence, the introduction of new smoking and health policies in England and wider social and cultural changes as discussed in Chapters 2 and 3. Fourth, individual-level data for different SEP indicators and aspects of smoking and drinking behaviour were required to determine how different socio-economic influences on smoking and drinking have changed over time. It was important

that the SEP variables were able to capture the underlying material and cultural factors that influence different elements of smoking and alcohol consumption.

A number of other national UK surveys collect repeated cross-sectional data on smoking and other health-related behaviours and were considered for this project. The Health Survey for England (HSE) (UKDS, 2015b) contains detailed smoking and alcohol data along with a variety of socio-economic indicators, which would allow for a comprehensive and detailed analysis of social inequalities of health-related behaviour. In addition to smoking and alcohol data, the HSE contains data on other health-related behaviours such as diet and physical activity, whereas the GHS/GLF only contains data on smoking and alcohol use. HSE data would have allowed for a comparison of the social patterning of other health-related behaviours to smoking, however, the period of analysis was a significant factor in the project. HSE data covered a 24-year period whereas the GHS/GLF data covered a 38-year period, which also coincided with the beginning of the significant decline in smoking and an increasing emphasis on lifestyle change policies. Other datasets such as the Integrated Household Survey (UKDS, 2015c) and the Opinions and Lifestyle Survey (UKDS, 2015d) were also considered, but did not meet the project requirements as they did not cover a significant time period or had limited data on elements of smoking and alcohol use. The GHS/GLF datasets are described in the section below.

4.2   General Household (GHS) and General Lifestyle (GLF) Surveys

The GLF (formerly the GHS) was a multi-purpose continuous survey which collected individual-level data on a range of topics from a nationally representative sample of people aged 16 and over, living in private households in Great Britain. The survey was conducted annually between 1971 and 2011, although there were breaks in 1997-1998 and 1999-2000 for review and redevelopment. In 2005, the GHS/GLF changed from cross-sectional to longitudinal design which comprised of one sample, split into four waves. Each household remained in the sample for four years, with one quarter of the sample dropped and replaced with a new sub-sample each year. Each quarter was representative of the target population. Further details of the survey's design changes can be found elsewhere (ONS, 2006). All eligible members in each household were interviewed face-to-face, with telephone interviews used from 2000, to convert any proxy interviews to full interviews. The survey consisted of two components: a household questionnaire usually completed by the householder or Household Reference Person (HRP) and an individual questionnaire completed by all other household members.

Questions on smoking were included in the GHS/GLF every year between 1972 and 1976, for alternate years between 1978 and 1998, and then every year from 2001 until 2011. Questions on alcohol consumption were included in the GHS/GLF for alternate years from 1978 to 1998 and then every year from 2001 until 2011. Data from 10 year intervals between 1973 to 2011 were used in the project to track changes on the relationship between SEP and smoking and drinking behaviours. Data from 1972

was not used because the documentation that described the methodology was unreadable in many places, making it difficult to reproduce. Data from 1982 was not used as one of the income variables of interest was missing, therefore, data from 1984 was used instead. Six data sets were selected for analysis as follows:

- smoking behaviour: 1973, 1984, 1992, 2002 and 2011;
- alcohol consumption: 1978, 1984, 1992, 2002 and 2011;

The GHS survey design changed in 2005, from cross-sectional to longitudinal with a four-year sample rotation in which households remained in the sample for four years (waves), with one quarter of the sample replaced each year (ONS, 2006). One of the difficulties with a longitudinal design is attrition bias whereby respondents who start a survey, subsequently leave. This can introduce bias into the findings as there can be characteristic differences between those who leave and those who remain (ONS, 2012). From 2006, one quarter of the GHS/GLF sample were replaced each year (Wave 1) with new respondents, therefore, in order to reduce the effects of attrition bias for the 2011 data and to ensure comparability with the earlier datasets, only data from Wave 1 was used in the analysis. However, this resulted in a much-reduced sample size, therefore Wave 1 data from GLF 2009, 2010 and 2011 (from here on collectively referred to as 2011) were combined to ensure a sufficient sample size for analysis. Prior to combining this data, cross-tabulations were conducted on key variables to ensure that the data for each year were not sufficiently different so as to affect comparison with other data in the project.

For the purpose of this project, only data for respondents aged 18-64 years was analysed. There were a number of reasons for this. Respondents aged 17 years and below were excluded as socio-economic indicators such as income, education and occupation were only likely to be relevant to a small proportion of this population. The minimum legal age for buying alcohol is 18 years and changed to 18 years for cigarettes from 2007, therefore although 16-17 year old respondents were asked to complete questionnaires for the smoking and drinking sections, this was carried out in the home which may have contributed to under-reporting of this behaviour (OPCS, 1994). Respondents aged 65 years and over were also excluded from the project as some measures of SEP present methodological challenges for the older population. For example, only a very small proportion of people over 65 were likely to have worked during the period under analysis. In addition, some of the older population might have left work early for health reasons, which might have contributed to a decrease in SEP, as they approached the end of their working lives. Education can also be difficult to measure amongst older people as many respondents would have left school at the minimum age and were more likely to have few or no academic qualifications (Grundy & Holt, 2001).

4.2.1 GHS/GLF Data Quality

The GHS/GLF used probability, stratified two-stage sampling to ensure the samples were representative of the population in Great Britain. Details of sample sizes and response rates for the datasets used in this project can be found in Appendix 2 (Table A2.1). The household middle response rate is a term defined by the GHS/GLF and includes full and partial interviews taken and provides an indicator with which to compare datasets (ONS, 2006). Between 1973 and 1992, there was very little change to household middle response rates, which were between 81% and 83% respectively, however by 2002, response rates had fallen to 69%. The reason for this decline was due to an increase in the proportion of households refusing to participate in the survey, which was part of a wider trend of survey non-participation more generally (ONS, 2006). Although there was very little change to the middle response rate between 1978 (82%) and 1984 (81%) there was a fall in the achieved sample of households interviewed for these survey years (11,815 and 9,803, respectively). This was due to a reduction in the number of addresses selected for interview (approximately 14%) and was made as part of a savings measure implemented in 1982 (OPCS, 1986). There was little change to the household response rates between 2002 and 2011 which fluctuated between 69% and 71% respectively. It is possible that because response rates have decreased due to survey participation that this could bias the project findings. For example, it is known that smokers, heavy drinkers, those in a very wealthy SEP and people in the most disadvantaged socio-economic groups are less likely to respond to surveys (Boniface, et al., 2017; Galea & Tracy, 2007; Goyder, et al., 2002), therefore, if these groups have become more under-represented over time, this is likely to bias the estimates of the relationship between SEP and smoking and drinking behaviour. Whilst it is possible that this is unlikely to affect the comparison of the different SEP indicators and smoking and drinking within a single year, it is likely to affect the comparison of changes over time. This is discussed in Chapter 7 in light of the project findings.

Survey samples were drawn from those living in private households, therefore some subgroups of the population would not have been included e.g. the homeless and those living in communal establishments. These sub-groups are more likely to smoke and drink excess alcohol and to be in the most disadvantaged socio-economic groups. However, given this and the reduction in response rates across the survey period, the GHS/GLF still provides high quality, reliable data with large representative sample sizes across a significant time period for an English population.

4.2.2 GHS/GLF Data Preparation

The GHS data was obtained from the UK Data Service (UKDS), while the GLF data was obtained via the UKDS Secure Lab. As the data was already anonymized and available for the purpose of secondary analysis, there was no requirement for ethics approval to be sought for its use. Prior to analysis, the concepts illustrated in Figure 4.1 were operationalized into a measurable form and made comparable

across the different datasets. Although the survey questions have been fairly consistent over the course of the GHS/GLF, there have been some changes relating to some of the variables used in this project. Full details of the variables used in the analysis, including their operationalization are given in sections 4.3 to 4.5 below.

4.3   Predictor variables

The discussion in Chapters 2 and 3 emphasized the strong relationship between SEP and smoking and drinking behaviour. Although measures of SEP reflect a person's position in the social hierarchy, different SEP indicators have particular characteristics that suggest they work through different pathways to influence health-related behaviours such as smoking and drinking (Galobardes, et al., 2006). The conceptual frameworks in Chapters 2 and 3 illustrated how smoking and drinking are influenced by material circumstances and cultural factors. Selection of the SEP indicators was constrained by the variables available in the datasets. Selected SEP measures needed to be in all datasets to be used in the analysis and comparable between each survey year. Three different SEP indicators were used in the analysis, to help unpick the different material and cultural factors that link SEP and smoking and drinking behaviour. The operationalization of these factors is illustrated in Figure 4.1 below.
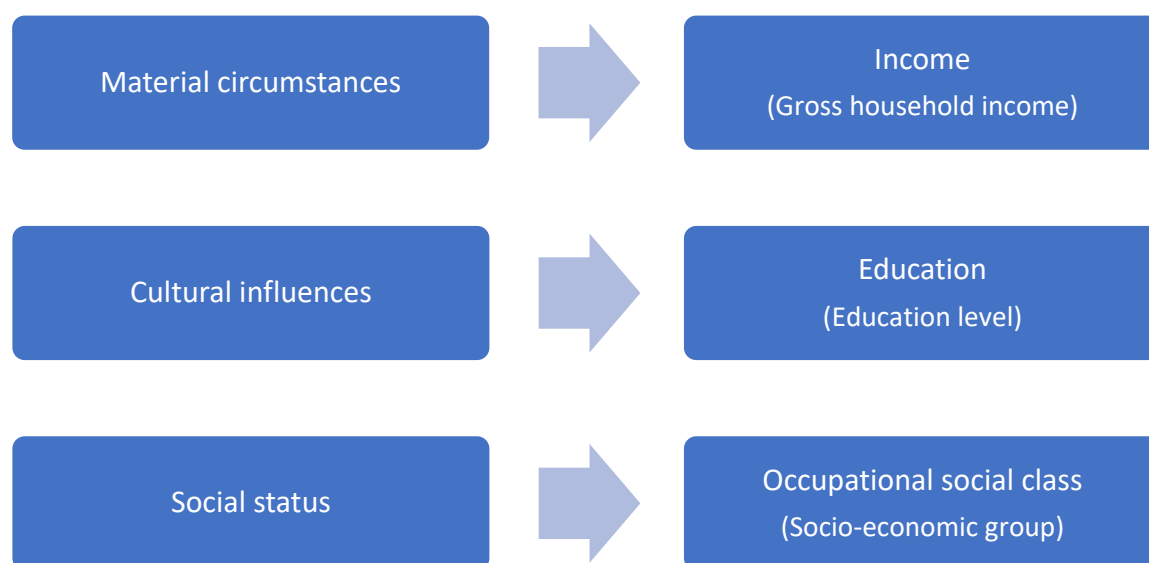
Figure 4.1 Operationalization of cultural influences and material circumstances into measurable forms

A key measure of material circumstances that is predominantly used to investigate the relationship between SEP and smoking and drinking behaviour is income. Income is the socio-economic indicator that most directly measures material resources and is a major determinant of material living circumstances although other measures such as car access/ownership and housing tenure are sometimes used to measure material resources if income is not available (Shaw, et al., 2007). Studies

have suggested that income does not always capture all elements of a person's material circumstances (e.g. wealth or other sources of support that individuals may have access to) (Perry, 2002; McKay & Collard, 2003) as individuals or households can still have reasonable material living circumstances but be in receipt of a low income. However, income is widely used to capture material resources and has been shown to generally be a valid indicator for this purpose, including in studies that have investigated the effects of material circumstances on smoking and drinking behaviour (Graham, 1989; Laaksonen, et al., 2005; NHS Digital; 2010; Droomers, et al., 1999; Beard, et al., 2019).

Equivalised gross household income was used to measure material circumstances in this project. Income was measured at the household level rather than the individual level because it captures a household's material circumstances by taking into account all incomes of those living in a particular household. One of the advantages of using household income rather than individual income is that it can be a useful indicator for women who may not be the main earners in the household or have their own income (Shaw, et al., 2007). Gross household income was used rather than net household income as the GHS/GLF did not start collecting net income data until 1979 and the income variables needed to be comparable for all survey years analysed. Net household income would have been preferable as it is generally considered to be a more accurate measure of income as it reflects the disposable income that households have available to use (Galobardes, et al., 2006). However, one advantage of using gross household income rather than net household income is that respondents are more likely to know their gross income rather than their net income.

Gross household income was equivalized so that household income could be compared across different households. Different types of households require different levels of income to achieve the same living standards due to their differing sizes and compositions (McClements, 1977). Gross household income was 'equivalized' using the McClements equivalence scale which takes into account the size of the household and its associated living costs (McClements, 1977). Different equivalence scales exist, however, the McClements scale was specifically designed for use in the UK and is used by researchers and government departments as well as in the GHS/GLF. The preparation and coding of the income variable is described in section 4.3.1.

The discussion in Chapters 2 and 3 suggested that cultural factors such as social identity/social distinction, the adoption of innovative behaviours and social norms/social networks can influence smoking and drinking behaviour. In previous research on health-related behaviours, a variety of indicators have been used to represent cultural factors e.g. taste in books, music, food (Bourdieu, 1984; Pampel, 2006) and locus of control, parochialism and orientation towards the future (Stronks, et al., 1997). However, these variables or variables that could represent other dimensions of culture were not available in the GHS/GLF data sets.

Education is widely used as a measure of SEP and is found to be strongly related to health-related behaviours with those in more advantaged socio-economic groups less likely to smoke and to drink heavily (Blaxter, 1990; Stronks *et al.,* 1997; Laaksonen, 2005; Beard *et al.,* 2019). Bartley (2004) suggests that it is possible, that within the culture of advantaged groups, education and health are important. Therefore, children raised within this context might be more likely to develop a disposition towards working hard and doing better at school. As a result, they are more likely to stay in the same socio-economic group as their parents and are more likely to adopt a healthier lifestyle. Therefore, any link between SEP and health-related behaviours such as not smoking or not drinking heavily is likely to be influenced by particular habits acquired over time. It has been suggested that a child's educational trajectory is strong influenced by family SEP (Graham, 2007; Reay, 2004) and there is also some support for the idea that childhood SEP is linked to health-related behaviour (Lynch, et al., 1997). Research on the stratification of cultural consumption suggests that there is a strong and consistent relationship between education and cultural context and in a series of studies that looked at the relationship between social stratification and cultural consumption, it was education rather than income that was found to be a more important indicator of cultural participation (Chan & Goldthorpe 2010, 2007a, 2007b).

Whilst it is acknowledged that education does not directly measure culture, the discussion above suggests that it could be used as a proxy indicator for cultural influences. Research that has simultaneously investigated the effects of different SEP indicators on health-related behaviour, appear to suggest that education has an independent effect on health-related behaviour when income and other SEP measures are included in statistical models. By controlling for income, any independent effect of education seen would suggest that it is capturing something that is not material (Winkleby, et al., 1992; Laaksonen, *et al.,* 2005; Beard *et al.,* 2019). Therefore, by including income, education and occupation all together in the regression models for the project analyses, income would be controlled for and it would be possible to see any independent effects of education on the smoking and drinking outcome measures.

Education level was used to measure cultural influences in this project and was measured using the highest level of educational qualification obtained. Education is widely available and a widely used measure of SEP, with response rates to educational questions generally tending to be high (Shaw, et al., 2007). However, one of the difficulties with using educational measures is that there have been a number of significant changes within education in both England and the UK, particularly during the second half of the 20th century. These include changes to school leaving age and educational qualifications as well as a significant expansion and participation in both further and higher education. This has resulted in a dramatic increase in the proportion of people participating in higher education and a significant increase in the average level of educational achievement (Connelly, et al., 2016), which

is likely to have led to changes in the status of a degree as a cultural signifier. As a result of these changes, the meaning and attainment of educational qualifications will be different for older educational cohorts compared to younger educational cohorts. For example, it is likely that older groups will be over-represented amongst lower educated groups whilst younger groups may be over-represented amongst the degree educated. Education links parental SEP to adult SEP, which is important for measuring cultural influences in this project. However, education is a strong determinant of employment opportunities and income (Shaw, et al., 2007), therefore it is possible that education might identify a mix of both material and cultural influences. It is acknowledged that it is difficult to isolate these factors in order to determine the precise effects of material and cultural influences on smoking and drinking behaviour. The preparation and coding of the education variable is described in section 4.3.2.

Socio-economic group (SEG) was used to measure status in this project. SEG was measured using the occupation of the Head of Household (HoH)/Household Reference Person (HRP) rather than the occupation of individuals because the occupation of the HRP contributes the most to household circumstances and can be used to measure the SEP of a household (Rose & Pevalin, 2003). SEG was used as this was the main occupational indicator in the GHS/GLF (until the National Statistics Socio-Economic Classification (NS-SEC) was introduced in 2001) and was available between 1973 and 2011. SEG is considered to be a measure of employment status rather than of skill or social standing (Rose, 1995) and is derived from occupation, employment status and size of employment organization. Although it has been criticized for lacking an explanation for its conceptual basis, it is similar to other sociological measures of social class such as the Goldthorpe Schema and NS-SEC (Rose & Pevalin, 2003). Although the NS-SEC was introduced in 2001, SEG or an approximated version of SEG was available in most of the GHS/GLF datasets. The approximated version of SEG is based on the operational categories of NS-SEC and has been shown to achieve a continuity level of 87% (Rose & Pevalin, 2005; 2003).

Occupation is a widely used measure of SEP in the UK (including research into the social patterning of health-related behaviours) and has traditionally been conceptualized to measure social stratification (Shaw, et al., 2007). It is considered to be an important determinant of the life chances of individual's and their families as this "depends on their position in the social division of labour and on the material and symbolic advantages they derive from it" (Rose & Pevalin, 2003, p.17). Occupation is very closely related to income, therefore any relationship between occupation and health-related behaviour might be mediated by material influences. Occupation is also strongly related to education and may capture elements of cultural influences as differences in health-related behaviour between different occupational groups might be indicative of particular lifestyles that are considered to be appropriate for certain groups (Bartley, 2017). Therefore, occupation is likely to pick up a mix of both material and cultural elements, although it is acknowledged that it is not possible to separate these aspects.

Occupation was included in the analyses as it was possible that it might capture something in terms of status and social class or occupational cultures. The preparation and coding of the occupation variable is described in section 4.3.3.

It has been suggested that some SEP indicators such as those relating to income, education and occupation are under-theorised and often based on administrative classifications, however, these indicators have achieved strong predictive validity through their extensive use in epidemiological research (Muntaner, et al., 2010).

Preparation and coding of the different SEP indicators are described in more detail in sections 4.3.1 to 4.3.3 below.

4.3.1 Income

Income was measured using gross household income which was equivalised using the McClements scale. Since the inception of the GHS/GLF, there have been a number of changes to the income section which presented some significant challenges in terms of trying to ensure the data was as comparable as possible across the survey years analysed. These changes are described in the paragraphs below.

Income data was originally collected on the GHS/GLF using a short set of questions that asked for the main components of an individual's gross income so as to provide classificatory variables for analysis. Individual income could then be summed to produce a household income measure. In 1979, the GHS income section was expanded to allow for analysis of income data itself and not just for classificatory purposes, as it had been used previously. Further changes were made to the income section in 1992 both as a cost cutting measure and to try to reduce the amount of missing income data. Rather than revert to using the original short income section of the early 1970's, it was decided that broader income measures would be introduced, which would be comparable to the more detailed income section introduced in 1979 (OPCS, 1994). As income was used as a classificatory measure in this project, the lack of detail in the earlier questions was not considered to be problematic. However, some of the other changes that were introduced in 1979 and 1992 had implications for the analyses and are discussed in more detail below.

Gross household income was calculated by summing the gross total income for all individuals within the household. Individual gross total income was based on income at the time of interview and was calculated by adding together the components of earnings, benefits, pensions, dividends, interest and other regular payments (OPCS, 1994). For the 1973 and 1978 survey years, respondents were asked how much gross income they had received during the 12 months prior to interview. However, from 1979, a

significantly revised and more detailed income section was introduced, which asked individuals what their gross pay was last time and whether it differed from the amount they usually received. The reason for this change was that annual income estimates might be inaccurate or less reliable when compared to current income estimates and current income would also take into account any inflation (OPCS, 1981). Usual gross income was calculated for the week by summing 'usual' pay, income from any additional jobs and other sources. Due to the income question change in 1979, it was possible that the gross household income for 1973 and 1978 might have been subject to reporting inaccuracies, which could result in some over or underestimation for these years, compared to income data for the later survey years used. However, it seems unlikely that this would significantly bias the project findings.

Up until 1992, household income was coded as missing unless income data was available for everyone aged 16+ in each household. Income information was also coded as missing for all proxy respondents and consequently for all households that contained a proxy. In 1992, in an effort to reduce missing data, respondents were asked to give estimates of their income if they did not know the exact amount or if they refused to answer any of the income questions. If respondents could not give an estimate, they were asked to make an estimate using income bands on a show card. Evaluation of income estimates was found to reduce the amount of missing data but resulted in less precision (OPCS, 1994). This could have affected the comparability of survey income estimates prior to 1992 and after 1992. However, analysis by the OPCS (Office of Population Censuses and Surveys) suggested that whilst there was evidence that some respondents might have underestimated their income, the effects on overall levels of income were likely to have only been marginal (OPCS, 1994).

A proxy income question was introduced in 1992, which asked proxy informants to estimate the total net income of the person concerned, using income bands on a show card (this was converted to gross income at the machine editing stage). Evaluation of this question by OPCS found that it resulted in an additional 4% of income data for individuals, although it was acknowledged that income data obtained by this method was only an approximation (OPCS, 1994). Prior to 1992, income information was not collected for proxies, therefore, this was likely to result in some underestimation of gross household income for 1973, 1978 and 1984. However, this underestimation was considered to only have a small effect on the project findings.

To prepare the gross household income variable for analyses the following steps were taken. A derived variable was available in the datasets for gross household income, therefore this variable was checked to ensure that it had been derived in the same way for all survey years to be used in the analyses. Whilst the survey documentation for 1973 and 1978 stated that household income could not be estimated unless income data was available for everyone aged 16+, it was found that household income had been calculated where income was missing for a household member. In order to make these datasets

comparable to the other datasets used in the project analyses, the gross household income variable in 1973 and 1978 was re-coded to missing where income was missing for a household member. However, one of the problems with this was that the 1973 dataset did not contain a variable for proxy interviews. This was important as income data was not collected for proxies up until 1992 and households containing a proxy had household income coded as missing. Therefore, it was possible that gross household income was overestimated for 1973 compared to 1978 and 1984. During the gross household income checks, it was also found that in 1973 and 1978, gross household income was based on <u>annual</u> household income whereas for 1992, 2002 and 2011, it was based on <u>weekly</u> household income. Therefore, to ensure comparability across the survey years, weekly household income was converted to annual household income for 1992, 2002 and 2011.

The next step was to equivalize the gross household income variable using the McClements Scale. The 2002 and 2011 datasets contained a gross household income variable which had been equivalised using the McClements Scale, however, there was no documentation which showed explicitly how the variable had been derived. Therefore, to ensure comparability, the gross household income variable was equivalised for each survey year to be used in the analyses. The equivalized gross household income variable was then split into five equal groups (quintiles) for each survey year, to enable comparison between the lowest and highest household income groups.

One of the main limitations with using income data is that it is sensitive and that people may be reluctant to disclose this information. Therefore, it was important to identify how much income data was missing as this would reduce the sample size for analysis and introduce bias into the findings. Details of the missing income data for each survey year are discussed in Section 4.6.1.

Details of the composition of gross household income groups by survey year are shown in Table 4.4 in section 4.6.

4.3.2 Education

Education was measured using the highest level of educational qualification obtained. Education level was grouped into three categories with a respondent's highest reported educational qualification falling into one of these:

1   Degree level or above

2   Other qualification

3   No qualifications

Table 4.1 shows the coding scheme used for the derivation of the highest educational level for survey years 1973, 1978, and 1984. However, a variable was available in the datasets for 1992, 2002 and 2011, which coded education level into three categories. This variable was checked to ensure it had been derived in the same way as in Table 4.1. The education questions in the GHS/GLF have been fairly consistent over time, however, there have been some significant changes to educational qualifications in the UK since the survey began. In order to reduce the effects of changes to educational qualifications over time, education was coded into 3 broader categories.

Table 4.1: Coding scheme used to classify educational qualifications for highest educational level

Category	Educational level	Educational qualification
1	Degree level or above	Higher degree, 1st degree, Teaching qualification, HNC, HND, BTEC Higher, City and Guilds Full Technological, NVQ level 4-5, GNVQ Advanced level, Nursing qualification
2	Other qualification	GCE A level, AS level, BTEC National, ONC, OND, GCE O level grades A-E, GCSE grades A-G, CSE grades 1-5, Clerical and Commercial qualification, City and Guilds Ordinary/Advanced, NVQ level 1-3, GNVQ Intermediate/foundation level, apprenticeship, foreign qualification
3	No qualifications	No qualifications

Details of the composition for highest educational level by survey year are given in Table 4.4 in Section 4.6.

4.3.3   Occupation

Occupation was measured using the SEG of the Head of Household (HoH)/Household Reference Person (HRP). SEG was grouped into two categories with the current or last job of the HoH/HRP falling into one of these:

1   Non-manual

2   Manual

Three levels of SEG were available for use: full version, seven group version and two group version. The two group version was used and divides occupations into manual and non-manual categories. This version was used because the seven group version would have resulted in cell sizes too small for analysis. One of the limitations with using the manual/non-manual categories is that across the period of analysis there has been a reduction in the proportion of those in manual occupations and an increase

in the proportion of those in non-manual occupations. Consequently, the size of these groups has changed over time. Another limitation with using SEG is that it excludes a variety of individuals including those who have never-worked, members of the armed forces, full-time students and those with no usual occupation. These effects are discussed in Chapter 7 Section 7.2.3 in relation to the project findings. However, despite these limitations, the occupational categories of SEG have generally been consistent over time, with SEG extensively used by both ONS and the Department of Health throughout the duration of the GHS/GLF.

Three different forms of SEG were available for analysis: individual SEG, where respondents were classified according to their current or last job; SEG where married or cohabiting women were classified according to their husbands or partners current or last job; household SEG, where all adults in the household were classified according to the current or last job of the HoH /HRP. Household SEG was used for the analyses as it classifies all members of the household in the same way. This is important as it has been suggested that the household measure is more likely to reflect an individual's standard of living due to the influence of shared conditions of family members (Rose & Pevalin, 2003). Prior to 2000, the reference person for household SEG was defined as the HoH and was the eldest householder (for couples and non-related joint householders, men took priority over women). From 2000, the HoH was replaced by the HRP who was defined as the person who owned or rented the accommodation, or in the case of joint householders, the person who had the highest income. If there was more than one person with the highest income, the HRP was the oldest of the two. The HRP was considered to be a better reflection of a household's social position and meant that women could be the higher income householder (Martin, et al., 1998).

The change from HoH to HRP was likely to affect comparability of SEG between different survey years. Analysis of this change by the Office for National Statistics (ONS) showed that approximately 14% of households were affected with an increase in the proportion of female HRPs, but very little change in the distributions for age, marital status or work status were found. However, there was a small change in social class distribution, with a 4% increase in those in skilled non-manual occupations balanced by a corresponding decrease in skilled manual occupations. This was mostly due to differences between male and female occupations. However, for the majority of households, the same person was likely to be selected as the household reference person when defined as either HoH or HRP (Martin, et al., 1998). It seems unlikely that these changes would have a significant effect on the project findings.

SEG was derived by collapsing the occupational categories in the full version of SEG into the two category version; non-manual and manual. Table 4.2 shows the coding scheme used for derivation of HoH/HRP SEG for survey years 1973, 1978, 1984, 1992 and 2002. However, a variable for the two category version was available in the 2009/2010/2011. This variable was checked to ensure it had been

derived in the same way as in Table 4.2. Details of the composition of occupational groups by survey year are given in Table 4.4 in section 4.6.

Table 4.2: Coding scheme used to classify HoH/HRP occupation for Socio-economic group

Category	Socio-economic group	HoH/HRP occupation
1	Non-manual	Employers:Large, Managers:Large, Employers:Small, Managers:Small, Professional:Self-employed, Professional:Employee, Intermediate non-manual-ancillary/artists, Intermediate non-manual-foreman, Junior non-manual, Farmers-employers/managers
2	Manual	Personal service, Manual:Foreman/supervisors, Skilled manual, Semi-skilled manual, Unskilled manual, Own-account-not professional, Farmers-own account, agricultural workers

4.4   Outcome variables

4.4.1   Smoking

Overall, the questions on smoking behaviour have been fairly consistent with very little change throughout the duration of the GHS/GLF although, three new questions on cigarette dependency were introduced in 1992.

4.4.1.1 Smoking status

Smoking status was measured in the following way: current smokers were used as an indicator of smoking prevalence; ex-smokers were used as an indicator of smoking cessation and never smokers were used as an indicator of those who have never smoked. Smoking prevalence, smoking cessation and never smoking cluster together to represent a respondent's smoking status as rates of prevalence are linked to rates of cessation and never smoking.

Smoking status was obtained during interview by asking respondents three questions: whether they had ever smoked a cigarette; whether they smoked cigarettes at all nowadays and whether they had ever smoked cigarettes regularly. Respondents who smoked cigarettes around the time of interview were classified as smokers, whilst respondents who did not smoke but had smoked cigarettes regularly in the past, were classified as ex-smokers, regardless of the length of time since quitting. Respondents who had smoked in the past but not regularly, were classified as ex-smokers, while respondents who had

never smoked a cigarette, were classified as never smokers. The 1992, 2002 and 2011 datasets contained a derived variable for smoking status which was checked to ensure that the variables in these datasets had been derived in the same way. However, this variable was not available in the 1973 and 1984 datasets. Therefore, a smoking status variable was created for 1973 and 1984, using existing smoking data and derived and coded in the same way as the smoking status variables in the 1992, 2002 and 2011 datasets. The smoking status variable was initially coded into three categories for the purpose of descriptive statistics:

1   Current cigarette smoker

2   Ex-smoker

3   Never smoker

The three categories above were used to create three binary variables for the statistical analyses and were coded as follows:

To identify the relative risk of being a smoker, categories 2 and 3 were collapsed and the variable was re-coded as follows:

0   Ex-smoker and never smoker

1   Current smoker

To identify the relative risk of being an ex-smoker, never smokers were excluded and the variable was re-coded as follows:

0   Current smoker

1   Ex-smoker

To identify the relative risk of being a never smoker, categories 1 and 2 were collapsed and the variable was re-coded as follows:

0   Ex-smoker and current smoker

1   Never smoker

4.4.1.2 Nicotine consumption

Nicotine consumption was measured in the following way: smoking initiation measured the age respondents started to smoke regularly and smoking intensity measured how many cigarettes respondents smoked per day. The nicotine consumption cluster is important as the earlier a person starts to smoke, the more likely they are to become a heavy smoker. In addition, the longer a person smokes and the more heavily they smoke, the higher their intake of nicotine. This is likely to increase their dependency on smoking, which in turn will make it harder to quit (See Chapter 2, Section 2.3.3 for a discussion on this).

Smoking initiation was obtained during interview by asking current smokers and ex-smokers how old they were when they started to smoke cigarettes regularly. Responses to this question were given in years. The 1992, 2002 and 2011 datasets contained a derived variable for age started smoking, which was checked to ensure that the variables in these datasets had been derived in the same way. However, in 1973, this data was collected separately for current smokers and ex-smokers. Therefore, the two smoking initiation variables were combined to form one variable that would be comparable with the other survey years. In 1984, age started smoking was only asked of current smokers and not ex-smokers, therefore this variable was not comparable to the smoking initiation variable in the other survey years and was not used in the project analyses.

The smoking initiation variable was initially coded into five categories for the purpose of descriptive statistics:

1	Under 16 years
2	16-17 years
3	18-19 years
4	20-24 years
5	25 years and over

The five categories above were used to create a binary variable for the statistical analyses by collapsing categories 2 to 5 and recoding the variable as follows:

0	Started smoking after 16 years
1	Started smoking before 16 years

The variable was coded in this way because smoking often starts during early adolescence (i.e. before 16 years) and a higher proportion of those who start to smoke at an early age are from disadvantaged socio-economic groups (See Chapter Two, Section 2.3.4 for a discussion on this).

Smoking intensity was obtained during interview by asking current smokers how many cigarettes a day they usually smoked at weekends and on weekdays. All survey years with the exception of 1973, contained a derived variable for the average number of cigarettes smoked per day. The variables were checked to ensure they had been derived in the same way. For 1973, a variable was created to measure the average number of cigarettes smoked per day using existing smoking data and was derived in the same way as for the other survey years, using the categories above. A categorical measure rather than a continuous measure was used for the average number of cigarettes smoked per day, as categorical data is more interpretable and removes the issue of extremely heavy smokers.

The smoking intensity variable was initially coded into three categories for the purpose of descriptive statistics:

1   20+ cigarettes a day

2   10-19 cigarettes a day

3   0-9 cigarettes a day

The three categories above were used to create a binary variable for the statistical analyses by collapsing categories 2 and 3 and recoding the variable as follows:

0   Light smokers (less than 20 cigarettes a day)

1   Heavy smokers (more than 20 cigarettes a day)

Whilst different thresholds are used in the literature to define heavy smoking, for the purpose of this project, heavy smoking was defined as more than 20 cigarettes a day, as this is the definition that tends to be used in UK literature.

4.4.1.3 Smoking dependency

Smoking dependency was measured using the following indicators: time to first cigarette of the day; perceived difficulty of not smoking for one day and desire to quit smoking. The smoking dependency cluster is an important element of smoking behaviour as it is linked to both the nicotine consumption cluster and to smoking cessation. Higher levels of nicotine consumption make a smoker more dependent on smoking, therefore they are more likely to smoke soon after waking, to find it more difficult to not smoke and to have less motivation to quit smoking (See Chapter 2, Section 2.3.2 for a discussion on this). Questions on smoking dependency were introduced in the GHS/GLF in 1992, therefore this data was not available for analysis for 1973 and 1984.

Time to first cigarette of the day was obtained during interview by asking current smokers how soon after waking they usually smoked their first cigarette of the day. The 1992, 2002 and 2011 datasets contained a variable for time to first cigarette which was checked to ensure that the variables had been derived in the same way. The variable in the datasets had been coded into six different categories as follows:

1   Less than 5 minutes

2   5-14 minutes

3   15-29 minutes

4   30 minutes but less than 1 hour

5   1 hour but less than 2 hours

6   2 hours or more

Cross-tabulation of the 'less than 5 minutes' after waking category indicated that some of the cell counts were too small to be meaningful for analysis. Therefore, categories 1 and 2 were collapsed into one single category and renamed 'within 15 minutes' after waking. A binary variable was created for the statistical analyses by collapsing categories 3 to 6 and recoding the variable as follows:

0   First cigarette after 15 minutes of waking

1   First cigarette within 15 minutes of waking

Difficulty not smoking for one day was obtained during interview by asking current smokers how easy or difficult they would find it to go without smoking for a whole day. A variable was available in the 1992, 2002 and 2011 datasets, which was checked to ensure it had been derived in the same way. To prepare this variable for statistical analysis, a binary variable was created and coded as follows:

0   Easy to not smoke for one day

1   Difficulty not smoking for one day

Desire to give up smoking was obtained during interview by asking current smokers whether they would like to give up smoking altogether. A variable was available in the 1992, 2002 and 2011 datasets, which was checked to ensure it had been derived in the same way. To prepare this variable for statistical analysis, a binary variable was created and coded as follows:

0   Wants to quit smoking

1   Does not want to quit smoking

The smoking dependency variables were coded in this way as it captures those who are likely to have a greater nicotine dependency, which has implications for smoking cessation.

Details of the descriptive statistics for the different smoking outcome variables by survey year can be found in Chapter 5.

4.4.1.4 The reliability of smoking estimates

It is likely that smoking data in the GHS/GLF surveys are underestimated, particularly in relation to cigarette consumption and to a lesser extent in terms of smoking prevalence (Rickards, et al., 2004). Evidence suggests that when respondents are asked about cigarette consumption and how many cigarettes they smoke per day, they are likely to round the number down to the nearest multiple of 10, with consumption being underestimated by about 10% (OPCS, 1994). Studies that have investigated the accuracy of self-reported smoking data have found that smoking prevalence is underestimated. For example, one particular study that used cotinine levels (an objective measure of nicotine intake) to assess self-reported measures of smoking prevalence in England, found that prevalence was underestimated by 2.8% (West, et al., 2007). However, it has been suggested that the extent to which self-reported smoking data is under-reported appears to be quite variable between different studies

(Gorber, et al., 2009). It might be assumed that when looking at trends in smoking patterns over time that under-reporting is fairly consistent, however, it is possible that as smoking has become less acceptable over time, that under-reporting might have increased (Rickards, et al., 2004). Whilst it is acknowledged that there is likely to have been some underestimation in the self-reported smoking data in the GHS/GLF, it was not considered to have had a significant effect on the project findings.

4.4.2   Alcohol

Questions on alcohol consumption were introduced in the GHS/GLF in 1978 and have been fairly consistent over time. However, there have been a number of changes and these are discussed below.

4.4.2.1 Weekly alcohol consumption

Weekly alcohol consumption was measured using the 'quantity-frequency' method which gave a continuous measure of a respondent's usual weekly alcohol consumption, in units (Goddard, 2007). Levels of weekly alcohol consumption have been shown to be associated with drinking inequalities although higher levels of weekly drinking tend to be found amongst more advantaged socio-economic groups compared to more disadvantaged socio-economic groups (See Chapter 3, Section 3.3.1 for a discussion on this).

Although two different measures of drinking were available in the datasets, weekly alcohol consumption was used as this measure was available from 1978, when alcohol questions were first introduced in the GHS/GLF, through to 2011. The second drinking measure calculated the maximum amount of alcohol consumed on any one day in the previous week, however, data on a respondent's heaviest drinking day was only available from 1998 to 2011.

Weekly alcohol consumption was obtained by asking respondents how often over the last 12 months they had consumed different types of alcoholic drinks and how much of each type of drink had they usually consumed on any one day. Usual weekly alcohol consumption was calculated by multiplying the number of units for each type of drink consumed on a usual drinking day by the frequency with which the drink was consumed. The number of units was then totalled for all drinks consumed. Appendix 3 (Table A3.1) shows the drinking frequency categories and multiplying factors used to calculate weekly alcohol consumption. Three differences in the multiplying factors were found when checking the derivation of this variable. The first was that the multiplying factor for 1978/1984 for drinking 'most days' was 6.5 compared to 7.0 for drinking 'almost every day' for 1992/2002/2011. Secondly, 1992/2002/2011 had an additional drinking frequency category of '5 or 6 days a week' which was not available for 1978/1984. The third difference was that 1984/1992 had a drinking frequency category of '1-2 per 6 months' whereas 1992/2002/2011 had a drinking frequency category of 'once every couple of

months'. The former relates to drinking once every 3 months and this was reflected by a smaller multiplying factor. It was not possible to make the drinking frequency measures and multiplying factors the same for all survey years however, any overestimation or underestimation of weekly alcohol consumption, where these differences exist, is likely to be small and may cancel each other out.

One advantage to using the quantity-frequency measure for calculating average weekly alcohol consumption was that it averages out drinking behaviour over a period of time. However, as respondents were asked about 'usual' drinking occasions, it is unlikely that heavier drinking occasions were taken into account, particularly for occasions such as holidays, weddings, Christmas and New Year (Goddard, 2007). Whilst this is likely to result in some underestimation of alcohol consumption, it is unlikely to significantly bias the project findings.

Since the introduction of drinking questions in the GHS/GLF in 1978, three changes have occurred within the alcohol industry, which have affected how estimates of alcohol consumption were calculated. The first of these was the introduction of new types of alcoholic drinks. Between 1978 and 1998, respondents were asked about five categories of drink: shandy; beer, lager and cider; wine; fortified wine; spirits and liqueurs. These categories generally represented the main types of alcohol consumed and were considered to be similar in terms of alcoholic strength. However, from 1998, two new categories were introduced into the survey: alcopops and strong beers, lagers and ciders. Shandy was no longer a separate category but was included with normal strength beer, lager and cider (Goddard, 2007). Secondly, the volumes in which alcoholic drinks were sold became more variable over time. For example, whereas a standard glass of wine bought in a bar or pub was 125ml, in more recent years it was likely to be 175ml or 250ml. There have also been changes to can and bottle sizes for alcohol sold in off-licences, with a wider variety of different sizes being available. Thirdly the alcoholic strength for some drinks has increased over time e.g. beer and wine. These changes have resulted in an increase in both alcoholic content and the amount of alcohol consumed and were considered to be particularly significant when converting the amount consumed to units (Goddard, 2007). In order to reflect these changes, an updated method of converting drink volumes to alcohol units was introduced in 2006 and in 2008 new questions were included in the GHS/GLF to distinguish between different wine glass sizes (small (125ml), medium (175ml) and large (250ml)) and the amount of wine consumed from bottles (Goddard, 2007).

Appendix 3 (Table A3.2) shows the main differences between the original conversion factors and the revised conversion factors used to convert drink volumes to alcohol units. Changes to the original method include an increase in 1.0 unit for a glass of wine and 3.0 units for a bottle of wine; an increase of 0.5 units for a half pint/small can/bottle of strong beer and 0.7 units for a large can/bottle of strong beer and an increase in 0.5 units for a small can/bottle and large can/bottle for normal beers. New

conversion factors were also introduced for very large cans of normal and strong beers and for bottles or litres of fortified wine and spirits. No changes were made to the conversion of alcopops or for single or small measures of fortified wines and spirits (Goddard, 2007).

The above changes were taken into consideration when deciding on how to ensure comparability of the weekly alcohol consumption variable for the project analyses. Analysis by the ONS when applying the new conversion factors to the GHS 2005 data, showed some underestimation of the number of units for average weekly alcohol consumption, although this was predominantly for wine, and to a lesser extent for beer, lager and cider. Overall, when using the new conversion factors, average weekly alcohol consumption tended to increase from 10.8 units to 14.3 units, although the increase was greater for women (15.8 to 19.8 units) when compared to men (6.5 to 9.4 units), as they tended to consume more wine (Goddard, 2007).

As the units used to calculate fortified wines, spirits and alcopops remained the same, it was not necessary to make any changes to the conversion factors for these drinks. Strong beer was not introduced in the surveys until 1998, therefore the conversion for these categories would only be applicable to the data in 2002 and 2011. As strong beers only accounted for a small proportion of alcohol consumption, the increase in units was unlikely to have a significant effect on the estimates of total consumption. One option for calculating the number of units of wine consumed was to use an average interim measure of 2 units for all survey years, although this interim measure would not have been necessary for 2011, which included data on the new category of glass sizes. It has been suggested that is likely that an 'average' glass size would have varied between different groups of respondents with young people and those in the highest occupational groups more likely to have used large glasses and older people were more likely to have used smaller glasses. Therefore, this could systematically underestimate consumption of wine for some respondents while overestimating it for others (Goddard, 2007).

The project was designed to look at trends over time and as new conversion factors were introduced to take account of changes that had taken place over a number of years, the new conversion factors would not have been appropriate for the earlier survey data. Therefore, for the reasons discussed above, the existing variables in the datasets were used to estimate average weekly alcohol consumption.

A continuous variable measuring average weekly alcohol consumption was available in the 1992, 2002 and 2011 datasets but was not available for 1978 and 1984. The latter two datasets contained a variable which estimated a respondent's usual weekly alcohol consumption but this was not comparable to the average weekly alcohol consumption variable in the later datasets. Therefore, a variable to measure usual weekly alcohol consumption was created for 1978 and 1984, using existing alcohol data and

derived in the same way as for the other survey years. The frequency distributions for this variable were examined and some outliers from unrealistically high estimates noticed. Therefore, in order to reduce the effects of these outliers, average weekly alcohol consumption was top-coded at 150 units for both men and women.

In September 2011, the Department of Health withdrew funding for the questions used to calculate average weekly alcohol consumption for the last quarter of the survey year. As a result, these questions were removed from the survey and data for weekly alcohol consumption was not collected between October and December 2011 (Office of National Statistics, 2013). The 2011 dataset being used for analysis was a combined dataset comprised of data from 2009, 2010 and 2011, therefore the impact of the missing data was less than if 2011 had been the only dataset used for analysis. One problem with the missing data is that it could be problematic if the patterning of the weekly alcohol consumption variable varied across the four quarters. This might be due to a change in respondents drinking patterns, related to particular occasions which might see an increase or decrease in alcohol consumption. To see if this was likely to be an issue, the mean weekly alcohol consumption was calculated for each quarter for 2009 and 2010 and then each quarter was compared across the two survey years. Overall, the mean for each quarter for 2009 and 2010 was similar and therefore the analysis could be conducted without adjusting for the missing data between October to December 2011.

4.4.2.2 Heavy drinking

Heavy drinking was measured using the top 10% of men and top 10% of women who had consumed the most units in a week. Heavy drinking is important as it is more likely to be associated with higher levels of alcohol-related harm to health which contributes to health inequalities (see Chapter 3, Section 3.3.2 for a discussion on this). There were two ways in which heavy drinking could have been defined for this project. The first would have been to use an existing definition that was based on evidence of harm from heavy drinking. For example, the UK government defines harmful drinking as greater than 35 units a week for women and 50 units a week for men (DH, 2007). A variable was created that classified respondents as heavy drinkers in accordance with the government guidelines, however, when cross-tabulations were conducted it was found that the cell counts for this variable were too low for the findings to be meaningful. One of the reasons for the low cell counts is that people who are heavy drinkers are likely to be more difficult to contact or unwilling to be interviewed and therefore this group may be under-represented in the data (Boniface, et al., 2017; Galea & Tracy, 2007). Also, the collection of data excludes those living rough or in institutions and these populations are likely to contain a higher than average proportion of heavy drinkers. It is also possible that heavy drinking may be under-estimated as people have a tendency to under-report their alcohol consumption due to social desirability bias (Boniface, 2014; ONS, 2013).

The second option for defining heavy drinking was to use the top 10% of men and the top 10% of women who consumed the most units on average during the week. These would be 'heavy drinkers' by definition regardless of whether they exceeded government guidelines as they had consumed the most alcohol in England as reported by the GHS/GLF. To create the heavy drinking variable, the average weekly alcohol consumption variable was categorized into percentiles for each survey year. The top 10% of drinkers were the 90th percentile and represented heavy drinkers.

Table 4.3: Unit thresholds for heavy drinkers for men and women for each survey year

Survey Year	Men	Women
1978	52 units or above	14 units or above
1984	42 units or above	15 units or above
1992	42 units or above	17 units or above
2002	44 units or above	22 units or above
2011	44 units or above	22 units or above

The unit thresholds for the heavy drinking outcome variable for the top 10% of men and women varied between survey years and are shown in Table 4.3. The government threshold for the maximum weekly number of units is 21 units for men and 14 units for women. Therefore, with the exception of 1978 for women, the heavy drinking units for the project exceeded the government threshold.

To prepare this variable for statistical analysis, a binary variable was created and coded as follows:

0   Other drinkers and non-drinkers

1   Heavy drinkers

Details of the descriptive statistics for the different drinking variables by survey year can be found in Chapter 6.

4.4.2.3 The reliability of drinking estimates

It is likely that alcohol consumption data is underestimated in the GHS/GLF surveys, particularly in relation to heavy drinking. Social surveys have been reported to under-estimate consumption levels when this data is compared to UK data on alcohol sales (ONS, 2013). There are a number of different reasons for this. The GHS/GLF interviews people living in private households and therefore excludes those living in institutions or those who are homeless, with these groups likely to contain a greater number of heavy drinkers (Goddard, 2001). Heavy drinkers are more likely to be under-represented in social/health surveys as this group are often more difficult to contact or less likely to participate in surveys (Boniface, et al., 2017). More generally though, it has been found that people tend to

underestimate the amount of alcohol they consume. This can be due to poor recollection of drinking occasions or by underestimating drink sizes or the number of drinks consumed (Boniface, et al., 2013; Bellis, et al., 2009). However, it is also possible that people under-report their alcohol consumption intentionally, due to social desirability, which is likely to be greater for heavy drinkers, (Boniface, et al., 2014). Individually, these reasons are unlikely to significantly bias the drinking estimates in this project, however, when the different reasons are combined, the effect is likely to be greater, with consumption levels under-estimated. This is likely to bias the project findings and is discussed in more detail in Chapter 7.

4.5   Other variables

4.5.1   Age and gender

The sample of interest for this project was adults aged 18-64 years. Both age and gender are associated with SEP, therefore, it was important to control for these variables in the analyses in order to see the effects of SEP on smoking and drinking, independent of the relationship between SEP and age and SEP and gender. There were two ways in which age could be controlled for. The first would be to include age-squared as a continuous variable in the analyses and the second would be to include age categories in the analyses. In order to account for the non-linear effects of age on smoking and drinking behaviour, age categories were used. Age was recorded in single years in the datasets, therefore the age variable was categorised into five broad bands as follows:

1	18-24
2	25-34
3	35-44
4	45-54
5	55-64

Chapters 2 and 3 highlighted gender variations in smoking and drinking behaviours, therefore, although gender could be controlled for by including it as an independent variable in the analyses, the analyses were conducted separately for men and women, to highlight any differences in terms of material or cultural influences on smoking and drinking behaviour. Descriptive statistics for age and gender variables for each survey year are shown in Table 4.4.

4.6   Characteristics of the final datasets

Descriptive statistics for the final datasets for the demographic and socio-economic variables are shown in Table 4.4. Descriptive statistics for smoking and drinking outcomes are given in Chapters 5 and 6. Table 4.4 shows there was a slightly higher proportion of women than men in all survey years although this difference increased over time. The 18-24 year age group were proportionately smaller for both

men and women however, this category covered a 5 year period whereas all other age group categories covered a 9 year period. The proportion of men and women with no educational qualifications significantly decreased over time, while the proportion of men and women with a degree or higher increased notably over time. Overall, there was a higher proportion of women with no educational qualifications than for men and a higher proportion of men educated to degree level or above than for women, except in 2011, when the trend was reversed. The proportion of men and women in manual occupations decreased over time, while the proportion of men and women in non-manual occupations increased over time. Overall, there was a higher proportion of men in manual occupations compared to women and a higher proportion of women in non-manual occupations than for men. Equivalized household income was categorized into five equal groups therefore, these groups were of a similar proportional size, however, with the exception of 1978, there was a higher proportion of men in the highest income groups and a higher proportion of women in the lowest income groups.

4.6.1   Missing data

Missing data in the final datasets for the predictor and outcome variables for men and women are shown in Appendix 4 (Tables A4.1 and A4.2). With the exception of income, missing data for the education and occupation variables was <5% for men and women for all survey years and therefore was unlikely to affect the project findings. However, with the exception of income data for men and women in 1973, missing data was greater >5% for all survey years, therefore income data was likely to be underestimated and is discussed in relation to the project findings in Chapter 7. Missing data for all smoking and drinking outcome variables and for age and gender were < 5% and are therefore unlikely to affect the project findings.

Table 4.4: Demographic characteristics of the study population (adults aged 18-64 years in England)

Persons aged 18-64 years	GHS 1973 Men (n=7,885)	GHS 1973 Women (n=8,159)	GHS 1978 Men (n=7,785)	GHS 1978 Women (n=8,003)	GHS 1984 Men (n=6,315)	GHS 1984 Women (n=6,523)	GHS 1992 Men (n=6,233)	GHS 1992 Women (n=6,519)	GHS 2002 Men (n=5,076)	GHS 2002 Women (n=5,528)	GLF 2011 Men (n=4,897)	GLF 2011 Women (n=5,367)
						Percentage (%)						
Sex	49.1	50.9	49.3	50.7	49.2	50.8	48.9	51.1	47.9	52.1	47.7	52.3
Age												
18-24 years	15.6	14.8	16.0	15.3	17.4	16.7	14.4	14.5	12.0	12.0	13.3	12.9
25-34 years	23.5	23.0	24.4	24.1	23.5	23.8	24.4	25.2	20.8	21.5	18.4	19.9
35-44 years	20.3	19.7	20.5	20.0	23.0	23.2	22.8	22.4	24.8	24.8	22.7	23.0
45-54 years	21.7	22.4	20.7	20.2	18.4	17.3	21.1	21.4	22.2	22.6	24.1	23.2
55-64 years	18.9	20.1	18.4	20.5	17.6	19.0	17.3	16.5	20.2	19.1	21.6	21.1
Education Level												
Degree level or above	10.7	7.4	14.9	9.1	18.9	12.8	23.6	16.8	29.6	28.0	34.8	35.1
Below degree level	35.4	26.3	39.9	32.4	42.7	40.6	48.0	50.9	52.0	51.6	53.0	51.2
No qualifications	53.9	66.3	45.2	58.4	38.4	46.7	28.4	32.2	18.5	20.4	12.3	13.7
HoH/HRP socio-economic group (SEG)												
Non-manual	37.9	40.4	41.5	43.3	43.3	46.2	46.9	50.6	55.9	59.1	59.6	61.5
Manual	62.1	59.6	58.5	56.7	56.7	53.8	53.1	49.4	44.1	40.9	40.4	38.5
Gross equivalised household income												
Highest group	21.4	18.6	22.4	17.7	21.9	18.2	21.2	18.8	21.7	18.4	21.8	18.3
Fourth group	21.0	19.0	21.6	18.5	21.0	19.1	21.1	19.0	21.1	19.0	20.7	19.4
Third group	20.5	19.4	21.0	19.0	20.7	19.3	20.3	19.7	20.9	19.2	20.3	19.7
Second group	19.7	20.4	19.5	20.4	19.3	20.7	19.6	20.4	18.7	21.2	18.4	21.5
Lowest group	17.3	22.6	15.4	24.3	17.1	22.7	17.8	22.1	17.6	22.1	18.8	21.1

Data unweighted

4.7　Methods

This section describes the methods and statistical analyses that were conducted to address the project's two research questions, as described in Chapters 2 and 3. The methods section comprises two sections, each of which describes the analyses for each research question. The methods that were used in the project were designed to assess the relative importance of material and cultural factors on elements of smoking and drinking behaviour.

4.7.1　Analysis of the relationship between cigarette smoking and SEP

This set of analyses was designed to address the first research question: to what extent has the relationship between different indicators of socio-economic position and cigarette smoking behaviour changed between 1973 and 2011. As described in section 4.2, five datasets from the following surveys were used for this set of analyses: 1973, 1984, 1992, 2002 and 2011. Details of the sample sizes for each dataset used in the analysis can be found in Appendix 2 (Table A2.1). All analyses were conducted separately for men and women to determine whether there was any variation in the relationship between SEP and each smoking outcome measure and whether there were any differences by gender in changes to this relationship over time.

Prior to running the analyses, multicollinearity statistics were run for each smoking outcome measure with the three SEP indicators and age (grouped), to ensure that the variables were not too highly correlated. If they were, this would make it difficult to disentangle the separate effects of each SEP indicator (Hutcheson & Sofroniou, 1999). The 'tolerance' and 'variance inflation factors' (VIF) from the collinearity diagnostics suggested that multicollinearity was unlikely to be high. The tolerance was always above 0.1 and the VIF was always below 1.5.

The response rates for the earlier survey years were generally high, although there was a drop in response rates for the 2002 and 2011 survey years (see Table 4.5). Although the GHS/GLF survey provides weights to address non-response bias, these were not introduced into the survey until 1998 (Social Survey Division, 2001). This was problematic as weights were not available for the earlier survey years. Whilst they could be applied to the 2002 and 2011 data, the earlier years would be unweighted and weighted and unweighted data cannot be meaningfully compared. Therefore, cross-tabulations were conducted on the variables of interest with the weighted data compared to the unweighted data for 2002 and 2011. Whilst there was some variation between the weighted and unweighted data, differences were not found to be significantly large enough to affect the project estimates. Therefore, all analyses were run with unweighted data.

Table 4.5: Household middle response rates[3] for survey years

Survey Year	Response Rate
1973	81
1978	82
1984	81
1992	83
2002	69
2011	70

Prior to running the statistical analyses, cross-tabulations were run to investigate the relationship between SEP and the smoking and drinking outcome measures and to provide descriptive statistics and are reported in Chapters 5 and 6.

4.7.1.1 Statistical models

A series of regression models were fitted to determine the nature of the relationship between each smoking outcome measure and the three SEP indicators, for each of the five survey years. Log-binomial regression was used to estimate relative risk ratios (RR) using SPSS version 24 and Stata version 15. Whilst Odds Ratios (OR) as estimated by logistic regression are widely used in studies investigating trends in inequalities in health and health-related behaviours, it has been argued that ORs have a tendency to overestimate the relationship, which can introduce bias into research findings (Khang, et al., 2008; Barros & Hirakata, 2003; Zocchetti, et al., 1997). This is because logistic regression produces ORs which are highly dependent on the prevalence of the outcome (e.g. smoking) and therefore, when frequencies for the outcome are relatively high (e.g. >10%) and significantly vary over time, ORs tend to overestimate the relationship. As a result, variations in the ORs are partly due to changes in the trends of smoking rather than changes in the strength of the relationship between smoking and SEP. Due to the potential effects of this problem, log-binomial regression was used rather than logistic regression for the project analyses.

The log-binomial model is a generalized linear model that assumes a binomial distribution of the outcome measure, where the link function is the logarithm of the proportion (i.e. the ratio between the cases and cases plus non-cases) of the variable of interest and the distribution of the error is binomial. The measure of effect in the model is the relative risk (Barros & Hirakata, 2003).

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[3] The household middle response rate is used as a performance index for GHS/GLF and includes full interviews and some partial household interviews.

In a binomial regression model with k covariates, the model is written as:

$$\text{Log } [a/(a+b)] = \beta_0 + \beta_1 X_1 + \beta_k X_k$$

where a is the number of cases and b is the number of non-cases, and X_i the covariates. Therefore, a/ (a + b) is the probability of success (e. g., the proportion of smokers in a group), and the RR is the estimated effect of a given covariate X_i (Diaz-Quijano, 2012).

Models were fitted with all three SEP indicators, controlling for age (grouped), for all binary smoking outcome variables[4]. The models were complete-case for all variables included. Separate analyses were run as follows:

1. Current smokers vs ex-smokers and never smokers to identify the relative risk of being a smoker;

2. Ex-smokers vs current smokers to identify the relative risk of being an ex-smoker;

3. Never smokers vs ex-smokers and current smokers to identify the relative risk of never smoking

4. Started smoking before 16 years vs started smoking after 16 years to identify the relative risk of smoking regularly before 16 years of age.

5. Heavy smokers vs light smokers to identify the relative risk of being a heavy smoker (smokes more than 20 cigarettes a day);

6. First cigarette within 15 minutes of waking or first cigarette after 15 minutes of waking to identify the relative risk of smoking shortly after waking;

7. Difficulty not smoking vs easy not smoking to identify the relative risk of being a smoker who would find it difficult to not smoke for one day;

8. Does not want to give up smoking vs wants to give up smoking to identify the relative risk of not wanting to quit smoking.

Whilst the predictor (SEP) variables in the models had a number of different levels (see Section 4.3), the findings reported in Chapters 5 and 6 are the difference between the top and the bottom category of these variables. The relationship between each SEP indicator and the smoking outcome measures are expressed as relative risk ratios. These relative risks (RR) were used to compare the magnitude of the effect of the different SEP indicators on the smoking outcome measures. One of the main limitations is that the different SEP measures are on different measurement scales and therefore cannot be directly

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[4] Models with single SEP indicators were also fitted. These results are reported in Appendices 6 to 8.

compared. However, the risk ratios (RR) give an indication of the relative magnitude of the gap between the lowest and highest socio-economic groups and this can be used to assess which SEP indicator appeared to be the more important predictor of each smoking behaviour. For example, if the gap between the lowest and highest income groups was wider than the gap between the lowest and highest educational groups, income was considered to be the more important indicator.

A comparison of the risk ratios (RR) across the survey years for each smoking outcome measure was used to determine whether the gap between the lowest and highest socio-economic groups had widened or narrowed across the period of analysis. The datasets for the survey years used in the analysis were then combined and dummy variables created for each survey year. Interaction tests using log-binomial regression were then conducted to estimate whether the changes to the relationship for each smoking outcome measure was statistically significant between each survey year.

4.7.2 Analysis of the relationship between alcohol consumption and SEP

This set of analyses was designed to address the second research question: to what extent is the relationship between different indicators of socio-economic position and drinking similar to or distinctive from the relationship between socio-economic position and smoking. As described in section 4.2, five datasets from the following surveys were used for this set of analyses: 1978, 1984, 1992, 2002 and 2011. Details of the sample sizes for each dataset used in the analysis can be found at Appendix 2 (Table A2.1). As per the smoking analyses, all analyses for alcohol consumption were conducted separately for men and women to determine whether there was any variation in the relationship between SEP and each drinking outcome measure and whether there were any differences by gender in changes to this relationship over time.

Multicollinearity statistics were run for each drinking outcome variable with the three SEP indicators and aged (grouped), to ensure that the variables were not too highly correlated. The 'tolerance' and 'variance inflation factors' (VIF) suggested that multicollinearity was unlikely to be high. The tolerance was always above 0.1 and the VIF was always below 1.5.

4.7.2.1 Statistical models

A series of regression models were fitted to determine the nature of the relationship between each drinking outcome measure and the three SEP indicators, for each of the five survey years. Two different types of regression methods were used to address the alcohol research question: coefficients were estimated by multiple linear regression and relative risk ratios were estimated by log-binomial

regression. Models were fitted with all three SEP indicators, controlling for age (grouped), for all the drinking outcome variables[5]. The models were complete-case for all variables included.

Separate analyses were run as follows:

1. Estimated usual weekly alcohol consumption, in units (multiple linear regression was used);

2. Heavy drinkers vs other drinkers and non-drinkers to determine the relative risk of being a heavy drinker (log-binomial regression was used).

Similar to the smoking analyses, the predictor (SEP) variables in the models had a number of different levels (see Section 4.3), although the findings reported in Chapter 6 are the difference between the top and the bottom category of these variables. The relationship between each SEP indicator and the drinking outcome measures are expressed as coefficients (β) and relative risk ratios and were used to compare the magnitude of the effect of the different SEP indicators on the drinking outcome measures.

A comparison of the risk ratios (RR) across the survey years for each drinking outcome measure was used to determine whether the gap between the lowest and highest socio-economic groups had widened or narrowed across the period of analysis. The datasets for the survey years used in the analysis were then combined and dummy variables created for each survey year. Interaction tests using log-binomial regression were then conducted to estimate whether the changes to the relationship for each drinking outcome measure was statistically significant between each survey year.

This chapter has discussed the project's methodology including the datasets that were used for the analysis, preparation of the predictor and outcome variables and the methods and statistical analyses. The following two chapters describe the results of the analyses for the smoking and drinking outcomes.

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[5] Models with single SEP indicators were also fitted. These results are reported in Appendices 9 to 10.

Chapter 5: Analysis of the Relationship between Smoking and Socio-economic Position

5.1   Introduction

Chapter 2 concluded that despite a significant fall in adult smoking prevalence in the UK, since the early 1970s, smoking inequalities persist and are characterised by higher rates of prevalence and consumption and lower rates of quitting and never smoking amongst the most disadvantaged socio-economic groups and by lower rates of prevalence and consumption and higher rates of cessation and never smoking amongst the least disadvantaged groups. Material and cultural theories explain why people smoke, however, it is not understood how these different SEP indicators differentially relate to these patterns. This is important as it can help to explain what mechanisms might be involved in smoking inequalities and how they might have changed over time.

This chapter describes the results of the analyses that were conducted to determine to what extent the relationship between different indicators of SEP (as measured by income, education and occupation) and smoking behaviour had changed between 1973 and 2011. Figure 5.1 illustrates the different elements of smoking behaviour that were analysed in this project. Chapter 2 highlighted how these elements are linked and cluster together although this is re-iterated here. Smoking prevalence, smoking cessation and never smoking represent a person's smoking status and naturally cluster together as prevalence rates are influenced by rates of cessation and the proportion of never smokers in a population. Smoking initiation relates to the age a person starts to smoke regularly, while smoking intensity relates to the amount a person smokes and whether they can be classified as a 'light' or 'heavy' smoker. Smoking initiation and smoking intensity can be clustered together as both are related to nicotine consumption. For example, the earlier a person starts to smoke regularly, the more likely they are to be a heavy smoker. Smoking initiation is also linked to smoking cessation as the longer a person smokes, the more likely they are to be dependent on smoking due to the effects of nicotine and to experience difficulty quitting. Similarly, smoking intensity is also linked to smoking cessation as higher levels of nicotine are more likely to make quitting more difficult. Smoking intensity may also be related to smoking prevalence as those in the most disadvantaged socio-economic groups may reduce consumption of cigarettes rather than quitting in order to make their smoking habit more 'affordable'. Some smokers may also reduce their cigarette consumption rather than quitting in an attempt to reduce the impact of smoking on their health. The nicotine consumption cluster is linked to the smoking dependency cluster as it is associated with the likelihood of quitting smoking. For example, time to first cigarette and difficulty not smoking are indicators of smoking dependency while desire to quit relates to the motivation to give up smoking. For example, those who have smoked for a longer period of time

and/or are heavier smokers are more likely to experience higher dependency levels and a lower motivation to quit.
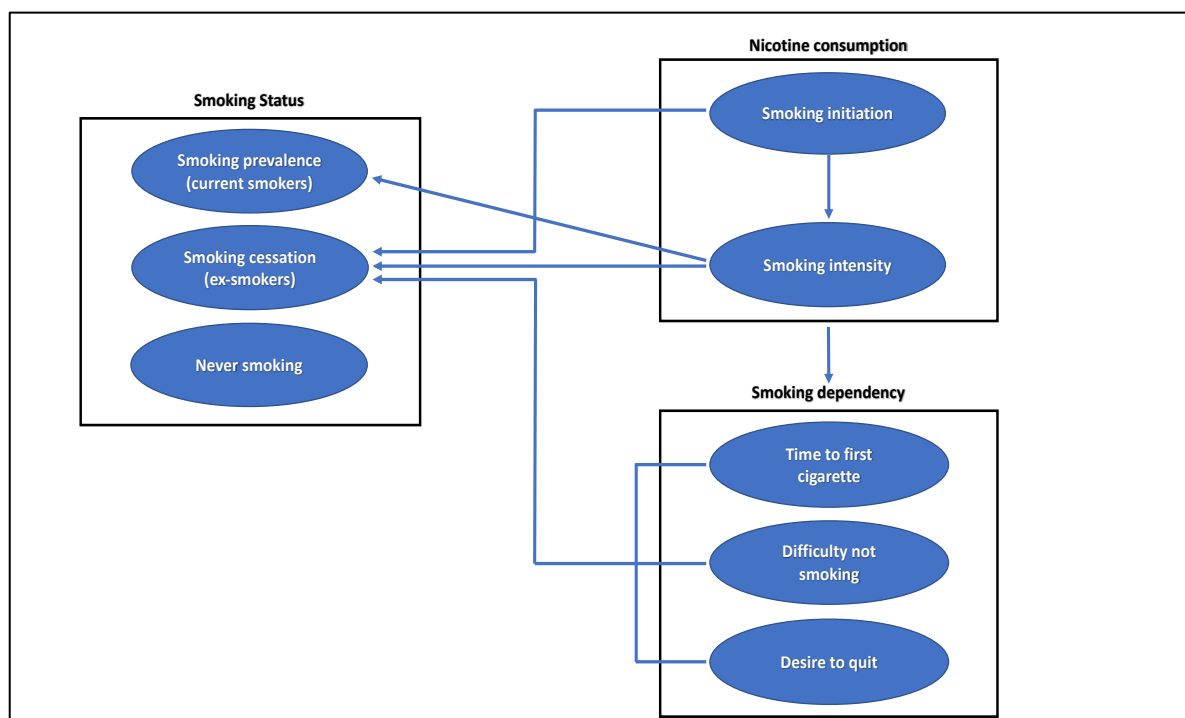
Figure 5.1: Relationship between the different elements of smoking behaviour.

As described in Chapter 4 (section 4.7), the analyses were designed to assess the relative importance of material and cultural factors on smoking behaviour. Details of the binary outcome measures used for smoking are given in Chapter 4 (section 4.4.1). All analyses were conducted for men and women separately for each smoking outcome measure. To briefly reiterate, the following analyses were conducted:

- Regression analysis for selected survey years to determine the nature of the relationship between each smoking outcome and SEP indicator to see whether these relationships differed for respondents in the lowest socio-economic groups compared to respondents in the highest socio-economic groups and to determine the magnitude of the gap between these groups. Risk ratios (RR) gave an indication of the size of the gap which was used to assess which SEP indicator appeared to be the more important predictor of smoking behaviour. For example, if the gap between the lowest and highest educational groups was wider than the gap between the lowest and highest income groups, education was considered to be the more important predictor. RR's were then compared across survey years to determine whether the gap between the lowest and highest socio-economic groups had widened or narrowed, which would suggest the relationship had strengthened or weakened;

- Interaction tests were conducted to determine whether any changes to the relationship between smoking outcomes and SEP were statistically significant between survey years.

The results from the regression analyses in this chapter report RR's for the lowest and highest socio-economic groups only and for the models fitted with all three SEP indicators (controlling for age). Findings for the intermediate socio-economic groups and results for the models fitted with single SEP indicators can be found in Appendices 5 to 8.

5.2   Descriptive statistics for smoking status

Descriptive statistics for smoking status are shown in Tables 5.1 and 5.2. Between 1973 and 2011, a higher proportion of men were smokers compared to women and whilst smoking prevalence declined for both men and women across the period, the decline was greatest for men, which resulted in a narrowing of the gender gap for smokers. It can also be seen that a higher proportion of men were ex-smokers compared to women and whilst quitting increased for women across the period, it increased initially for men before decreasing. Higher rates of quitting amongst women over time, resulted in a narrowing of the gender gap in terms of ex-smokers.

Table 5.1: Smoking status for men aged 18-64 years by survey year

Survey year	n	Current smoker (%)	Ex-smoker (%)	Never smoked (%)
1973	7,079	53.7	21.9	24.5
1984	5,652	37.6	27.7	34.7
1992	5,701	31.4	27.6	41.0
2002	4,521	29.2	23.9	46.8
2011	3,806	25.2	23.2	51.6

Table 5.2: Smoking status for women aged 18-64 years by survey year

Survey year	n	Current smoker (%)	Ex-smoker (%)	Never smoked (%)
1973	7,634	44.4	11.2	44.4
1984	6,248	35.4	17.3	47.3
1992	6,291	29.6	18.9	51.5
2002	5,242	27.5	19.0	53.5
2011	4,663	22.6	20.3	57.1

Never smoking was highest amongst women compared to men for all survey years analysed and increased for men and women between 1973 and 2011. However, due to a greater increase in never smoking amongst men, the gender gap for never smokers significantly narrowed over time.

5.3   Analyses for smoking status

The analyses reported in this section investigated the relationship between SEP and smoking prevalence, smoking cessation and never smoking for selected survey years between 1973 and 2011. Cross-tabulations were initially conducted to examine the relationship between smoking status and SEP and are illustrated in Figures 5.2, 5.5 and 5.8. It should be noted that the figures show changes over time to this relationship, however, they do not take into account the age effect on smoking behaviours. Following the cross-tabulations, a series of log binomial regression models were conducted. The procedure is described in Chapter 4 (Section 4.7) but is briefly summarised below.

Log-binomial models were fitted with all three SEP indicators (income, education and occupation) and age (grouped) as a single block to determine the bivariate relationship between each SEP measure and the smoking status outcomes. The findings are illustrated as follows: for smoking prevalence in Figures 5.3 and 5.4; for smoking cessation in Figures 5.6 and 5.7; for never smoking in Figures 5.9 and 5.10.

5.3.1   Smoking prevalence

As discussed in Chapter 2, overall adult smoking prevalence has declined since the early 1970s, therefore the first set of findings in Figure 5.2 illustrates the observed rates of smoking prevalence for men and women in the highest and lowest socio-economic groups as measured by gross household income, educational level and occupation (SEG) between 1973 and 2011 (Appendix 5 Table A5.1 shows the observed rates (%) for smoking prevalence in more detail).

Overall, an inverse relationship was found between smoking prevalence and all socio-economic indicators for men and women, with smoking rates highest in the lowest socio-economic groups and lowest in the highest socio-economic groups. The gap between the highest and lowest socio-economic groups was widest as measured by education for men and by income for women but was narrowest for men and women as measured by occupation. Across the period of analysis, smoking prevalence declined for men and women as measured by all three socio-economic indicators whilst the gap between the lowest and highest socio-economic groups generally widened for men and women although this was to a lesser degree as measured by occupation.
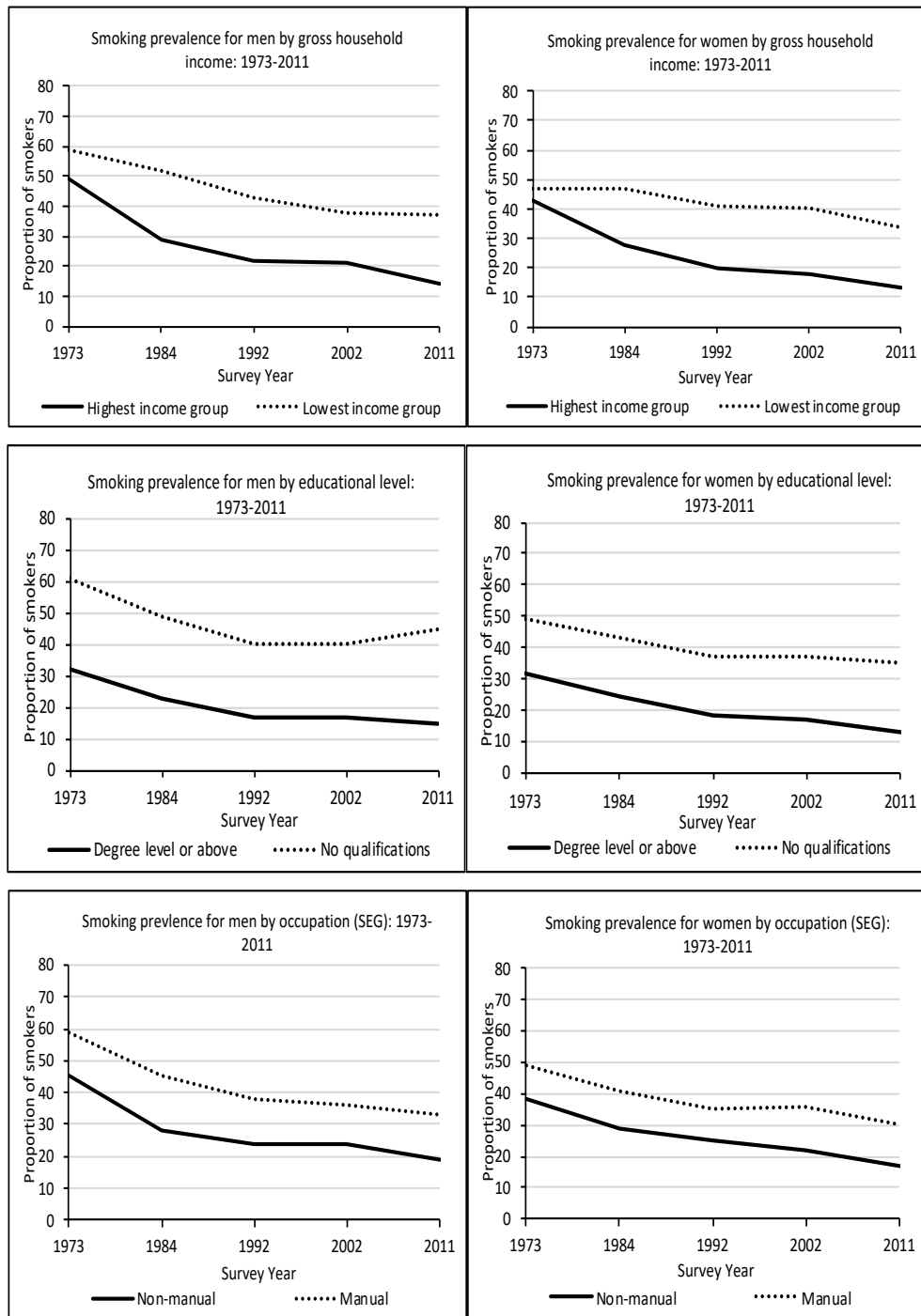
Figure 5.2: Observed rates (%) for smoking prevalence by income, education and occupation for men and women for all survey years.

The next set of analyses consisted of a series of log binomial regression models. Tables 5.3 and 5.4 show the strength of the relationship for each SEP indicator and smoking prevalence for men and women, when all three SEP indicators and age were included as a single block. Figures 5.3 and 5.4 present these values in a visual format, with the values on the vertical axis giving the relative risk (RR) of a respondent being a smoker in the lowest versus the highest socio-economic groups (Appendix 6 Tables A6.1 and A6.2 show the RRs and confidence intervals (CI) in more detail).

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Table 5.3 and Figure 5.3 show that between 1973 and 2011, men with no qualifications or who were in a manual occupation had a higher risk of being a smoker compared to men educated to degree level or above or who were in a non-manual occupation. Men in the lowest income households also had a higher risk of being a smoker compared to men in the highest income households although there was no statistically significant difference between these households in 1973, in terms of being a smoker. The findings suggest that education appeared to be the more important predictor of smoking for men between 1973 and 2011, as the gap between the lowest and highest groups was widest as measured by education for all survey years analysed. The least important predictor of smoking appeared to be occupation as the gap between the lowest and highest occupational groups was narrowest between 1973 and 2011.

Table 5.3: Relationship (risk ratios and 95% confidence intervals) between smoking prevalence and SEP indicators, (controlling for age) from log binomial regression models for men for selected survey years.

SEP indicator	1973 RR (95% CI)	1984 RR (95% CI)	1992 RR (95% CI)	2002 RR (95% CI)	2011 RR (95% CI)
Education					
No qualifications	**1.72*****	**1.85*****	**2.09*****	**2.36*****	**2.37*****
	(1.53-1.94)	(1.59-2.17)	(1.79-2.44)	(1.98-2.81)	(1.95-2.88)
Occupation					
Manual	**1.15*****	**1.18****	**1.19*****	**1.19****	**1.24****
	(1.08-1.21)	(1.07-1.30)	(1.08-1.31)	(1.07-1.33)	(1.09-1.42)
Income					
Lowest income group	1.07	**1.35*****	**1.46*****	**1.24***	**1.73*****
	(0.99-1.15)	(1.18-1.55)	(1.26-1.68)	(1.05-1.47)	(1.39-2.15)

Note: **Bold text** shows statistical significance while asterisks show level of significance (***p<0.001, **p<0.01, *p<0.05;); Reference categories for predictor variables: Degree level or above; Non-manual occupation; Highest income group; Reference group for outcome variable: ex-smoker or never smoker.

Between 1973 and 2011, the relationship between smoking and SEP noticeably strengthened for men as measured by education and income but did not really strengthen as measured by occupation. This indicates that the gap between the lowest and highest educational and income groups widened between 1973 and 2011 and that smoking inequalities increased between these groups. These trends were statistically significant for income between 1973 and 1984 (p<0.05) and 2002 and 2011 (p<0.05).
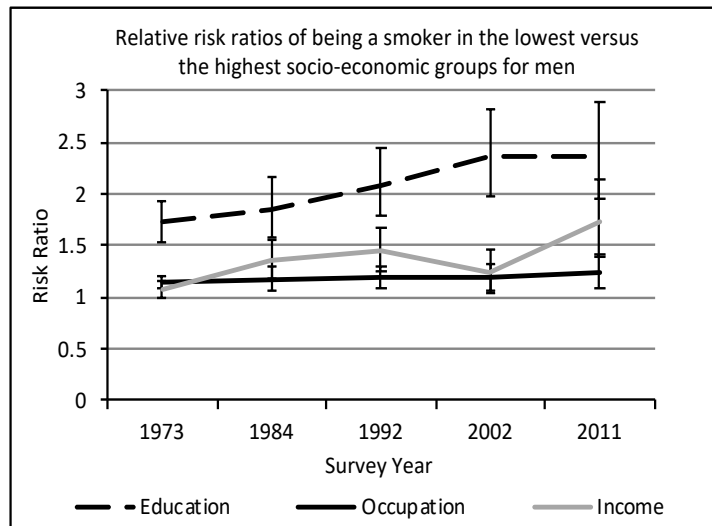
Figure 5.3: Changes over time for the relationship between smoking prevalence and SEP for men for selected survey years.

Table 5.4 and Figure 5.4 shows the relationship between smoking prevalence and SEP for women which was very similar to the pattern reported for men above. However, the trends for this relationship were slightly different for women as they were statistically significant for education between 2002 and 2011 ($p<0.05$) and between 1973 and 2011 ($p<0.05$), for occupation between 1984 and 1992 ($p<0.05$) and for income between 1973 and 1984 ($p<0.05$) and between 1984 and 1992 ($p<0.05$).

Table 5.4: Relationship (risk ratios and 95% confidence intervals) between smoking prevalence and SEP indicators, (controlling for age) from log binomial regression models for women for selected survey years.

SEP indicator	1973 RR (95% CI)	1984 RR (95% CI)	1992 RR (95% CI)	2002 RR (95% CI)	2011 RR (95% CI)
Education					
No qualifications	**1.49***	**1.57***	**1.73***	**1.85***	**2.40***
	(1.30-1.71)	(1.31-1.89)	(1.46-2.04)	(1.57-2.20)	(1.95-2.94)
Occupation					
Manual	**1.14***	**1.26***	**1.14****	**1.25***	**1.20****
	(1.07-1.22)	(1.14-1.39)	(1.04-1.25)	(1.13-1.38)	(1.06-1.36)
Income					
Lowest income	0.98	**1.33***	**1.65***	**1.63***	**1.72***
group	(0.90-1.07)	(1.15-1.53)	(1.43-1.92)	(1.35-1.96)	(1.38-2.13)

Note: **Bold text** shows statistical significance while asterisks show level of significance (***$p<0.001$, **$p<0.01$, *$p<0.05$;); Reference categories for predictor variables: Degree level or above; Non-manual occupation; Highest income group; Reference group for outcome variable: ex-smoker or never smoker.

Figure 5.4: Changes over time for the relationship between smoking prevalence and SEP for women for selected survey years.

5.3.2 Smoking cessation

Rates of smoking prevalence are influenced by rates of cessation, therefore Figure 5.5 illustrates the observed rates of smoking cessation for men and women in the highest and lowest socio-economic groups between 1973 and 2011 (Appendix 5 Table A5.2 shows the observed rates (%) for smoking cessation in more detail). Overall, a positive relationship was found between smoking cessation for men and women and income and occupation, with the highest proportion of ex-smokers in the highest income households and in non-manual occupations and the lowest proportion of ex-smokers in the lowest income households and in manual occupations. However, the relationship between smoking cessation and education was more mixed. Although a positive relationship was found for both men and women in 1973, this changed after 1984, with very little difference found in terms of cessation between women in the lowest and highest educational groups, whilst for men, there was a higher proportion of ex-smokers with no qualifications and a lower proportion of ex-smokers educated to degree level or above. The gap between the highest and lowest socio-economic groups was widest as measured by income for men and women but narrowest as measured by education. Across the period of analysis, smoking cessation tended to increase for men and women for most socio-economic groups, although for men in the highest socio-economic groups, smoking cessation appeared to decrease slightly. Over time, the gap between the lowest and highest socio-economic groups generally narrowed for men and women, although the gap for women as measured by income appeared to widen slightly.
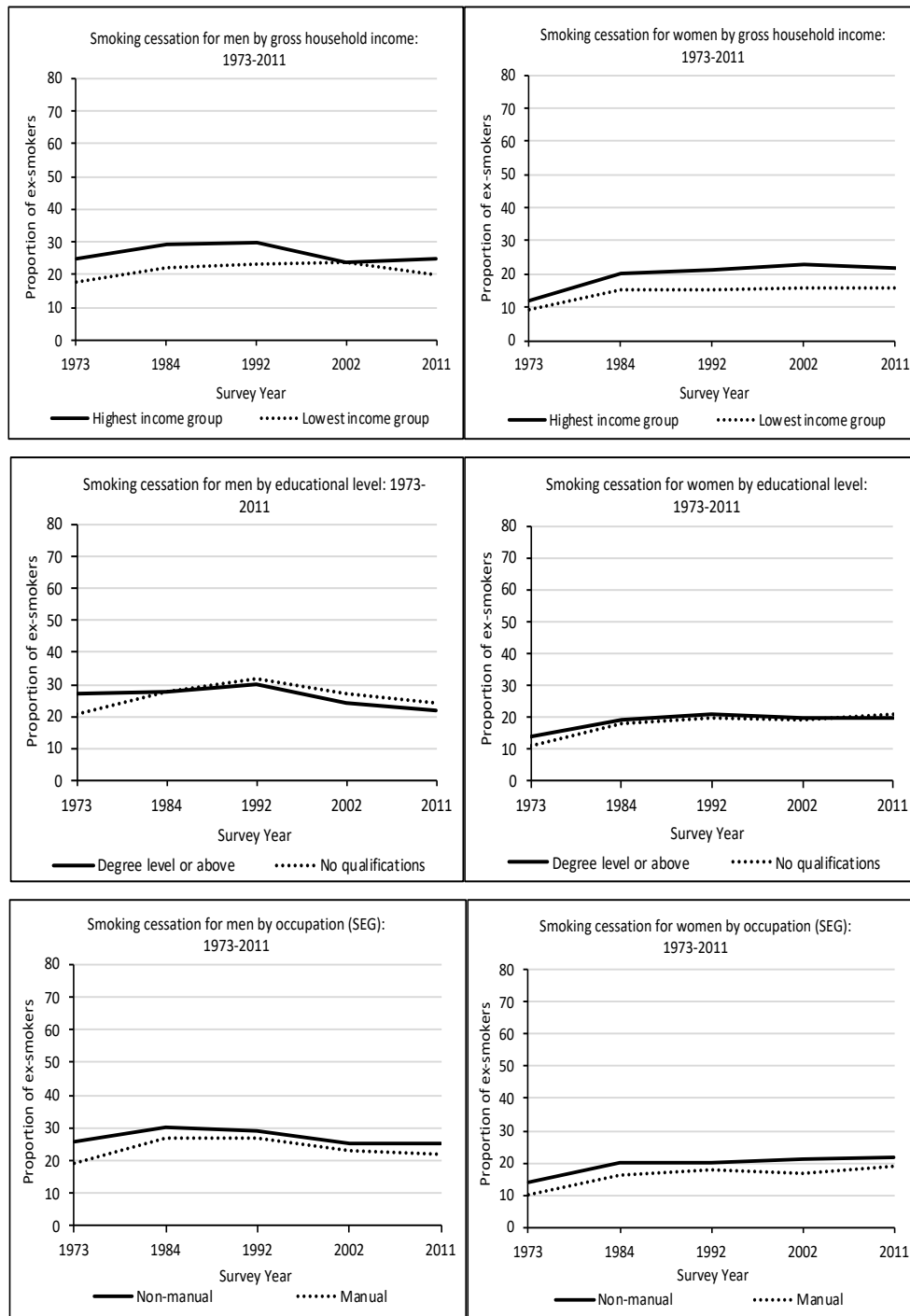
Figure 5.5: Observed rates (%) for smoking cessation by income, education and occupation for men and women for all survey years.

The next set of findings in Tables 5.5 and 5.6 and Figures 5.6 and 5.7 show the strength of the relationship between SEP and smoking cessation for men and women from the log binomial regression analyses. The values on the vertical axis of Figures 5.6 and 5.7 give the relative risk of a respondent being an ex-smoker in the lowest versus the highest socio-economic groups (Appendix 6 Tables A6.3 and A6.4 show the RR and CIs in more detail).

Table 5.5: Relationship (risk ratios and 95% confidence intervals) between smoking cessation and SEP indicators (controlling for age) from log binomial regression models for men for selected survey years.

SEP indicator	1973 RR (95% CI)	1984 RR (95% CI)	1992 RR (95% CI)	2002 RR (95% CI)	2011 RR (95% CI)
Education					
No qualifications	**0.68*****	**0.73*****	**0.74*****	**0.71*****	**0.72****
	(0.59-0.78)	(0.63-0.84)	(0.67-0.82)	(0.62-0.81)	(0.59-0.87)
Occupation					
Manual	**0.77*****	0.93	**0.90****	**0.84****	**0.82****
	(0.70-0.84)	(0.84-1.03)	(0.83-0.97)	(0.76-0.93)	(0.73-0.92)
Income					
Lowest income	**0.83***	**0.74*****	**0.75*****	0.91	**0.79****
group	(0.71-0.99)	(0.63-0.88)	(0.66-0.85)	(0.79-1.05)	(0.69-0.94)

Note: **Bold text** shows statistical significance while asterisks show level of significance (***p<0.001, **p<0.01, *p<0.05;); Reference categories for predictor variables: Degree level or above; Non-manual occupation; Highest income group; Reference group for outcome variable: smoker.

Table 5.5 and Figure 5.6 show that between 1973 and 2011, men in the lowest socio-economic groups had a lower risk of quitting compared to men in the highest socio-economic groups, although there were no statistically significant differences in terms of quitting between the lowest and highest groups as measured by occupation in 1984 and by income in 2002. The findings suggest that education appeared to be the more important predictor of cessation for men between 1973 and 2011, as the gap between the lowest and highest groups was widest as measured by education for all survey years analysed. However, the differences in the gaps between the lowest and highest groups as measured by education and income in 1984 and 1992 were only very small. The least important predictor of cessation appeared to be income in 1973 and 2002 and occupation in 1984, 1992 and 2011.
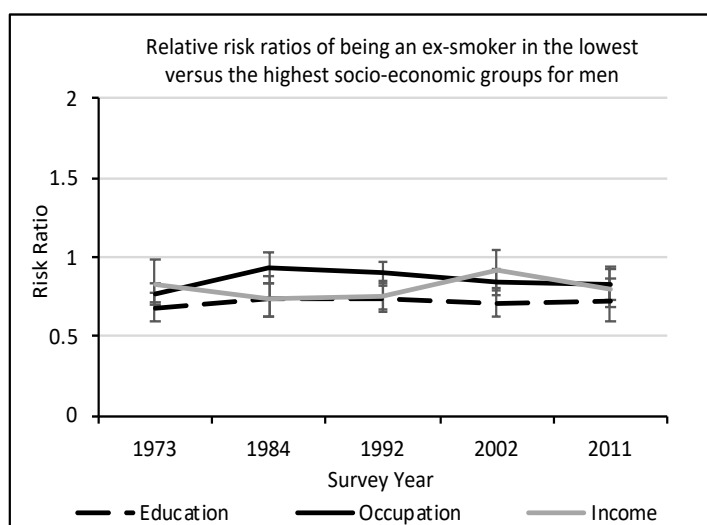
Figure 5.6: Changes over time for the relationship between smoking cessation and SEP for men for selected survey years.

Between 1973 and 2011, the relationship between smoking cessation and SEP weakened very slightly for men as measured by education and occupation and strengthened very slightly as measured by income. This indicates that between 1973 and 2011, the gap between the lowest and highest educational and occupational groups narrowed slightly, with inequalities in quitting decreasing between these groups, whilst the gap between the lowest and highest income groups widened slightly, with inequalities in quitting increasing between these groups. These trends were statistically significant for occupation between 1973 and 1984 ($p<0.05$) and for income between 1992 and 2002 ($p<0.05$).

Table 5.6 and Figure 5.7 show that similar to men, between 1973 and 2011, women in the lowest socio-economic groups had a lower risk of quitting compared to women in the highest socio-economic groups. However, there was no statistically significant difference in terms of quitting between the lowest and highest income households in 1973. The findings suggest that education appeared to be the more important predictor of cessation for women in 1973, 2002 and 2011 and income in 1984 and 1992, as the gap between the lowest and highest groups was widest as measured by education and income for the respective survey years. The least important predictor of cessation appeared to be income in 1973, education in 1984 and occupation between 1992 and 2011.

Table 5.6: Relationship (risk ratios and 95% confidence intervals) between smoking cessation and SEP indicators, (controlling for age) from log binomial regression models for women for selected survey years.

SEP indicator	1973 RR (95% CI)	1984 RR (95% CI)	1992 RR (95% CI)	2002 RR (95% CI)	2011 RR (95% CI)
Education					
No qualifications	**0.69****	**0.78****	**0.74*****	**0.68*****	**0.75****
	(0.55-0.87)	(0.65-0.93)	(0.65-0.85)	(0.58-0.80)	(0.63-0.89)
Occupation					
Manual	**0.71*****	**0.76*****	**0.90***	**0.81****	**0.84****
	(0.62-0.82)	(0.67-0.86)	(0.81-0.99)	(0.72-0.91)	(0.75-0.95)
Income					
Lowest income	0.89	**0.69*****	**0.67*****	**0.70*****	**0.78****
group	(0.72-1.11)	(0.56-0.84)	(0.57-0.79)	(0.59-0.83)	(0.65-0.94)

Note: **Bold text** shows statistical significance while asterisks show level of significance (***$p<0.001$, **$p<0.01$, *$p<0.05$;); Reference categories for predictor variables: Degree level or above; Non-manual occupation; Highest income group; Reference group for outcome variable: smoker.
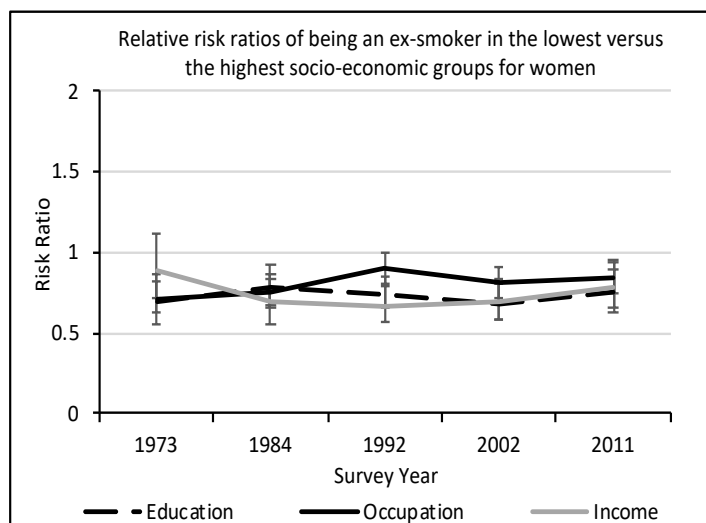
Figure 5.7: Changes over time for the relationship between smoking cessation and SEP for women for selected survey years.

Between 1973 and 2011, the relationship between smoking cessation and SEP weakened for women as measured by occupation and to a lesser degree by education, but strengthened as measured by income. This indicates that between 1973 and 2011, the gap between the lowest and highest educational and occupational groups narrowed, with inequalities in quitting decreasing between these groups, whilst the gap between the lowest and highest income groups widened, with inequalities in quitting increasing between these groups. These trends were statistically significant for occupation between 1984 and 1992 (p<0.05) and for income between 1973 and 1984 (p<0.05).

5.3.3   Never smoking

As well as being influenced by cessation, smoking prevalence is also influenced by rates of never smoking, therefore Figure 5.8 illustrates the observed rates of never smoking for men and women in the highest and lowest socio-economic groups between 1973 and 2011 (Appendix 5 Table A5.3 shows the observed rates (%) for never smoking in more detail). Overall, a positive relationship was found between never smoking and all socio-economic indicators for men and women, with the highest proportion of never smokers in the highest socio-economic groups and lowest proportion of never smokers in the lowest socio-economic groups. The gap between the highest and lowest socio-economic groups was widest as measured by education for men and women but narrowest as measured by occupation. Across the period of analysis, never smoking increased for both men and women as measured by all three socio-economic indicators while the gap between the lowest and highest socio-economic groups widened, although this was to a lesser degree as measured by occupation.
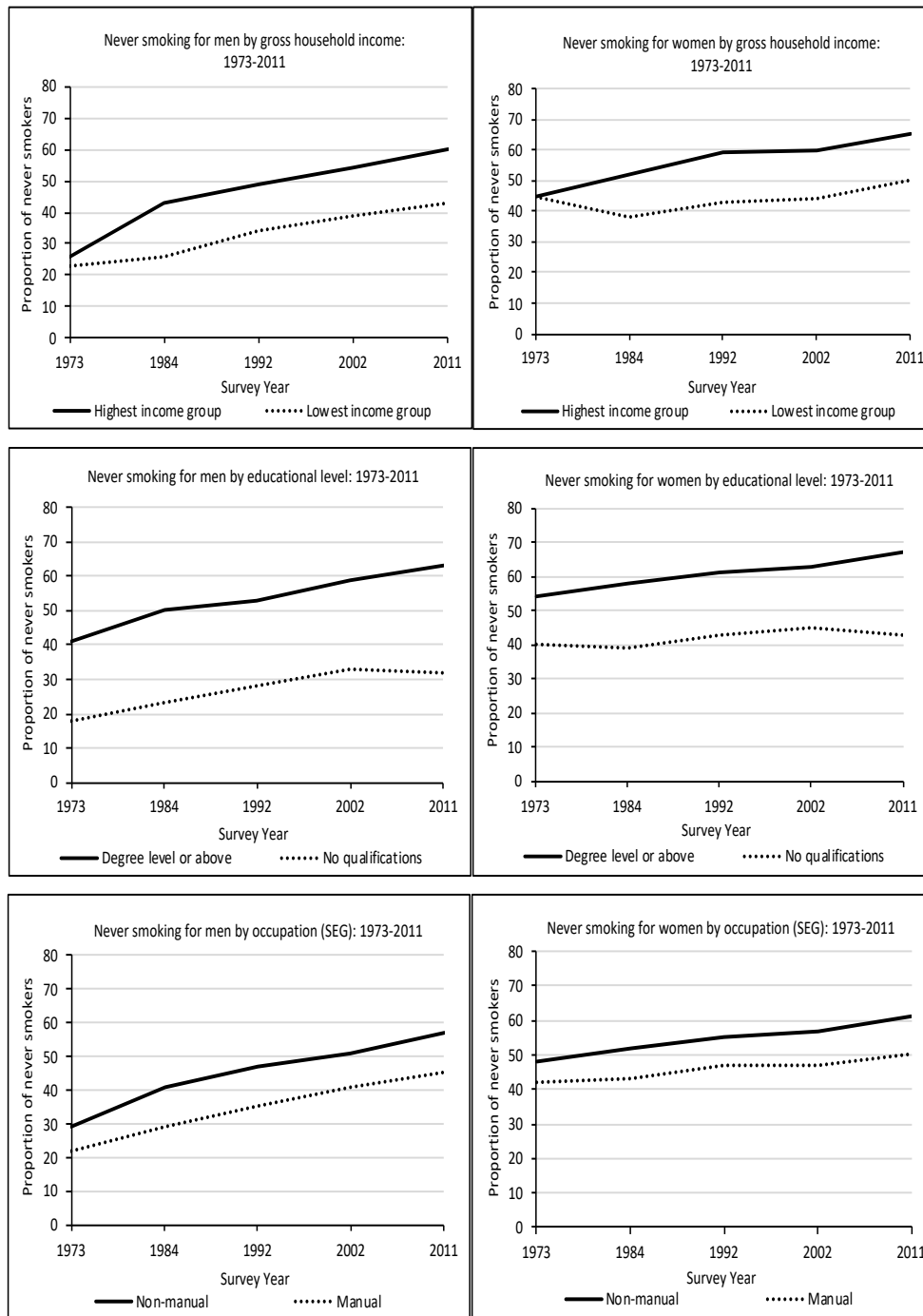
Figure 5.8: Observed rates (%) for never smokers by income, education and occupation for men and women for all survey years.

The next set of findings in Tables 5.7 and 5.8 and Figures 5.9 and 5.10 show the strength of the relationship between SEP and never smoking for men and women from the log binomial regression analyses. The values on the vertical axis of Figures 5.9 and 5.10 give the relative risk of a respondent being a never smoker in the lowest versus the highest socio-economic groups (Appendix 6 Tables A6.5 and A6.6 show the RR and CIs in more detail). Table 5.7 and Figure 5.9 show that between 1973 and 2011, men not having any qualifications or in a manual occupation had a lower risk of being a never smoker compared to men educated to degree level or above or in a manual occupation. However, there

were no statistically significant differences in terms of being a never smoker between the lowest and highest groups as measured by occupation in 2002 and 2011. A similar relationship was also found between household income and being a never smoker for men although the relationship between income and never smoking in 1973 was positive and there was no statistically significant difference between the lowest and highest income households in terms of being a never smoker. The findings suggest that education appeared to be the more important predictor of never smoking for men across the period of analysis, as the gap between the lowest and highest groups was widest as measured by education for all survey years analysed. The least important predictor of never smoking appeared to be income in 1973 and occupation between 1984 and 2011.

Table 5.7: Relationship (risk ratios and 95% confidence intervals) between never smoking and SEP indicators, (controlling for age) from log binomial regression models for men for selected survey years.

SEP indicator	1973 RR (95% CI)	1984 RR (95% CI)	1992 RR (95% CI)	2002 RR (95% CI)	2011 RR (95% CI)
Education					
No qualifications	**0.51***	**0.60***	**0.63***	**0.63***	**0.55***
	(0.45-0.58)	(0.52-0.68)	(0.56-0.70)	(0.55-0.71)	(0.46-0.64)
Occupation					
Manual	**0.91***	**0.87****	**0.88****	0.96	0.95
	(0.83-1.00)	(0.79-0.96)	(0.82-0.95)	(0.89-1.04)	(0.88-1.03)
Income					
Lowest income	1.09	**0.81***	**0.84****	**0.87***	**0.86****
group	(0.93-1.27)	(0.69-0.95)	(0.75-0.94)	(0.77-0.99)	(0.76-0.96)

Note: **Bold text** shows statistical significance while asterisks show level of significance (***$p<0.001$, **$p<0.01$, *$p<0.05$;); Reference categories for predictor variables: Degree level or above; Non-manual occupation; Highest income group; Reference group for outcome variable: ex-smoker or smoker.

Figure 5.9: Changes over time for the relationship between never smoking and SEP for men for selected survey years.

Between 1973 and 2011, the relationship between never smoking and SEP weakened slightly for men as measured by education and occupation, but strengthened as measured by income. This indicates that between 1973 and 2011, the gap between the lowest and highest educational and occupational groups narrowed slightly, with inequalities in never smoking decreasing between these groups, whilst the gap between the lowest and highest income groups widened, with inequalities in never smoking increasing between these groups. These trends were statistically significant for education between 1973 and 1984, ($p<0.05$) for occupation between 1992 and 2002 ($p<0.05$) and for income between 1973 and 1984 ($p<0.05$).

Table 5.8 and Figure 5.10 show that similar to men, between 1973 and 2011, women with no qualifications or who were in a manual occupation had a lower risk of being a never smoker compared to women educated to degree level or above or who were in a non-manual occupation. However, there was no statistically significant difference in terms of being a never smoker between the lowest and highest groups as measured by occupation in 1973. A similar relationship was found between household income and being a never smoker for women although the relationship between income and never smoking in 1973 was positive and there was no statistically significant difference between the lowest and highest income groups in terms of being a never smoker. The findings suggest that education appeared to be the more important predictor of never smoking for women for all survey years with the exception of 1992, when income appeared to be a slightly more important predictor than education. The least important predictor of never smoking appeared to be occupation for all survey years with the exception of 1973, when income appeared to be the least important predictor although the relationship between never smoking and income in 1973 was not statistically significant.

Table 5.8: Relationship (risk ratios and 95% confidence intervals) between never smoking and SEP indicators, (controlling for age) from log binomial regression models for women for selected survey years.

SEP indicator	1973 RR (95% CI)	1984 RR (95% CI)	1992 RR (95% CI)	2002 RR (95% CI)	2011 RR (95% CI)
Education					
No qualifications	**0.76*****	**0.73*****	**0.79*****	**0.79*****	**0.68*****
	(0.69-0.84)	(0.66-0.81)	(0.72-0.85)	(0.72-0.87)	(0.61-0.77)
Occupation					
Manual	0.96	**0.89****	**0.92****	**0.91****	**0.92***
	(0.91-1.02)	(0.83-0.96)	(0.87-0.98)	(0.85-0.97)	(0.86-0.99)
Income					
Lowest income	1.05	**0.85****	**0.78*****	**0.81*****	**0.85****
group	(0.97-1.14)	(0.75-0.96)	(0.72-0.86)	(0.73-0.90)	(0.77-0.95)

Note: **Bold text** shows statistical significance while asterisks show level of significance (***$p<0.001$, **$p<0.01$, *$p<0.05$;); Reference categories for predictor variables: Degree level or above; Non-manual occupation; Highest income group; Reference group for outcome variable: ex-smoker or smoker.

Between 1973 and 2011, the relationship between never smoking and SEP strengthened for women as measured by education and income but did not really strengthen as measured by occupation. This suggests that between 1973 and 2011, the gap between the lowest and highest education and income groups widened and that inequalities in never smoking between these groups increased. These trends were statistically significant for education between 2002 and 2011 ($p<0.05$) and for income between 1973 and 1984 ($p<0.05$).
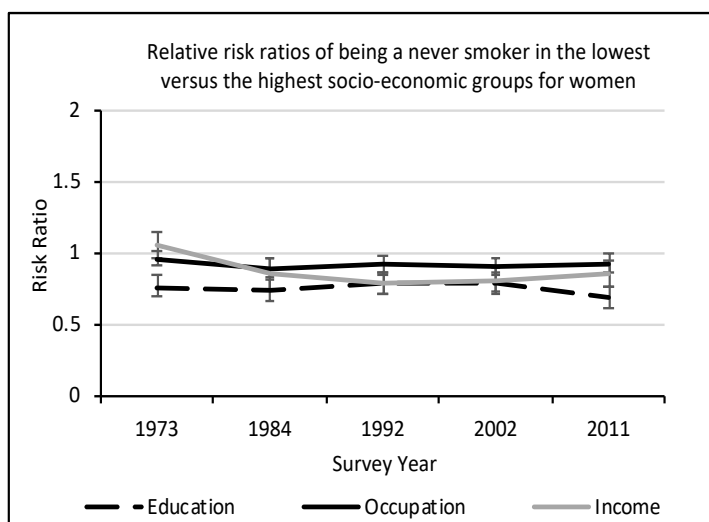
Figure 5.10: Changes over time for the relationship between never smoking and SEP for women for selected survey years.

The descriptive statistics and subsequent analyses discussed in the remainder of this chapter are for smokers only.

5.4   Descriptive statistics for nicotine consumption

The next set of findings look at the relationship between SEP and indicators of nicotine consumption. These are age started smoking regularly and 'heavy' smoking (defined as those who smoke 20 or more cigarettes a day). Smoking uptake and smoking intensity are linked as the younger a person is when they start to smoke regularly, the more likely they are to be a heavy smoker. Smoking uptake and smoking intensity are also related to smoking cessation as higher levels of nicotine intake over a longer period of time and/or heavy smoking tend to result in higher levels of nicotine dependency, which are likely to make quitting more difficult. Smoking intensity may also be linked to smoking prevalence as those in the poorest socio-economic groups may reduce the amount they smoke, rather than quitting in order to make smoking a more 'affordable' habit.

Descriptive statistics for smoking uptake are shown in Tables 5.9 and 5.10. It should be noted that data on smoking uptake for 1984 was not included in the analysis as this variable was not comparable to the smoking uptake variable in the other survey years (see Chapter 4 Section 4.4.1.2 for more detail). Between 1973 and 2011, a higher proportion of men started to smoke regularly before age 16 compared to women. Smoking uptake before age 16 increased for both men and women between 1973

and 2011, although the increase was significantly greater for women, which contributed to a narrowing of the gender gap by 2011. Smoking uptake after 16 years generally decreased for men and women between 1973 and 2011, although it increased for men aged 25+ and for women aged 16-17 years. Overall, smoking uptake decreased as men and women got older.

Table 5.9: Smoking uptake for men aged 18-64 years by survey year.

Survey year	n	Under 16 years (%)	16-17 years (%)	18-19 years (%)	20-24 years (%)	25+ years (%)
1973	3,800	34.2	28.9	18.7	13.9	4.3
1992	1,788	40.5	28.1	17.4	11.0	3.1
2002	1,322	41.6	30.2	13.9	10.7	3.6
2011	961	41.0	27.0	15.6	10.9	5.5

Table 5.10: Smoking uptake for women aged 18-64 years by survey year.

Survey year	n	Under 16 years (%)	16-17 years (%)	18-19 years (%)	20-24 years (%)	25+ years (%)
1973	3,388	17.6	27.2	21.9	18.5	14.8
1992	1,864	29.1	30.1	19.7	13.9	7.1
2002	1,441	34.9	30.6	17.8	11.3	5.4
2011	1,054	40.6	29.5	16.5	9.1	4.3

Descriptive statistics for the number of cigarettes smoked per day (grouped) are shown in Tables 5.11 and 5.12. Between 1973 and 2011, a higher proportion of men were heavy smokers (20+ cigarettes per day) compared to women. Heavy smoking decreased for men and women between 1973 and 2011, although the decrease was greater for men, which resulted in a narrowing of the gender gap in terms of heavy smoking. Overall, the proportion of men and women who smoked less than 20 cigarettes per day increased across the period of analysis.

Table 5.11: Number of cigarettes smoked (grouped) per day for men aged 18-64 years by survey year.

Survey year	n	20+ (%)	10-19 (%)	0-9 (%)
1973	3,800	51.6	30.9	17.5
1984	2,122	47.0	34.3	18.7
1992	1,788	42.9	33.2	24.0
2002	1,322	37.3	37.9	24.8
2011	961	30.1	40.0	29.9

Table 5.12: Number of cigarettes smoked (grouped) per day for women aged 18-64 years by survey year.

Survey year	n	20+ (%)	10-19 (%)	0-9 (%)
1973	3,572	31.9	35.1	33.0
1984	2,208	35.5	39.3	25.2
1992	1,864	33.4	40.6	25.9
2002	1,441	26.4	45.2	28.5
2011	1,054	21.1	44.7	34.2

5.5   Analyses for nicotine consumption

The analyses reported in this section investigated the relationship between SEP and the nicotine consumption behaviours as described above for selected survey years between 1973 and 2011. Cross-tabulations of the relationship between nicotine consumption and SEP are illustrated and reported along with log binomial regression findings (see Section 5.3 for more detail on the analyses conducted).

5.5.1   Smoking uptake

Figure 5.11 illustrates the observed rates of men and women who started to smoke regularly before age 16 in the highest and lowest socio-economic groups between 1973 and 2011 (Appendix 5 Table A5.4 shows the observed rates (%) for smoking uptake in more detail). Overall, an inverse relationship was found between smoking uptake and all socio-economic indicators for men and women, with the highest proportion of those who started to smoke regularly before age 16 in the lowest socio-economic groups and the lowest proportion of those who started to smoke regularly before age 16 in the highest socio-economic groups. The gap between the highest and lowest socio-economic groups was widest as measured by education for men and women but tended to be narrowest as measured by occupation. Across the period of analysis, smoking uptake before age 16 increased for men and women as measured by all three socio-economic indicators while the gap between the lowest and highest socio-economic groups tended to widen except for women as measured by occupation and for men as measured by income when it narrowed.
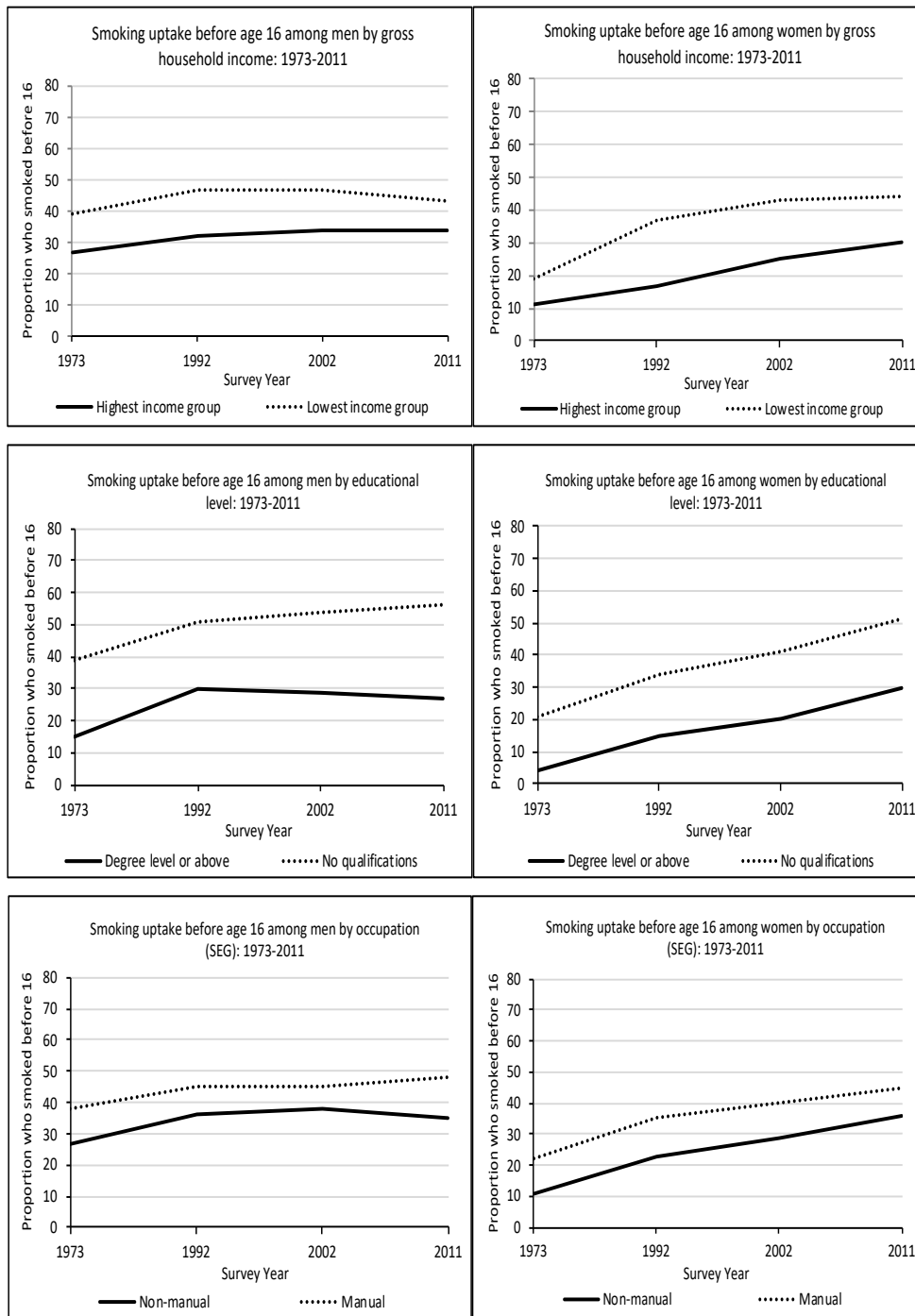
Figure 5.11: Observed rates (%) for men and women who started to smoke regularly before age 16 by income, education and occupation for all survey years.

The next set of findings in Tables 5.13 and 5.14 and Figures 5.12 and 5.13 show the strength of the relationship between SEP and smoking uptake before age 16 for men and women from the log binomial regression analyses. The values on the vertical axis of Figures 5.12 and 5.13 give the relative risk of a respondent starting to smoke before age 16 in the lowest versus the highest socio-economic groups (Appendix 7 Tables A7.1 and A7.2 show the RR and CIs in more detail.

Table 5.13: Relationship (risk ratios and 95% confidence intervals) between smoking uptake before age 16 and SEP indicators, (controlling for age) from log binomial regression models for men for selected survey years.

SEP indicator	1973 RR (95% CI)	1992 RR (95% CI)	2002 RR (95% CI)	2011 RR (95% CI)
Education				
No qualifications	**2.30***	**1.62***	**1.80***	**1.97***
	(1.80-2.93)	(1.39-1.89)	(1.49-2.19)	(1.57-2.48)
Occupation				
Manual	**1.13***	1.02	0.95	**1.16***
	(1.03-1.25)	(0.92-1.13)	(0.85-1.07)	(1.02-1.33)
Income				
Lowest income	**1.18***	**1.26****	1.11	0.98
group	(1.03-1.36)	(1.07-1.48)	(0.92-1.35)	(0.78-1.22)

Note: **Bold text** shows statistical significance while asterisks show level of significance (***$p<0.001$, **$p<0.01$, *$p<0.05$;); Reference categories for predictor variables: Degree level or above; Non-manual occupation; Highest income group; Reference group for outcome variable: started smoking after 16 years.

Figure 5.12: Changes over time for the relationship between started smoking before 16 years of age and SEP for men for selected survey years.

Table 5.13 and Figure 5.12 show that between 1973 and 2011, men with no qualifications had a higher risk of starting to smoke before age 16 compared to men educated to degree level or above. However, whilst a similar relationship was found between smoking uptake before age 16 and income and occupation, differences between the lowest and highest groups were only statistically significant as measured by occupation in 1973 and 2011 and by income in 1973 and 1992. A negative relationship was found between smoking uptake before age 16 and occupation in 2002 and by income in 2011, although neither of these findings were statistically significant. The findings suggest that education appeared to be the more important predictor of smoking uptake for men between 1973 and 2011, as the gap

between the lowest and highest groups was widest as measured by education for all survey years analysed. Occupation appeared to be the least important predictor of smoking uptake for all survey years, except in 2011, when income appeared to be the least important predictor.

Between 1973 and 2011, the relationship between smoking uptake and SEP weakened for men as measured by education and income but changed very little as measured by occupation. This indicates that between 1973 and 2011, the gap between the lowest and highest educational and income groups narrowed, with inequalities in starting to smoke before 16 years decreasing between these groups. These trends were statistically significant for education between 1973 and 1992 ($p<0.05$) and for occupation between 2002 and 2011 ($p<0.05$).

Table 5.14 and Figure 5.13 show that, similar to men, between 1973 and 2011, women with no qualifications had a higher risk of starting to smoke before 16 years compared to women educated to degree level or above. A similar relationship was also found for smoking uptake before 16 years and income and occupation, although statistically significant differences between the lowest and highest groups were only found as measured by occupation between 1973 and 2002 and by income in 1992.

Table 5.14: Relationship (risk ratios and 95% confidence intervals) between smoking uptake before age 16 and SEP indicators, (controlling for age) from log binomial regression models for women for selected survey years.

	1973	1992	2002	2011
SEP indicator	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)
Education				
No qualifications	**4.56*****	**2.16*****	**1.98*****	**1.77*****
	(2.38-8.72)	(1.64-2.83)	(1.59-2.47)	(1.42-2.20)
Occupation				
Manual	**1.42*****	**1.20****	**1.15***	1.03
	(1.19-1.69)	(1.05-1.36)	(1.02-1.31)	(0.90-1.18)
Income				
Lowest income	1.26	**1.46****	1.21	1.07
group	(0.97-1.62)	(1.14-1.86)	(0.97-1.51)	(0.83-1.37)

Note: **Bold text** shows statistical significance while asterisks show level of significance (***$p<0.001$, **$p<0.01$, *$p<0.05$;); Reference categories for predictor variables: Degree level or above; Non-manual occupation; Highest income group; Reference group for outcome variable: started smoking after 16 years.

The findings suggest that education appeared to be the more important predictor of smoking uptake for women between 1973 and 2011, as the gap between the lowest and highest groups was widest as measured by education for all survey years analysed. However, the RR for education for 1973 should be interpreted with caution as the CI was particularly wide. This was possibly due to a very small number of

women who started to smoke before age 16 (*n* = 9), who were educated to degree level or above and therefore, it is not clear whether this shows a marked difference. Earlier survey years were more likely to have a lower proportion of women educated to degree level or above compared to later years due to the increasing number of women in higher education during the second half of the 20th century (as discussed in Chapter 4 Section 4.3.2). The least important predictor of smoking uptake before age 16 appeared to be occupation, for all survey years, except in 1973, when income appeared to be the least important predictor.
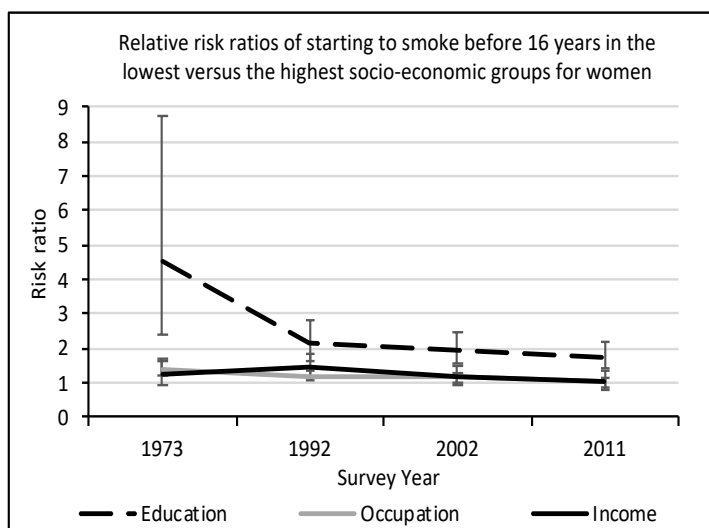
Figure 5.13: Changes over time for the relationship between started smoking before 16 years of age and SEP for women for selected survey years.

Between 1973 and 2011, the relationship between smoking uptake before 16 years and SEP weakened for women as measured by all three SEP indicators. This indicates that between 1973 and 2011, the gap between the lowest and highest socio-economic groups narrowed over time, with inequalities in smoking uptake before age 16 decreasing between these groups. These trends were statistically significant for education between 1973 and 1992 (*p*<0.05).

5.5.2   Heavy smoking

Figure 5.14 illustrates the observed rates of heavy smoking (those who smoke 20 or more cigarettes a day) for men and women in the highest and lowest socio-economic groups between 1973 and 2011 (Appendix 5 Table A5.5 shows the observed rates (%) for heavy smoking in more detail).
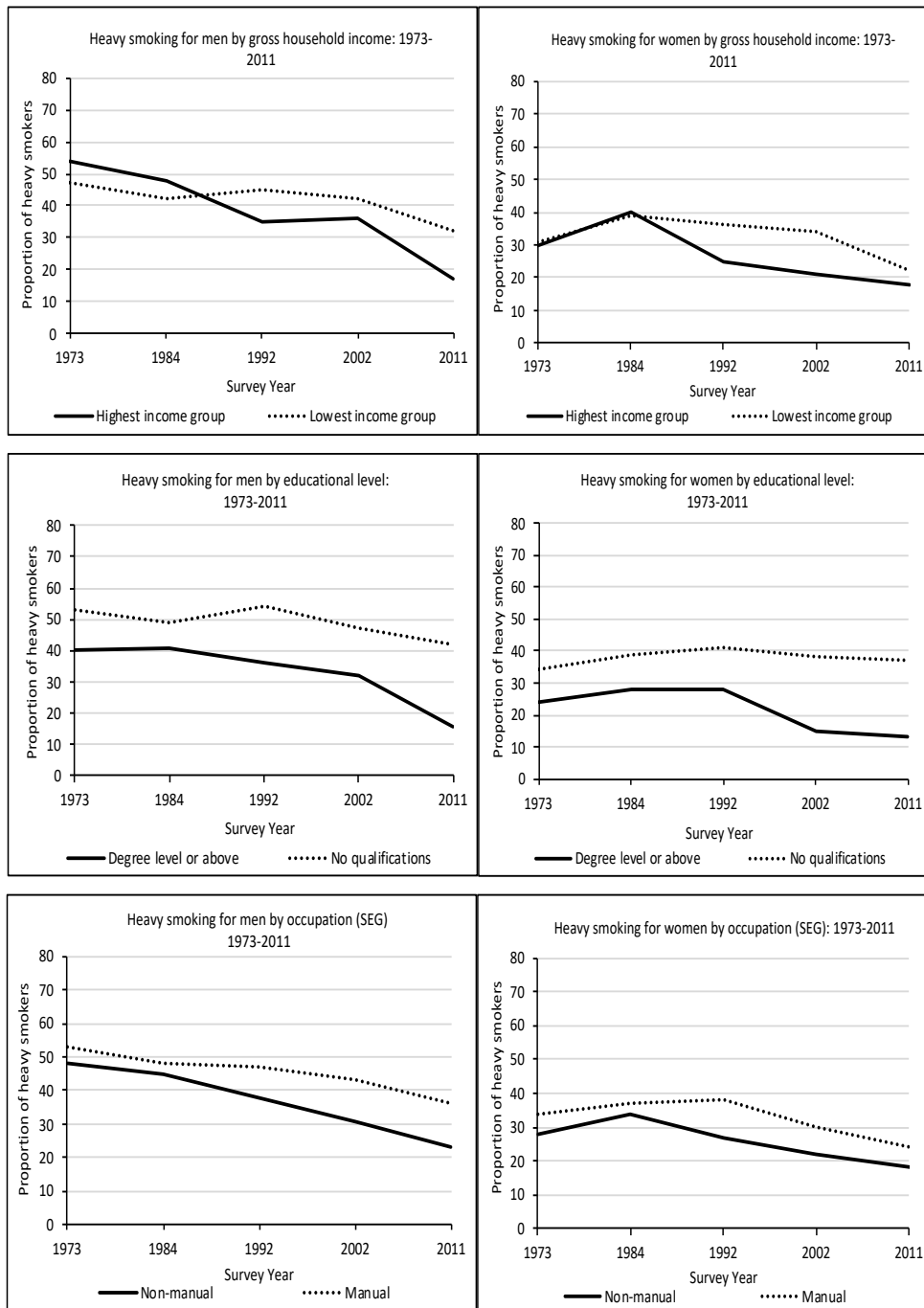
Figure 5.14: Observed rates (%) for heavy smokers by income, education and occupation for men and women for all survey years.

There was an inverse relationship between heavy smoking and education and occupation between 1973 and 2011 for men and women, with the highest proportion of heavy smokers in the lowest socio-economic groups and the lowest proportion of heavy smokers in the highest socio-economic groups. However, the relationship between heavy smoking and household income was more mixed. Between 1973 and 1984, a positive relationship was found for heavy smoking for men, whilst for women there was very little difference between the lowest and highest income households in terms of heavy smoking although, after 1984 an inverse relationship was found for heavy smoking for both men and women. The gap between the highest and lowest socio-economic groups was widest as measured by education

for men and women but tended to be narrowest as measured by occupation. Across the period of analysis, heavy smoking decreased for men and women amongst all socio-economic groups, whilst the gap between these groups tended to widen.

The findings in Tables 5.15 and 5.16 and Figures 5.15 and 5.16 show the strength of the relationship between SEP and heavy smoking for men and women from the log binomial regression analyses. The values on the vertical axis give the relative risk of a respondent being a heavy smoker in the lowest versus the highest socio-economic groups (Appendix 7 Tables A7.3 and A7.4 show the RR and CIs in more detail).

Table 5.15: Relationship (risk ratios and 95% confidence intervals) between heavy smoking and SEP indicators, (controlling for age) from log binomial regression models for men for selected survey years.

SEP indicator	1973 RR (95% CI)	1984 RR (95% CI)	1992 RR (95% CI)	2002 RR (95% CI)	2011 RR (95% CI)
Education					
No qualifications	**1.36*****	1.16	**1.31***	1.05	**1.59***
	(1.15-1.61)	(0.93-1.45)	(1.06-1.61)	(0.80-1.37)	(1.06-2.38)
Occupation					
Manual	1.07	1.07	1.11	**1.26***	1.23
	(0.99-1.15)	(0.93-1.22)	(0.98-1.25)	(1.05-1.50)	(0.97-1.57)
Income					
Lowest income	0.78	**0.83***	1.07	0.95	1.40
group	(0.69-0.87)	(0.68-1.00)	(0.87-1.32)	(0.74-1.23)	(0.87-2.25)

Note: **Bold text** shows statistical significance while asterisks show level of significance (***$p<0.001$, **$p<0.01$, *$p<0.05$;); Reference categories for predictor variables: Degree level or above; Non-manual occupation; Highest income group; Reference group for outcome variable: lighter smokers (those that smoke 0-19 cigarettes a day).

Table 5.15 and Figure 5.15 show that between 1973 and 2011, men with no qualifications or who were in a manual occupation had a higher risk of being a heavy smoker compared to men educated to degree level or above or who were in a non-manual occupation. However, statistically significant differences between the lowest and highest groups, in terms of being a heavy smoker, were only found as measured by education in 1973, 1992 and 2011 and by occupation in 2002. The relationship between household income and heavy smoking was more mixed. Men in the lowest income households were less likely to be heavy smokers than men in the highest income households in 1973, 1984 and 2002, however, the relationship was reversed in 1992 and 2011, when men in the lowest income households were more likely to be heavy smokers than men in the highest income households. However, with the exception of 1984, there were no statistically significant differences between the lowest and highest income households in terms of being a heavy smoker. The findings suggest that education appeared to be the most important predictor of heavy smoking for men, in 1973, 1992 and 2011, whilst income and

occupation appeared to be the most important predictors in 1984 and 2002 respectively. The least important predictor of heavy smoking appeared to be occupation in 1973, 1984 and 2011 and income in 1992 and 2002.
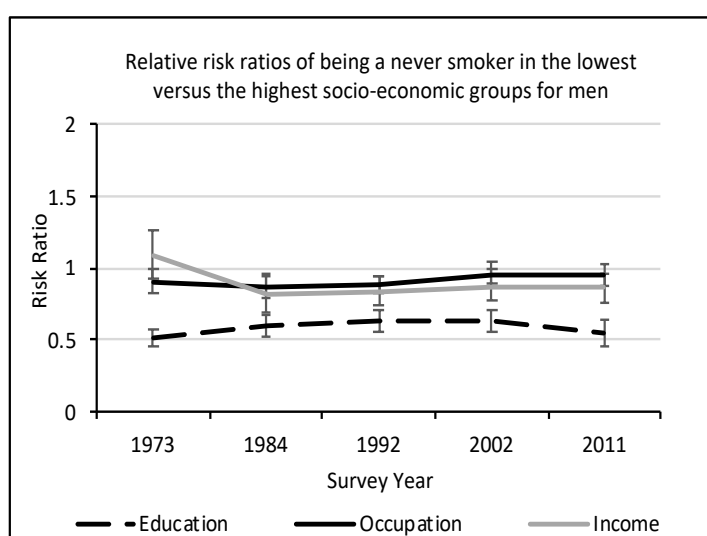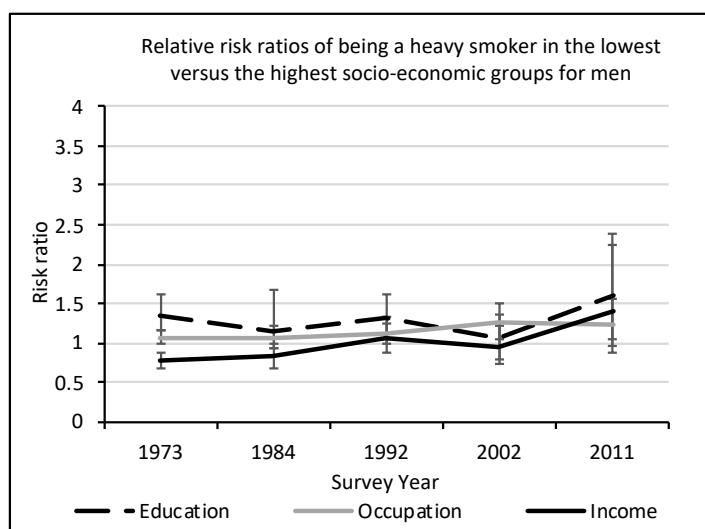

Figure 5.15: Changes over time for the relationship between heavy smoking and SEP for men for selected survey years.

Between 1973 and 2011, the relationship between heavy smoking and SEP strengthened for men as measured by all three SEP indicators. This suggests that between 1973 and 2011, the gap between the lowest and highest socio-economic groups widened over time, with inequalities in heavy smoking between the lowest and highest socio-economic groups increasing between these groups. These trends were statistically significant for education between 2002 and 2011 ($p<0.05$) and for income between 1984 and 1992 ($p<0.05$).

Table 5.16 and Figure 5.16 show that similar to men, between 1973 and 2011, women with no qualifications or who were in a manual occupation had a higher risk of being a heavy smoker compared to women educated to degree level or above or who were in a non-manual occupation. Statistically significant differences between the lowest and highest groups in terms of being a heavy smoker were only found as measured by education in 1973, 1984, 2002 and 2011 and by occupation in 1992. Again, similar to men, the relationship between household income and heavy smoking was more mixed. Women in the lowest income households were less likely to be heavy smokers than women in the highest income households in 1973, 1984 and 2011, although, this relationship was reversed in 1992 and 2002, when women in the lowest income households were more likely to be heavy smokers than women in the highest income households. However, no statistically significant differences were found between the lowest and highest income households for women, in terms of being a heavy smoker, for any of the survey years analysed. With the exception of 1992, the findings suggest that education appeared to be the more important predictor of heavy smoking between 1973 and 2011, as the gap

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between the lowest and highest groups was widest as measured by education, although income appeared to be the more important predictor in 1992. The least important predictor of heavy smoking appeared to be income in 1973 and 1984, education in 1992 and occupation in 2002 and 2011.

Table 5.16: Relationship (risk ratios and 95% confidence intervals) between heavy smoking and SEP indicators, (controlling for age) from log binomial regression models for women for selected survey years.

SEP indicator	1973 RR (95% CI)	1984 RR (95% CI)	1992 RR (95% CI)	2002 RR (95% CI)	2011 RR (95% CI)
Education					
No qualifications	**1.32***	**1.37***	1.20	**1.73****	**2.44*****
	(1.00-1.73)	(1.01-1.86)	(0.92-1.58)	(1.16-2.59)	(1.53-3.88)
Occupation					
Manual	1.11	1.15	**1.25****	1.07	1.21
	(0.99-1.25)	(0.97-1.36)	(1.07-1.46)	(0.87-1.30)	(0.91-1.60)
Income					
Lowest income	0.96	0.87	1.26	1.42	0.77
group	(0.81-1.14)	(0.69-1.09)	(0.95-1.66)	(0.99-2.03)	(0.46-1.31)

Note: **Bold text** shows statistical significance while asterisks show level of significance (***p<0.001, **p<0.01, *p<0.05;); Reference categories for predictor variables: Degree level or above; Non-manual occupation; Highest income group; Reference group for outcome variable: lighter smokers (those that smoke 0-19 cigarettes a day).

Figure 5.16: Changes over time for the relationship between heavy smoking and SEP for women for selected survey years.

Between 1973 and 2011, the relationship between heavy smoking and SEP strengthened for women as measured by all three SEP indicators, although it appeared to strengthen the most as measured by education. However, the finding for education in 2011 should be interpreted with caution as the CI was wide. This was possibly due to a small number of women who were heavy smokers, who were educated

to degree level or above (*n* = 26), therefore it is not clear whether this shows a marked difference. These findings indicate that between 1973 and 2011, the gap between the lowest and highest socio-economic groups widened, with inequalities in heavy smoking increasing. These trends were statistically significant for income between 1984 and 1992 ($p<0.05$) and between 2002 and 2011 ($p<0.05$).

5.6   Descriptive statistics for smoking dependency

The previous section reported the findings for nicotine consumption behaviours which are associated with smoking dependency as the longer the period of time that people have been regularly smoking and the more heavily that people smoke, the more likely they are to be dependent on smoking, making it harder to quit. The next set of findings looks at the relationship between SEP and indicators of smoking dependency. These are time to first cigarette on waking, difficulty not smoking for one day and desire to quit smoking. Survey questions on these elements of smoking behaviour were not introduced until 1992, therefore no earlier data was available for these analyses. Descriptive statistics for smoking dependency behaviours are shown in Tables 5.17 and 5.18.

Table 5.17: Smoking dependency for men aged 18-64 years by survey year.

Survey year	*n*	First cigarette within 15 minutes of waking (%)	Difficulty not smoking for one day (%)	Does not want to quit smoking (%)
1992	*1,788*	30.9	53.6	27.5
2002	*1,322*	33.1	55.3	25.9
2011	*961*	33.7	57.7	27.4

Table 5.18: Smoking dependency for women aged 18-64 years by survey year.

Survey year	*n*	First cigarette within 15 minutes of waking (%)	Difficulty not smoking for one day (%)	Does not want to quit smoking (%)
1992	*1,864*	31.4	61.6	26.6
2002	*1,441*	31.7	58.2	23.8
2011	*1,054*	31.1	57.7	25.2

In 1992, there was little difference in the proportion of men and women who smoked their first cigarette within 15 minutes of waking, although in 2002 and 2011, a higher proportion of men were more likely to smoke within 15 minutes of waking compared to women. Between 1992 and 2011, there was a small increase in the proportion of men who smoked within 15 minutes of waking but very little change for women, which resulted in a slight widening of the gender gap. In 1992 and 2002, a higher proportion of women had difficulty not smoking for one day compared to men although in 2011, there

was no difference between men and women in terms of this behaviour. Across the period of analysis, there was an increase in the proportion of men who had difficulty not smoking for one day whilst for women, there was a decrease in this behaviour, which contributed to a narrowing of the gender gap. Overall, a slightly higher proportion of men were more likely to not want to give up smoking compared to women. Across the period of analysis, not wanting to quit smoking changed little for men but decreased very slightly for women.

5.7   Analyses for smoking dependency

The analyses reported in this section investigated the relationship between SEP and the smoking dependency behaviours as described above for selected survey years between 1992 and 2011. Cross-tabulations of the relationship between smoking dependency and SEP and are illustrated and reported along with log binomial regression findings (for more detail on the analyses see section 5.3).

5.7.1   First cigarette within 15 minutes of waking

Figure 5.17 illustrates the observed rates of men and women who smoked their first cigarette within 15 minutes of waking in the highest and lowest socio-economic groups between 1992 and 2011 (Appendix 5 Table A5.6 shows the observed rates (%) for first cigarette within 15 minutes in more detail). Overall, an inverse relationship was found between time to first cigarette and all socio-economic indicators for men and women, with the highest proportion of those who had their first cigarette within 15 minutes of waking in the lowest socio-economic groups and the lowest proportion who smoked within 15 minutes of waking in the highest socio-economic groups. The gap between the highest and lowest socio-economic groups tended to be widest as measured by education and narrowest as measured by occupation. Across the period of analysis, the proportion having their first cigarette within 15 minutes of waking decreased for women in the highest education and income groups and for men in the highest occupational groups but increased for men in the lowest educational and occupational groups. For all other groups, however, there was very little change.
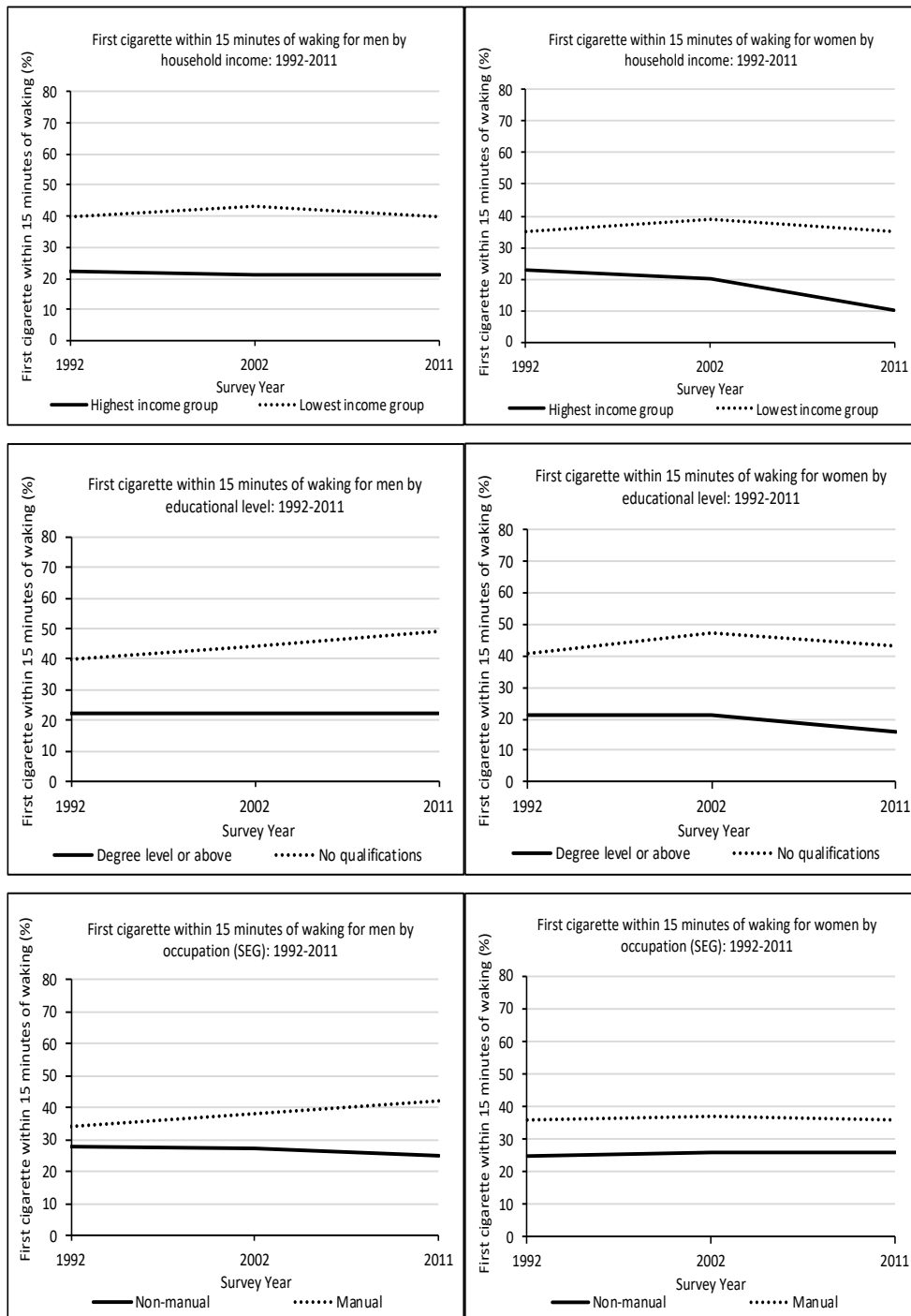
Figure 5.17: Observed rates (%) for men and women who smoke their first cigarette within 15 minutes of waking by income, education and occupation for all survey years

The next set of findings in Tables 5.19 and 5.20 and Figures 5.18 and 5.19 show the strength of the relationship between SEP and first cigarette within 15 minutes of waking for men and women from the log binomial regression analyses. The values on the vertical axis give the relative risk of a respondent smoking within 15 minutes of waking in the lowest versus the highest socio-economic groups (Appendix 8 Tables A8.1 and A8.2 show the RR and CIs in more detail).

Table 5.19: Relationship (risk ratios and 95% confidence intervals) between first cigarette within 15 minutes of waking and SEP indicators, (controlling for age) from log binomial regression models for men for selected survey years.

SEP indicator	1992 RR (95% CI)	2002 RR (95% CI)	2011 RR (95% CI)
Education			
No qualifications	**1.56****	**1.49***	**1.65****
	(1.15-2.11)	(1.05-2.12)	(1.16-2.34)
Occupation			
Manual	0.98	1.11	**1.31***
	(0.83-1.17)	(0.91-1.35)	(1.05-1.64)
Income			
Lowest income	**1.59****	**1.63****	1.50
group	(1.19-2.13)	(1.16-2.28)	(1.00-2.25)

Note: **Bold text** shows statistical significance while asterisks show level of significance (***p<0.001, **p<0.01, *p<0.05;); Reference categories for predictor variables: Degree level or above; Non-manual occupation; Highest income group; Reference group for outcome variable: smokes first cigarette after 15 minutes of waking.
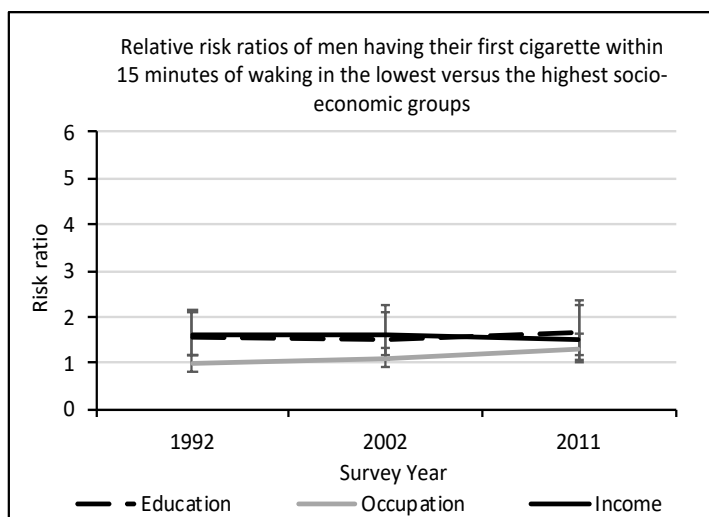
Figure 5.18: Changes over time for the relationship between first cigarette within 15 minutes of waking and SEP for men for selected survey years.

Table 5.19 and Figure 5.18 show that between 1992 and 2011, men with no qualifications and in the lowest income household had a higher risk of smoking within 15 minutes of waking compared to men educated to degree level or above or in the highest income household, although the finding as measured by income in 2011, was not statistically significant. The relationship between occupation and time to first cigarette was more mixed. Men in manual occupations had a lower risk of smoking within 15 minutes of waking compared to men in non-manual occupations, although this relationship was reversed in 2002 and 2011, when men in manual occupations had a higher risk of smoking within 15 minutes of waking than men in non-manual occupations. Statistically significant differences between the lowest and highest occupational groups were only found in 2011. The findings suggest that income

appeared to be the more important predictor of smoking within 15 minutes of waking in 1992 and 2002 and education in 2011, whilst occupation appeared to be the least important predictor between 1992 and 2002.

Between 1992 and 2002, the relationship between smoking within 15 minutes of waking and SEP strengthened for men as measured by education and occupation but weakened as measured by income. This indicates that between 1992 and 2002, the gap between the lowest and highest educational and occupational groups widened, with inequalities in smoking within 15 minutes of waking increasing between these groups, whilst the gap between the lowest and highest income groups narrowed, with inequalities in smoking within 15 minutes of waking decreasing between these groups. None of the trends were statistically significant for any of the measures of SEP between 1992 and 2011.

Table 5.20 and Figure 5.19 show that between 1992 and 2011, women in the lowest socio-economic groups had a higher risk of smoking within 15 minutes of waking compared to women in the highest socio-economic groups, although the findings as measured by occupation in 2002 and 2011 and by income in 1992 were not statistically significant. The findings suggest that education appeared to be the more important predictor of smoking within 15 minutes of waking in 1992 and 2002 and income in 2011, although the latter finding had a wide CI, possibly due to a very small number of women who smoked within 15 minutes of waking, who were in the highest income households (n=10). This should be interpreted with caution as it is not clear whether the RR for income in 2011 shows a marked difference. Income appeared to be the least important predictor in 1992 and education in 2002 and 2011 although none of the differences between the lowest and highest groups were statistically significant.

Table 5.20: Relationship (risk ratios and 95% confidence intervals) between first cigarette within 15 minutes of waking and SEP indicators, (controlling for age) from log binomial regression models for women for selected survey years.

	1992	2002	2011
SEP indicator	RR (95% CI)	RR (95% CI)	RR (95% CI)
Education			
No qualifications	**1.65****	**1.64****	**1.72****
	(1.18-2.31)	(1.21-2.24)	(1.17-2.52)
Occupation			
Manual	**1.23***	1.13	1.10
	(1.04-1.45)	(0.94-1.35)	(0.90-1.35)
Income			
Lowest income	1.18	**1.61****	**2.68****
group	(0.88-1.57)	(1.14-2.29)	(1.44-5.00)

Note: **Bold text** shows statistical significance while asterisks show level of significance (***p<0.001, **p<0.01, *p<0.05;); Reference categories for predictor variables: Degree level or above; Non-manual occupation; Highest income group; Reference group for outcome variable: smokes first cigarette after 15 minutes of waking.
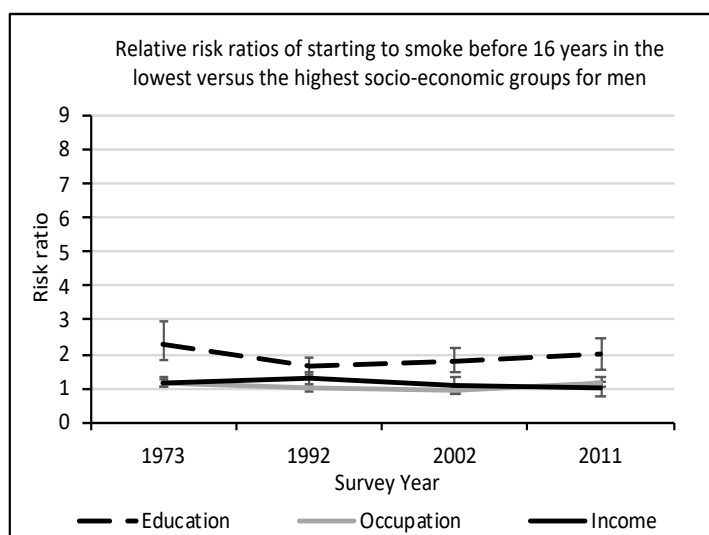
Between 1992 and 2011, the relationship between smoking within 15 minutes of waking and SEP strengthened for women as measured by education and income but weakened as measured by occupation. This indicates that between 1992 and 2011, the gap between the lowest and highest educational and income groups widened, with inequalities in smoking within 15 minutes of waking increasing between these groups, whilst the gap between the lowest and highest occupational groups narrowed, with inequalities in smoking within 15 minutes of waking decreasing between these groups. None of the trends were statistically significant for any of the measures of SEP between 1992 and 2011.
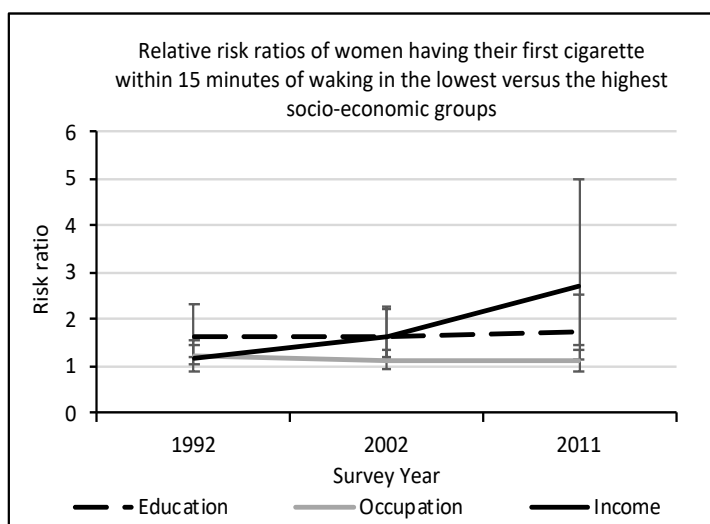
Figure 5.19: Changes over time for the relationship between first cigarette within 15 minutes of waking and SEP for women for selected survey years.

5.7.2   Difficulty not smoking for one day

Figure 5.20 illustrates the observed rates of perceived difficulty of not smoking for one day in the highest and lowest socio-economic groups between 1992 and 2011 (Appendix 5 A5.7 shows the observed rates (%) for difficulty not smoking for one day in more detail). Overall, an inverse relationship was found between difficulty not smoking for one day and all socio-economic indicators for men and women, with the highest proportion of those who would have difficulty not smoking for one day in the lowest socio-economic groups and the lowest proportion who would have difficulty not smoking for one day in the highest socio-economic groups. The gap between the highest and lowest socio-economic groups tended to be widest for men as measured by education although the gap noticeably widened in 2011 as measured by income, whilst the gap was widest for women as measured by education. For both men and women, the gap was narrowest as measured by occupation. Between 1992 and 2011, difficulty not smoking for one day tended to increase for men in most SEP groups, except for men in non-manual occupations and the highest income households, when it decreased, whilst for women, difficulty not smoking for one day decreased for all socio-economic groups.
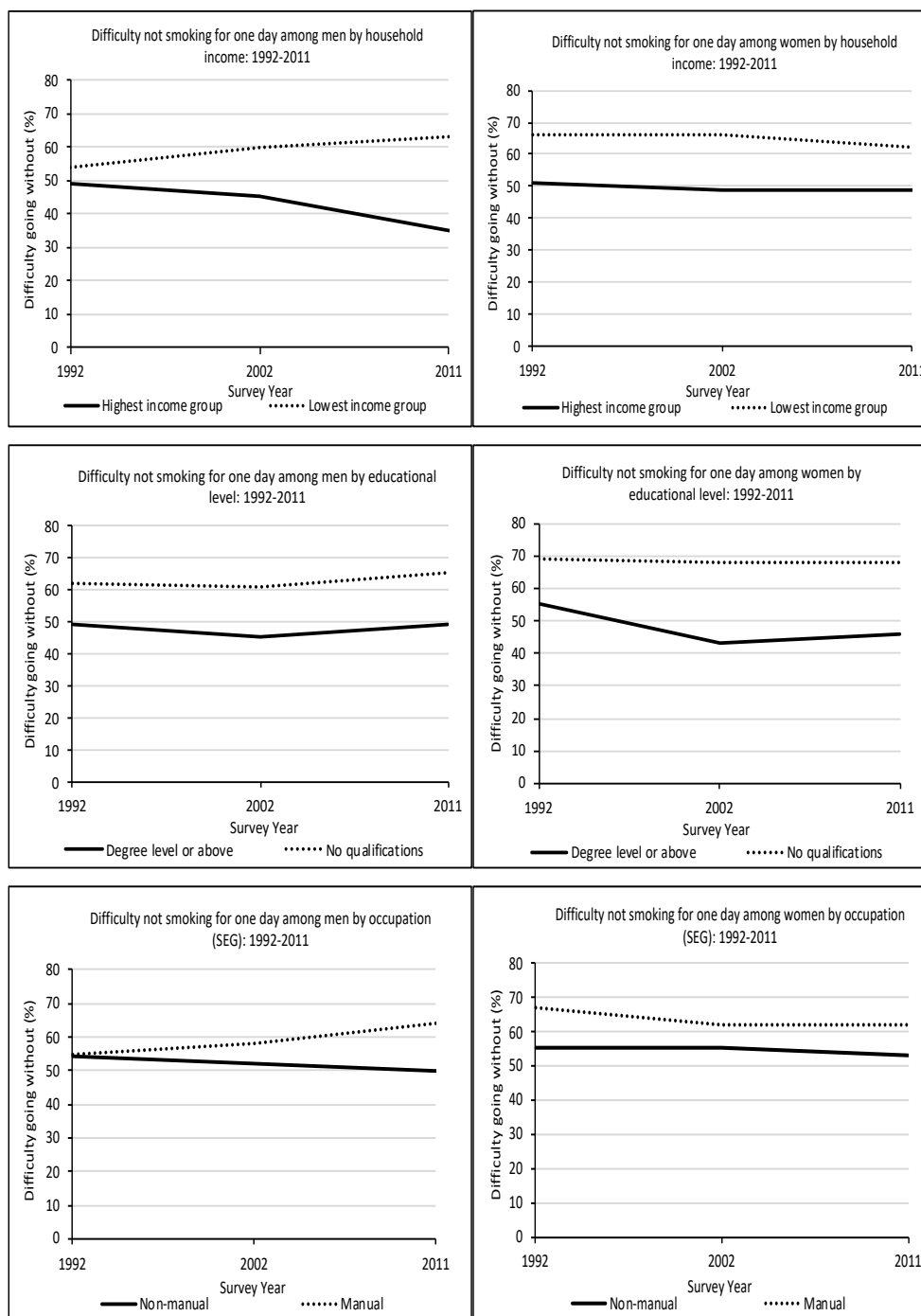
Figure 5.20: Observed rates (%) for difficulty not smoking for one day by education, occupation and income for men and women for all survey years.

The next set of findings in Tables 5.21 and 5.22 and Figures 5.21 and 5.22 show the strength of the relationship between SEP and difficulty not smoking for one day for men and women from the log binomial regression analyses. The values on the vertical axis give the relative risk of a respondent finding it difficult to not smoke for one day in the lowest versus the highest socio-economic groups (Appendix 8 Tables A8.3 and A8.4 show the RR and CIs in more detail).

Table 5.21: Relationship (risk ratios and 95% confidence intervals) between difficulty not smoking for one day and SEP indicators (controlling for age) from log binomial regression models for men for selected survey years.

	1992	2002	2011
SEP indicator	RR (95% CI)	RR (95% CI)	RR (95% CI)
Education			
No qualifications	**1.21***	1.14	0.98
	(1.03-1.43)	(0.92-1.41)	(0.80-1.20)
Occupation			
Manual	0.95	1.02	1.10
	(0.86-1.05)	(0.90-1.14)	(0.97-1.26)
Income			
Lowest income	1.05	1.17	**1.70***
group	(0.89-1.24)	(0.95-1.44)	(1.28-2.26)

Note: **Bold text** shows statistical significance while asterisks show level of significance (***p<0.001, **p<0.01, *p<0.05;); Reference categories for predictor variables: Degree level or above; Non-manual occupation; Highest income group; Reference group for outcome variable: would find it easy to not smoke for one day.
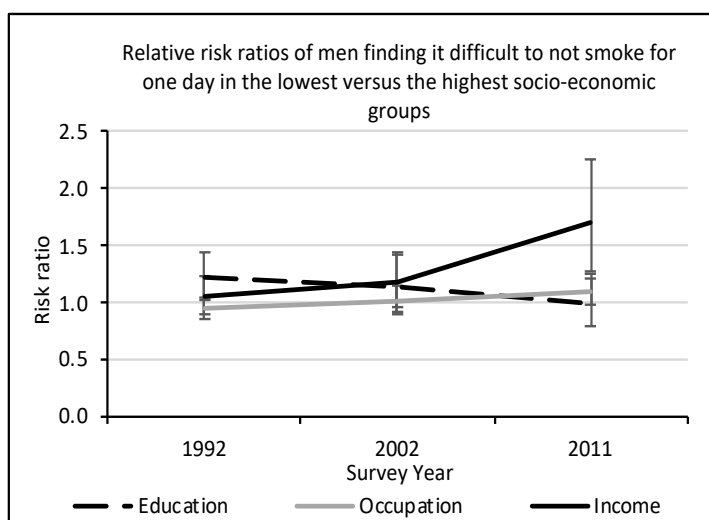
Figure 5.21: Changes over time for the relationship between difficulty not smoking for one day and SEP for men for selected survey years.

Table 5.21 and Figure 5.21 generally show that between 1992 and 2011, men in the lowest socio-economic groups had a higher risk of difficulty not smoking for one day compared to men in the highest socio-economic groups, although only the findings as measured by education in 1992 and income in 2011 showed statistically significant differences between the lowest and highest groups. However, the relationship was reversed as measured by occupation in 1992 and by education in 2011, when men in the lowest occupational and educational groups had a lower risk of difficulty not smoking for one day compared to men in the highest occupational and educational groups, although neither of these findings showed statistically significant differences between the lowest and highest groups. The findings

suggest that between 1992 and 2011, education appeared to be the more important predictor of difficulty not smoking for one day in 1992 and income in 2002 and 2011, whilst occupation appeared to be the least important predictor in 1992 and 2002 and education in 2011.

Between 1992 and 2011, the relationship between difficulty not smoking for one day and SEP strengthened over time for men as measured by occupation and income but weakened as measured by education. This indicates that between 1992 and 2011, the gap between the lowest and highest occupational and income groups widened, with inequalities in difficulty not smoking for one day increasing between these groups, whilst the gap between the lowest and highest educational groups narrowed, with inequalities in difficulty not smoking for one day decreasing between these groups. These trends were statistically significant for income between 2002 and 2011 ($p<0.05$) and between 1992 and 2011 ($p<0.05$).

Table 5.22: Relationship (risk ratios and 95% confidence intervals) between difficulty not smoking for one day and SEP indicators (controlling for age) from log binomial regression models for women for selected survey years.

SEP indicator	1992 RR (95% CI)	2002 RR (95% CI)	2011 RR (95% CI)
Education			
No qualifications	1.08	**1.30****	**1.29***
	(0.93-1.25)	(1.07-1.58)	(1.04-1.61)
Occupation			
Manual	**1.17*****	1.02	1.12
	(1.07-1.27)	(0.92-1.13)	(0.99-1.26)
Income			
Lowest income	**1.20***	1.21	1.11
group	(1.03-1.39)	(0.99-1.47)	(0.87-1.41)

Note: **Bold text** shows statistical significance while asterisks show level of significance (***$p<0.001$, **$p<0.01$, *$p<0.05$;); Reference categories for predictor variables: Degree level or above; Non-manual occupation; Highest income group; Reference group for outcome variable: would find it easy to not smoke for one day.

Table 5.22 and Figure 5.22 show that between 1992 and 2011, women in the lowest socio-economic groups had a higher risk of difficulty not smoking for one day compared to women in the highest socio-economic groups, although statistically significant differences between the lowest and highest socio-economic groups were only found for the findings as measured by education in 2002 and 2011 and by occupation and income in 1992. The findings suggest that income appeared to be the more important predictor of difficulty not smoking for one day in 1992 and by education in 2002 and 2011, whilst education in 1992, occupation in 2002 and income in 2011, appeared to be the least important predictors.
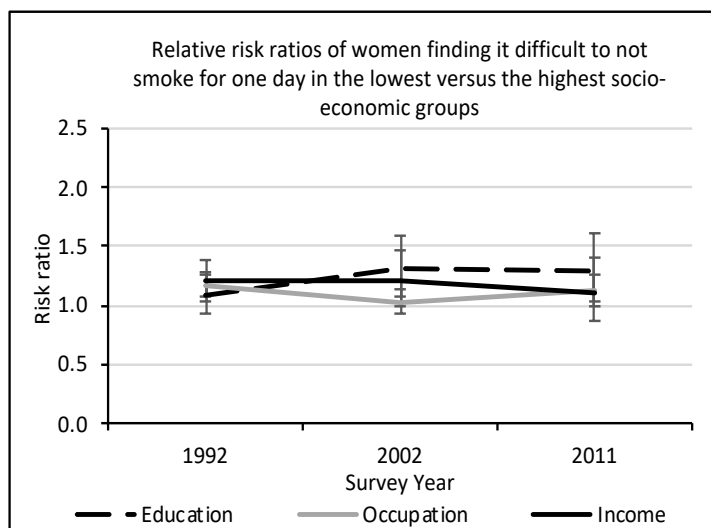
Figure 5.22: Changes over time for the relationship between difficulty not smoking for one day and SEP for women for selected survey years.

Between 1992 and 2002, the relationship between difficulty not smoking for one day and SEP weakened for women as measured by occupation and income but strengthened as measured by education. This indicates that between 1992 and 2002, the gap between the lowest and highest occupational and income groups narrowed, with inequalities in difficulty not smoking for one day decreasing between these groups, whilst the gap between the lowest and highest educational groups widened over time, with inequalities in difficulty not smoking for one day increasing between these groups. These trends were statistically significant for occupation between 1992 and 2002 ($p<0.05$).

5.7.3   Does not want to give up smoking

Figure 5.23 illustrates the observed rates of men and women who do not want to give up smoking in the highest and lowest socio-economic groups between 1992 and 2011 (Appendix 5 Table A5.8 shows the observed rates (%) for not wanting to give up smoking in more detail). Overall, the relationship between not wanting to give up smoking and SEP was quite mixed. Generally, a positive relationship was found in 1992 with a higher proportion of men and women in the highest socio-economic groups not wanting to quit smoking compared to men and women in the lowest socio-economic groups, although there was no difference between the highest and lowest groups for women in 1992 as measured by education. However, by 2011 and with the exception of women as measured by occupation, the relationship between SEP and not wanting to give up smoking had changed to an inverse relationship, with a lower proportion of men and women in the highest socio-economic groups not wanting to give up smoking compared to men and women in the lowest socio-economic groups. The gap between the highest and lowest socio-economic groups appeared to vary over time in terms of which socio-economic indicator had the widest and narrowest gap between the highest and lowest socio-economic groups. Across the period of analysis, the proportion of men and women who did not want to quit smoking generally

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decreased for those in the highest socio-economic groups but increased for those in the lowest socio-economic groups.
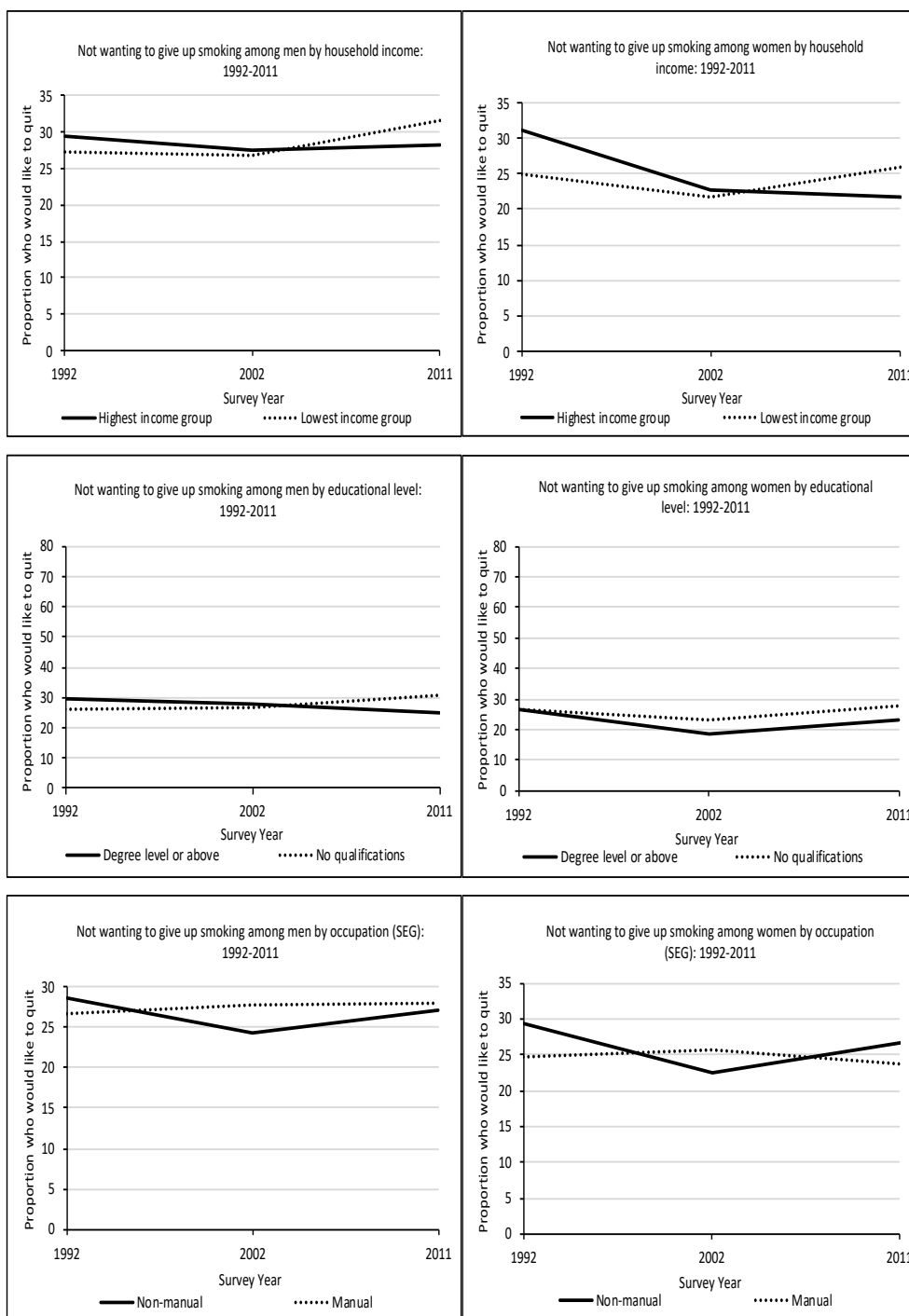
Figure 5.23: Observed rates (%) for not wanting to give up smoking by education, occupation and income for men and women for all survey years.

The next set of findings in Tables 5.23 and 5.24 and Figures 5.24 and 5.25 show the strength of the relationship between SEP and not wanting to give up smoking for men and women from the log binomial regression analyses. The values on the vertical axis give the relative risk of a respondent not wanting to quit smoking in the lowest versus the highest socio-economic groups (Appendix 8 Tables A8.5 and A8.6 show the RR and CIs in more detail).

Table 5.23: Relationship (risk ratios and 95% confidence intervals) between not wanting to give up smoking and SEP indicators, (controlling for age) from log binomial regression models for men for selected survey years.

	1992	**2002**	**2011**
SEP indicator	RR (95% CI)	RR (95% CI)	RR (95% CI)
Education			
No qualifications	0.90	0.83	1.31
	(0.69-1.17)	(0.60-1.16)	(0.87-1.98)
Occupation			
Manual	0.97	1.25	0.96
	(0.82-1.16)	(1.00-1.56)	(0.74-1.26)
Income			
Lowest income	0.99	0.92	1.10
group	(0.76-1.30)	(0.64-1.31)	(0.73-1.68)

Note: **Bold text** shows statistical significance while asterisks show level of significance (***p<0.001, **p<0.01, *p<0.05;); Reference categories for predictor variables: Degree level or above; Non-manual occupation; Highest income group; Reference group for outcome variable: wants to give up smoking.

Table 5.23 and Figure 5.24 show that between 1992 and 2011, there was a very mixed relationship for men between SEP and not wanting to give up smoking, with no statistically significant differences were found between the highest socio-economic groups and the lowest socio-economic groups for any of the SEP indicators.
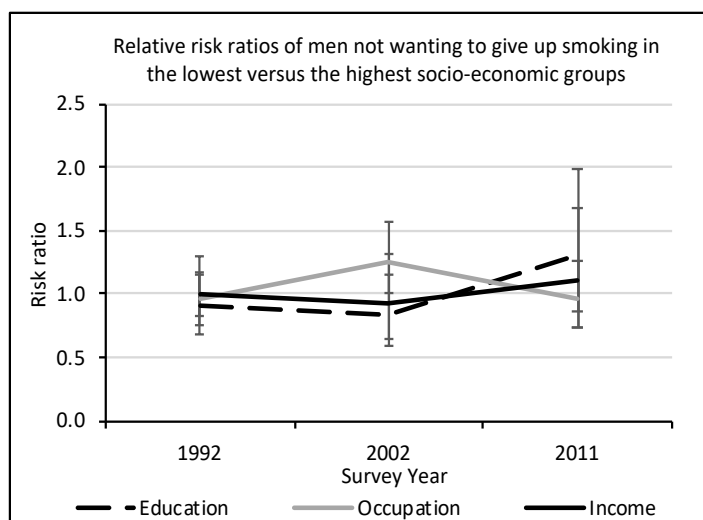
Figure 5.24: Changes over time for the relationship between not wanting to give up smoking and SEP for women for selected survey years.

Between 1992 and 2011, the relationship between not wanting to quit and SEP strengthened over time for men as measured by education and income but did not really change as measured by occupation. This indicates that between 1992 and 2011, the gap between the lowest and highest educational and

income groups widened, with inequalities in not wanting to quit smoking increasing between these groups. The trends were statistically significant for occupation between 1992 and 2002 ($p<0.05$).

Table 5.24: Relationship (risk ratios and 95% confidence intervals) between not wanting to give up smoking and SEP indicators, (controlling for age) from log binomial regression models for women for selected survey years.

SEP indicator	1992 RR (95% CI)	2002 RR (95% CI)	2011 RR (95% CI)
Education			
No qualifications	0.99	1.14	1.06
	(0.73-1.33)	(0.78-1.65)	(0.70-1.62)
Occupation			
Manual	0.88	1.15	0.94
	(0.75-1.04)	(0.93-1.42)	(0.72-1.21)
Income			
Lowest income	0.81	0.85	1.02
group	(0.62-1.06)	(0.59-1.22)	(0.66-1.59)

Note: **Bold text** shows statistical significance while asterisks show level of significance (***$p<0.001$, **$p<0.01$, *$p<0.05$;); Reference categories for predictor variables: Degree level or above; Non-manual occupation; Highest income group; Reference group for outcome variable: wants to give up smoking.

Table 5.24 and Figure 5.25 show that very similar to men, there was a very mixed relationship for women between SEP and not wanting to give up smoking between 1992 and 2011, with no statistical differences found between the highest socio-economic groups and the lowest socio-economic groups for any of the SEP indicators.
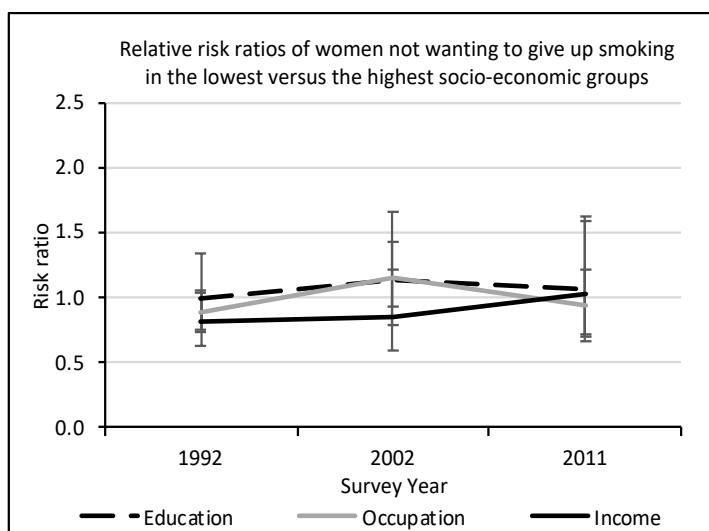
Figure 5.25: Changes over time for the relationship between not wanting to give up smoking and SEP for women for selected survey years.

Between 1992 and 2011, the relationship between not wanting to quit and SEP weakened for women as measured by occupation and income but strengthened to a small degree as measured by education. This indicates that the gap between the lowest and highest occupational and income groups narrowed, with inequalities in not wanting to quit smoking decreasing between these groups, whilst the gap between the lowest and highest educational groups widened slightly, with inequalities in not wanting to quit smoking increasing between these groups. The trends were statistically significant for occupation between 1992 and 2002 ($p<0.05$).

5.8   Summary

Three hypotheses were proposed for the smoking element of the project and are re-iterated as follows:

Hypothesis 1: Cultural factors have a bigger influence than material factors on smoking behaviour due to social identity, social distinction and social norms.

Hypothesis 2: Material factors have a bigger influence than cultural factors on smoking behaviour due to disadvantaged material circumstances.

Hypothesis 3: The relative importance of cultural factors compared to material factors on smoking behaviour will have increased between 1973 and 2011.

The first set of analyses examined the relationship between smoking status behaviours (smoking prevalence, smoking cessation and never smoking) and SEP and found that for men, education appeared to be the more important predictor for these behaviours, with those with no qualifications being at a higher risk of being a smoker, and at a lower risk of being an ex- smoker and a never smoker, compared to those educated to degree level or above. Between 1973 and 2011, the gap between the lowest and highest educational groups widened in terms of smoking prevalence but narrowed to a small degree in terms of smoking cessation and never smoking indicating an increase in inequalities in smoking prevalence and a decrease in inequalities in smoking cessation and never smoking. These findings appear to support a cultural explanation for smoking prevalence, smoking cessation and never smoking with the influence of cultural factors appearing to increase for men in terms of smoking prevalence and decreasing to a small degree in terms of smoking cessation and never smoking, across the period of analysis.

Education also generally appeared to be the more important predictor of smoking prevalence, smoking cessation and never smoking for women, with those with no qualifications being at a higher risk of being a smoker and at a lower risk of being an ex- smoker and a never smoker, compared to those educated to

degree level or above. However, household income appeared to be the more important predictor of smoking cessation for women in 1984 and 1992 and the more important predictor of never smoking in 1992. Between 1973 and 2011, the gap between the lowest and highest educational groups widened in terms of never smoking and smoking prevalence but narrowed in terms of smoking cessation. This indicates that there was an increase in inequalities in smoking prevalence and never smoking and a decrease in inequalities in smoking cessation. However, it is possible that these two phenomena are related and are an artefact of the data. These findings appear to support a cultural explanation for smoking prevalence, smoking cessation and never smoking with the influence of cultural factors appearing to increase for women in terms of smoking prevalence and never smoking and decrease in terms of smoking cessation across the period of analysis.

The findings for smoking status are consistent with Hypothesis 1 as cultural factors had a bigger influence than material factors on smoking behaviour with higher levels of smoking prevalence and lower levels of cessation and never smoking amongst men and women in the lowest educational groups. The findings for smoking prevalence for men and women and for female never smoking are consistent with Hypothesis 3 as the relative importance of cultural factors compared to material factors on these behaviours had increased between 1973 and 2011. However, Hypothesis 3 was not supported by the findings for the other elements of smoking status.

The second set of analyses examined the relationship between nicotine consumption behaviours (smoking uptake before age 16 and heavy smoking) and SEP and found that for men, education generally appeared to be the more important predictor for these behaviours, with those with no qualifications being at a higher risk of starting to smoke regularly before age 16 and being a heavy smoker, compared to those educated to degree level or above. However, household income appeared to be the more important predictor of heavy smoking for men in 1984, although it showed an inverse relationship, whilst occupation appeared to be the more important predictor of heavy smoking in 2002. Between 1973 and 2011, the gap between the lowest and highest educational groups narrowed in terms of starting to smoke before age 16 but strengthened in terms of heavy smoking, indicating a decrease in inequalities in smoking uptake before age 16 and an increase in inequalities in heavy smoking. These findings appear to support a cultural explanation for starting to smoke before age 16 and heavy smoking with the influence of cultural factors appearing to decrease for men in terms of smoking uptake before age 16 and increase in terms of heavy smoking, across the period of analysis.

Education also generally appeared to be the more important predictor of smoking uptake before age 16 for women, with those with no qualifications being at a higher risk of starting to smoke regularly before age 16 and being a heavy smoker, compared to those educated to degree level or above. However,

household income appeared to be the more important predictor of heavy smoking for women in 1992, although the differences between the lowest and highest income households were not statistically significant. Between 1973 and 2011, the gap between the lowest and highest educational groups narrowed in terms of starting to smoke before age 16 but strengthened in terms of heavy smoking, indicating a decrease in inequalities in smoking uptake before age 16 and an increase in inequalities in heavy smoking. These findings appear to support a cultural explanation for starting to smoke before age 16 and heavy smoking with the influence of cultural factors appearing to decrease for women in terms of smoking uptake before age 16 and increase in terms of smoking heavy smoking, across the period of analysis.

The findings that men and women in the lowest educational groups were at a greater risk of starting to smoke before age 16 and that women in the lowest educational groups were more likely to be heavy smokers was consistent with Hypothesis 1 as cultural factors had a bigger influence than material factors on these elements of smoking behaviour. However, the findings that men in the lowest educational groups were more likely to be heavy smokers were more mixed and were not consistent with Hypothesis 1. The findings for heavy smoking for women was consistent with Hypothesis 3 as the relative importance of cultural factors compared to material factors had increased between 1973 and 2011. However, Hypothesis 3 was not supported by the findings for the other elements of nicotine consumption.

The third set of analyses examined the relationship between smoking dependency behaviours (smoking within 15 minutes of waking, difficulty not smoking for one day and not wanting to give up smoking) and SEP and found that for men, the findings were quite mixed. Income generally appeared to be the more important predictor for smoking within 15 minutes of waking, with men in the lowest income households being at a higher risk of smoking their first cigarette within 15 minutes of waking, compared to men in the highest income households. However, education appeared to be the more important predictor of smoking within 15 minutes of waking for men in 2011. Between 1992 and 2011, the gap between the lowest and highest income households narrowed in terms of smoking within 15 minutes of waking, indicating a decrease in inequalities in this particular behaviour. These findings appear to support a material explanation for smoking within 15 minutes of waking, although the influence of material factors appears to have decreased for men across the period of analysis.

Income also generally appeared to be the more important predictor for difficulty not smoking for one day for men, with those in the lowest income households being at a higher risk of having difficulty not smoking for one day, compared to those in the highest income households, although the difference between the lowest and highest income households in 2002 were not statistically significant. However,

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education appeared to be the more important predictor of difficulty not smoking for one day for men in 1992. Between 1992 and 2011, the gap between the lowest and highest income households widened in terms of difficulty not smoking for one day, indicating an increase in inequalities in this particular behaviour. These findings appear to support a material explanation for difficulty not smoking for one day although the influence of material factors appears to have increased for men across the period of analysis.

The findings for not wanting to give up smoking for men, were very mixed with none of the findings between 1992 and 2011 being statistically significant.

The findings for the smoking dependency behaviours for women were also quite mixed. Education generally appeared to be the more important predictor for smoking within 15 minutes of waking, with women in the lowest income households being at a higher risk of smoking their first cigarette within 15 minutes of waking, compared to women in the highest income households. However, household income appeared to be the more important predictor of smoking within 15 minutes of waking for women in 2011. Between 1992 and 2011, the gap between the lowest and highest educational groups widened in terms of smoking within 15 minutes of waking, indicating an increase in inequalities in this particular behaviour. These findings appear to support a cultural explanation for smoking within 15 minutes of waking, although the influence of cultural factors appears to have increased for women across the period of analysis.

Education also generally appeared to be the more important predictor for difficulty not smoking for one day for women, with those in the lowest income households being at a higher risk of having difficulty not smoking for one day, compared to those in the highest income households. However, income appeared to be the more important predictor of difficulty not smoking for one day for women in 1992. Between 1992 and 2011, the gap between the lowest and highest educational households widened in terms of difficulty not smoking for one day, indicating an increase in inequalities in this particular behaviour. These findings appear to support a cultural explanation for difficulty not smoking for one day although the influence of cultural factors appears to have increased for women across the period of analysis.

Similar to men, the findings for not wanting to give up smoking for women, were very mixed with none of the findings between 1992 and 2011 being statistically significant.

The findings for the smoking dependency behaviours were much more mixed with two of the three survey years analysed suggesting that women in the lowest educational groups were at a greater risk of

smoking within 15 minutes of waking and having difficulty not smoking for one day. This was consistent with Hypothesis 1 as cultural factors had a bigger influence than material factors on these smoking behaviours. The findings for women for smoking within 15 minutes of waking and difficulty not smoking for one day were consistent with Hypothesis 3 as the relative importance of cultural factors compared to material factors on these behaviours had increased between 1973 and 2011. However, Hypothesis 3 was not supported by the findings for the other elements of smoking dependency. Two of the three survey years analysed suggested that men in the lowest income households were at a greater risk of smoking within 15 minutes of waking, which was consistent with Hypothesis 2 as material factors had a bigger influence than cultural factors on this smoking behaviour.

The findings reported in this chapter are discussed in more detail in Chapter 7 and consider possible explanations for these results. The findings are also discussed in relation to the existing literature in the field.

Chapter 6: Analysis of the Relationship Between Alcohol Consumption and Socio-economic Position

6.1   Introduction

Chapter 3 concluded that despite a noticeable decline in alcohol consumption levels in the UK, since 2008, that drinking inequalities persist and are characterised by more moderate but more frequent consumption by those in more advantaged socio-economic groups and by less frequent but heavier and more harmful consumption by those in more disadvantaged socio-economic groups. Material and cultural theories explain the differences in these drinking behaviours however, it is not understood how these different SEP indicators differentially relate to these patterns. This is important as it can help to explain what mechanisms might be involved in drinking inequalities and how they might have changed over time.

This chapter describes the results of the analyses for the relationship between alcohol consumption and the three measures of SEP: education, income and occupation. As described in Chapter 4 (section 4.7), the analyses were designed to assess the relative importance of material and cultural factors on drinking behaviour. Details of the outcome measures used for drinking are given in Chapter 4 (section 4.4.2) and are briefly summarized below:

> 1. Weekly alcohol consumption was a continuous measure of the respondent's estimated weekly alcohol consumption, in units;

> 2. Heavy drinking was coded as a binary variable which indicated whether the respondent was a heavy drinker (among the top 10% of men and top 10% of women who had consumed the most units in a week) or had consumed less units than heavy drinkers or no alcohol in the preceding 12 months.

All analyses were conducted for men and women separately for each drinking outcome measure. To briefly reiterate, the following analyses were conducted:

- Regression analysis for selected survey years to determine the relative strength of the relationship between each drinking outcome measure and SEP indicator to see whether these relationships differed for respondents in the lowest socio-economic groups compared to respondents in the highest socio-economic groups and to determine the magnitude of the gap between these groups. The coefficients (β) and risk ratios (RR) gave an indication of the size of the gap which was used to assess which SEP indicator appeared to be the more important predictor of drinking behaviour. For example, if the gap between the lowest and highest income groups was wider than the gap between the lowest and highest educational groups, income was

considered to be the more important predictor. The coefficients and RR's were then compared across survey years to determine whether the gap between the lowest and highest socio-economic groups had widened or narrowed which would suggest the relationship had strengthened or weakened;

- Interaction tests were conducted to determine whether any changes to the relationship between the drinking outcome measures and SEP were statistically significant between survey years.

The results from the regression analyses in this chapter report coefficients and RR's for the lowest and highest socio-economic groups only and for the models fitted with all three SEP indicators (controlling for age). Findings for the intermediate socio-economic groups and results for the models fitted with single SEP indicators can be found in Appendices 9 and 10.

6.2   Descriptive statistics for weekly alcohol consumption

Descriptive statistics for weekly alcohol consumption are shown in Table 6.1. Frequency distributions for weekly alcohol consumption for men and women for all survey years were positively skewed, therefore the median was used to measure average weekly alcohol consumption. Table 6.1 shows that between 1978 and 2011, men consumed on average, a higher number of units of alcohol per week compared to women and whilst median weekly consumption decreased for men across the period of analysis, it increased for women, resulting in a narrowing of the gender gap for weekly drinking.

Table 6.1: Median weekly alcohol consumption in units for men and women by survey year

	Men	*n*	SD	Women	*n*	SD
1978	11.5	*7,143*	24.2	1.9	*7,706*	8.7
1984	10.4	*5,656*	20.2	2.6	*6,250*	9.6
1992	11.0	*5,700*	20.8	3.0	*6,292*	9.5
2002	11.6	*4,513*	22.2	3.9	*5,233*	11.9
2011	9.4	*3,783*	23.8	3.0	*4,643*	12.6

The standard deviation (SD) for median weekly alcohol consumption suggested there was substantial variability in weekly consumption among men for each survey year, although variability decreased to a small degree over time. However, the standard deviation for median weekly alcohol consumption for women suggested there was less variability in weekly consumption, although variability was found to increase to a small degree across the period of analysis.

6.3   Analyses for weekly alcohol consumption

The analyses reported in this section investigated the relationship between SEP and usual weekly alcohol consumption for selected survey years between 1978 and 2011. Cross-tabulations were initially conducted to examine the relationship between the median number of alcohol units consumed per week and SEP and are illustrated in Figure 6.1. It should be noted that this figure shows changes over time to this relationship, however, it does not take into account the age effect on drinking behaviour. Following the cross-tabulations, a series of multiple linear regression models were conducted. The procedure is described in Chapter 4 (Section 4.7) but is briefly summarised below.

Multiple linear regression models were fitted with all three SEP indicators (income, education and occupation) and age (grouped) as a single block to determine the relationship between each SEP measure and weekly alcohol consumption. The findings for weekly alcohol consumption are illustrated in Figure 6.1.

Figure 6.1 illustrates the observed median number of alcohol units consumed weekly for men and women in the highest and lowest socio-economic groups as measured by gross household income, educational level and occupation (SEP) between 1978 and 2011 (Appendix 9 Table A9.2 shows the observed rates (%) for weekly alcohol consumption in more detail). A positive relationship was generally found between median weekly alcohol consumption and all socio-economic indicators for men and women, with the highest number of units consumed per week by adults in the highest socio-economic groups and the least number of units consumed per week by adults in the lowest socio-economic groups. However, an inverse relationship was initially found for median weekly alcohol consumption for men in 1978, as measured by education and occupation although this relationship had changed to a positive relationship by 1984. The gap between the highest and lowest socio-economic groups was widest as measured by household income and generally narrowest as measured by occupation. Across the period of analysis, median weekly alcohol consumption generally increased for men and women in the highest socio-economic groups and decreased for men and women in the lowest socio-economic groups, although there was a slight decrease for median weekly consumption for men in the highest income households and a slight increase for women in manual occupations. Between 1978 and 2011, the gap between the lowest and highest socio-economic groups widened for men and women.
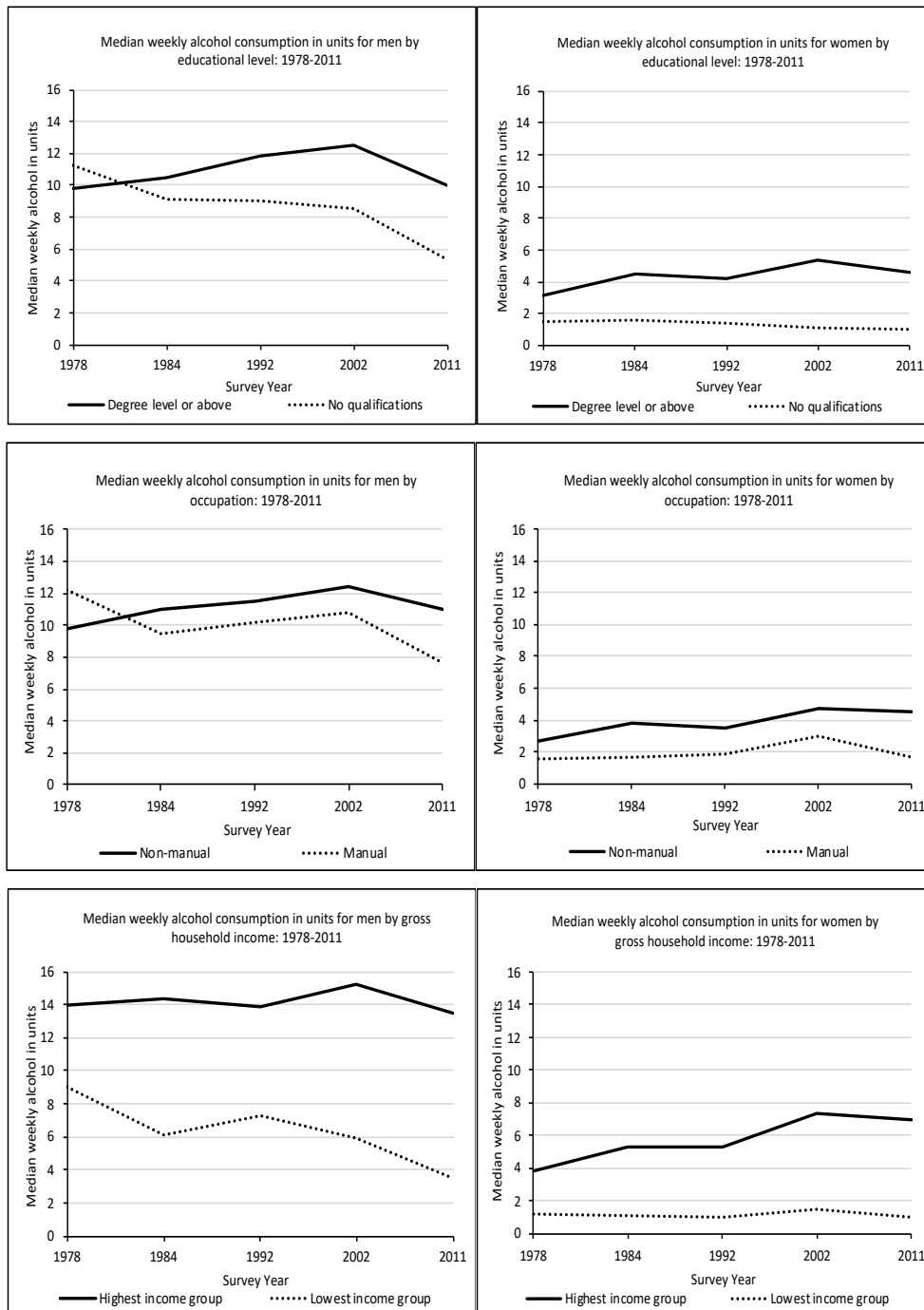
Figure 6.1: Observed median number of alcohol units consumed per week by education, income and occupation for men and women for all survey years.

Tables 6.2 and 6.3 show the results for the R^2 values for Models 1 and 2 for men and women obtained from multiple linear regressions to examine the relationship between weekly alcohol consumption and SEP. Overall, the model fit generally improved for men when all 3 SEP indicators were included. Income tended to explain a greater proportion of the variance in alcohol consumption, although occupation explained a greater proportion of the variance in 1978. Over time the proportion of the variance in weekly alcohol consumption that could be explained by SEP decreased.

Table 6.2: R² values for Models 1 and 2 for the relationship between weekly alcohol consumption and SEP for men

SEP indicator		1978	1984	1992	2002	2011
		R^2	R^2	R^2	R^2	R^2
Education	Model 1	0.039	0.021	0.015	0.015	0.003
Occupation	Model 1	0.042	0.021	0.011	0.015	0.003
Income	Model 1	0.037	0.045	0.016	0.021	0.007
All 3 SEP indicators plus age	Model 2	0.052	0.052	0.016	0.025	0.012

Table 6.3: R² values for Models 1 and 2 for the relationship between weekly alcohol consumption and SEP for women

SEP indicator		1978	1984	1992	2002	2011
		R^2	R^2	R^2	R^2	R^2
Education	Model 1	0.026	0.024	0.017	0.038	0.008
Occupation	Model 1	0.028	0.028	0.014	0.029	0.010
Income	Model 1	0.037	0.042	0.028	0.047	0.019
All 3 SEP indicators plus age	Model 2	0.038	0.044	0.025	0.044	0.020

For women, the model fit improved when all 3 SEP indicators were included for 1978, 1984 and 2011 but not for 1992 or 2002. Income generally explained a greater proportion of the variance in alcohol consumption for all survey years analysed. Across the period of analysis, the proportion of the variance in weekly alcohol consumption that could be explained by SEP decreased. Overall, the R^2 values for both men and women only explain a small proportion of variance in the amount of alcohol consumed, by SEP which would suggest that other factors may also be influencing weekly alcohol consumption.

The next set of findings in Tables 6.4 and 6.5 show the strength of the relationship for each SEP indicator for the weekly alcohol consumption outcome measure for men and women, when all three SEP indicators and age were included as a single block. Figures 6.2 and 6.3 present these values in a visual format, with the values on the vertical axis showing how much more or less alcohol was consumed for

those in the lowest socio-economic groups compared to those in the highest socio-economic groups (Appendix 10 Tables A10.1 and A10.2 show the coefficients (β) and CIs in more detail.

Table 6.4: Relationship (unstandardized β coefficients and 95% confidence intervals) between weekly alcohol consumption and SEP indicators (controlling for age) from multiple linear regression models for men for selected survey years.

SEP indicator	1978 β (95% CI)	1984 β (95% CI)	1992 β (95% CI)	2002 β (95% CI)	2011 β (95% CI)
Education					
No qualifications	**4.60*** (2.71-6.48)	**3.43**** (1.42-5.44)	1.80 (-0.01-3.61)	2.34 (-0.02-4.70)	1.53 (-1.41-4.46)
Occupation					
Manual	**4.41*** (3.15-5.68)	1.39 (-0.06-2.84)	0.38 (-0.92-1.67)	1.14 (-0.46-2.75)	-1.83 (-3.65-0.01)
Income					
Lowest income group	**-6.84*** (-8.76- -4.93)	**-10.80*** (-12.97- -8.63)	**-3.88*** (-5.84- -1.93)	**-5.48*** (-7.92- -3.04)	**-4.75**** (-7.53- -2.00)

Note: **Bold text** shows statistical significance while asterisks show level of significance (***$p<0.001$, **$p<0.01$, *$p<0.05$;); Reference categories for predictor variables: Degree level or above; Non-manual occupation; Highest income group.

Table 6.4 and Figure 6.2 show a positive relationship between education and weekly alcohol consumption for men, with those not having any qualifications more likely to consume more units of alcohol per week compared to those educated to degree level or above. However, there were no statistically significant differences in terms of weekly alcohol consumption between the lowest and highest educational groups for men, between 1992 and 2011. With the exception of 1992, a positive relationship was found between occupation and weekly alcohol consumption for men with those in manual occupations more likely to consume a higher number of alcohol units per week compared to those in non-manual occupations. However, statistically significant differences between the lowest and highest occupational groups were only found in 1978. A negative relationship was found between household income and weekly alcohol consumption for men for all survey years analysed with those in the lowest income households consuming a lower number of alcohol units per week compared to those in the highest income households. The findings suggest that income appeared to be the more important predictor of weekly alcohol consumption for men between 1978 and 2011, as the gap between the lowest and highest socio-economic groups was widest as measured by income for all survey years analysed. However, the wide CI's for these estimates are a product of the sampling error plus the variance. The least important predictor of weekly alcohol consumption appeared to be occupation as the gap between the lowest and highest occupational groups was narrowest for all survey years.
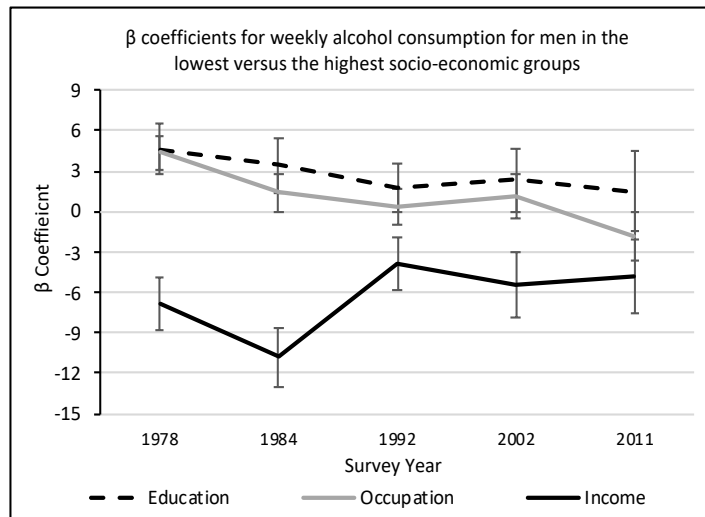
Figure 6.2: Changes over time for the relationship between estimated weekly alcohol consumption (in units) and SEP for men for selected survey years.

Between 1973 and 2011, the relationship between weekly alcohol consumption and SEP weakened for men as measured by all three SEP indicators. This indicates that the gap between the lowest and highest socio-economic groups narrowed between 1978 and 2011, with inequalities in weekly alcohol consumption decreasing between these groups. These trends were statistically significant for occupation between 1978 and 1984 ($p<0.05$); between 2002 and 2011 ($p<0.05$) and between 1978 and 2011 ($p<0.05$) and for income between 1978 and 1984 ($p<0.05$) and between 1984 and 1992 ($p<0.05$).

Table 6.5 and Figure 6.3 show a generally negative relationship between weekly alcohol consumption and education and occupation for women between 1978 and 2011, with those not having any educational qualifications or being in a manual occupation less likely to consume more units of alcohol per week compared to those educated to degree level or above or in a non-manual occupation. However, statistically significant differences between the lowest and highest groups were only found as measured by occupation in 1978, 1984 and 2011. A negative relationship was also found between household income and weekly alcohol consumption for women between 1978 and 2011, with women in the lowest income households more likely to consume less units of alcohol per week compared to women in the highest income households. The findings suggest that income appeared to be the more important predictor of weekly alcohol consumption for women between 1978 and 2011, as the gap between the lowest and highest socio-economic groups was widest as measured by income for all survey years analysed. The least important predictor of weekly alcohol consumption appeared to be education in 1978, 1984 and 2011 and occupation in 1992 and 2002, as the gap between the lowest and highest educational and occupational groups was narrowest for these particular years.

Table 6.5: Relationship (unstandardized β coefficients and 95% confidence intervals) between weekly alcohol consumption and SEP indicators, plus age (grouped) from multiple linear regression models for women for selected survey years.

SEP indicator	1978 β (95% CI)	1984 β (95% CI)	1992 β (95% CI)	2002 β (95% CI)	2011 β (95% CI)
Education					
No qualifications	-0.16 (-0.91-0.59)	0.24 (-0.70-1.18)	-0.55 (-1.38-0.28)	0.29 (-0.84-1.42)	-0.79 (-2.54-0.96)
Occupation					
Manual	**-0.53*** (-0.96- -0.10)	**-0.89**** (-1.49- -0.29)	-0.26 (-0.79-0.27)	-0.10 (-0.86-0.66)	**-1.15*** (-2.24- -0.05)
Income					
Lowest income group	**-2.57**** (-3.22- -1.93)	**-3.62**** (-4.56- -2.69)	**-2.75**** (-3.59- -1.92)	**-4.06**** (-5.24- -2.88)	**-3.22**** (-4.94- -1.50)

Note: **Bold text** shows statistical significance while asterisks show level of significance (***$p<0.001$, **$p<0.01$, *$p<0.05$;); Reference categories for predictor variables: Degree level or above; Non-manual occupation; Highest income group.
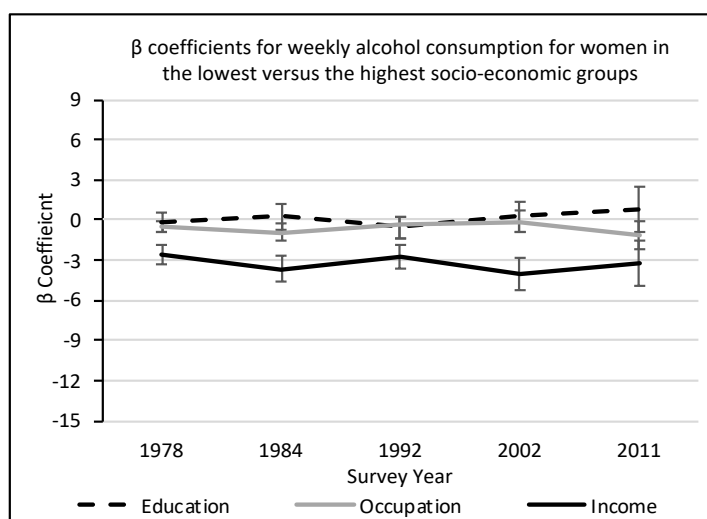
Figure 6.3: Changes over time for the relationship between estimated weekly alcohol consumption (in units) and SEP for women for selected survey years.

Between 1978 and 2011, the relationship between weekly alcohol consumption and SEP strengthened for women as measured by all three SEP indicators. This indicates that the gap between the lowest and highest socio-economic groups widened between 1978 and 2011, with inequalities in weekly alcohol consumption increasing between these groups. These trends were statistically significant for income between 1978 and 1984 ($p<0.05$) and between 1992 and 2002 ($p<0.05$).

6.4   Descriptive statistics for heavy drinking

Heavy drinkers were categorised as the top 10% of men and top 10% of women who had consumed the most units in a week. Heavy drinking was coded as a binary variable which indicated whether the respondent was a heavy drinker. As the proportion (%) of men and women who were heavy drinkers was defined as 10%, it was not necessary to include a table for descriptive statistics for heavy drinking.

6.5   Analyses for heavy drinking

The analyses reported in this section investigated the relationship between SEP and heavy drinking for selected survey years between 1978 and 2011. Cross-tabulations were initially conducted to examine the relationship between heavy drinking and SEP and are illustrated in Figure 6.4. It should be noted that these findings show whether heavy drinking increased or decreased over time, as measured by the different SEP indicators, however, it does not take into account the age effect on heavy drinking.

Figure 6.4 illustrates the observed rates for heavy drinking for men and women in the highest and lowest socio-economic groups between 1978 and 2011 (Appendix 9 Tables A9.4 and A9.5 show the observed rates (%) for heavy drinking in more detail). Overall, the relationship between heavy drinking and SEP was quite mixed. An inverse relationship was generally found between heavy drinking and education and occupation for men, with the highest proportion of heavy drinkers in the lowest educational and occupational groups and the lowest proportion of heavy drinkers in the highest educational and occupational groups. However, by 2011, the relationship between occupation and heavy drinking had changed to a positive relationship with a higher proportion of men in non-manual occupations drinking more heavily than men in manual occupations. The relationship between heavy drinking and income for men was more variable with a positive relationship found between 1978 and 1992, with the highest proportion of heavy drinkers in the highest income households and the lowest proportion of heavy drinkers in the lowest income households, although by 2011, the relationship between heavy drinking and income was positive.

A positive relationship was generally found between heavy drinking and all socio-economic indicators for women, with the highest proportion of heavy drinkers in the highest socio-economic groups and the lowest proportion of heavy drinkers in the lowest socio-economic groups, although rates of heavy drinking for women were very similar between the highest and lowest groups as measured by occupation in 2002. The gap between the highest and lowest socio-economic groups was generally widest as measured by education for men and widest as measured by income for women but was narrowest as measured by occupation for both men and women. Between 1978 and 2011, there was little change to rates of heavy drinking for men in the lowest educational groups although there was a

decrease for men in the lowest occupational groups and a small increase for men in the lowest income households, although rates of heavy drinking as measured by income were more variable over time. For men in the highest educational and occupational groups, heavy drinking increased between 1978 and 2011 but decreased for men in the highest income households. For women in the highest educational, income and occupational groups, heavy drinking generally declined across the period of analysis, while for women in the lowest socio-economic groups, there was very little changes to rates of heavy drinking.
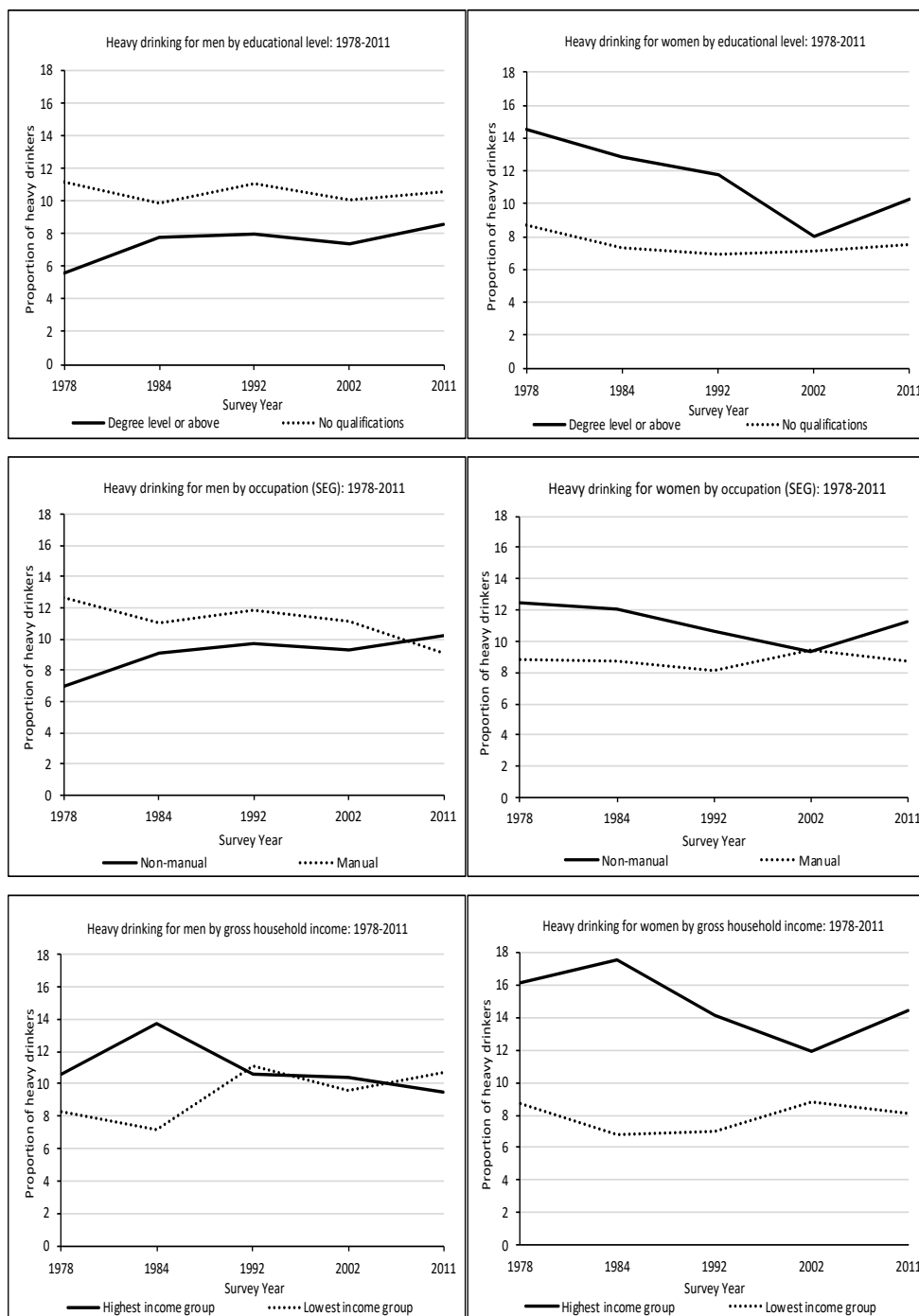
Figure 6.4: Observed rates for heavy drinking by education, occupation and income for men and women for selected survey years.

The next set of analyses consisted of a series of log binomial regression models. The procedure is described in Chapter 4 (section 4.7) but is briefly summarized here. Log binomial regression models

were fitted with all three SEP indicators (education, income and occupation) and age (grouped) as a single block to determine the bivariate relationship between each SEP indicator and the heavy drinking outcome measure. Tables 6.6 and 6.7 and Figures 6.5 and 6.6 show the strength of the relationship for each SEP indicator and heavy drinking for men and women from the log binomial regression analyses. Figures 6.5 and 6.6 present these values in a visual format, with the values on the vertical axis giving the relative risk (RR) of a respondent being a heavy drinker in the lowest versus the highest socio-economic groups (Appendix 10 Tables A10.3 and A10.4 show the RR and CIs in more detail).

Table 6.6 and Figure 6.5 generally show that between 1978 and 2011, men with no educational qualifications or who were in a manual occupation had a higher risk of being a heavy drinker compared to those educated to degree level or above or who were in a non-manual occupation, although the relationship between occupation and heavy drinking had reversed in 2011. However, there were no statistically significant differences between the lowest and highest groups in terms of being a heavy drinker as measured by education in 2011 and by occupation between 1992 and 2011. Between 1978 and 2011, men in the lowest income households were less likely to be heavy drinkers compared to men in the highest income households, although statistically significant differences between the lowest and highest income households were only found in 1978 and 1984.

Table: 6.6 Relationship (risk ratios and 95% confidence intervals) between heavy drinking and SEP indicators, plus age (grouped) from log binomial regression models for men for selected survey years

SEP indicator	1978 RR (95% CI)	1984 RR (95% CI)	1992 RR (95% CI)	2002 RR (95% CI)	2011 RR (95% CI)
Education					
No qualifications	**1.92***	**1.68**	**1.53**	**1.67**	1.39
	(1.43-2.56)	(1.20-2.36)	(1.16-2.03)	(1.19-2.33)	(0.91-2.12)
Occupation					
Manual	**1.67***	**1.31***	1.20	1.17	0.81
	(1.41-1.97)	(1.05-1.64)	(0.99-1.44)	(0.95-1.45)	(0.63-1.04)
Income					
Lowest income	**0.61***	**0.38***	0.82	0.74	0.97
group	(0.47-0.79)	(0.27-0.54)	(0.62-1.09)	(0.53-1.04)	(0.67-1.40)

Note: **Bold text** shows statistical significance while asterisks show level of significance (***$p<0.001$, **$p<0.01$, *$p<0.05$;); Reference categories for predictor variables: Degree level or above; Non-manual occupation; Highest income group; Reference group for outcome variable: other drinkers and non-drinkers.
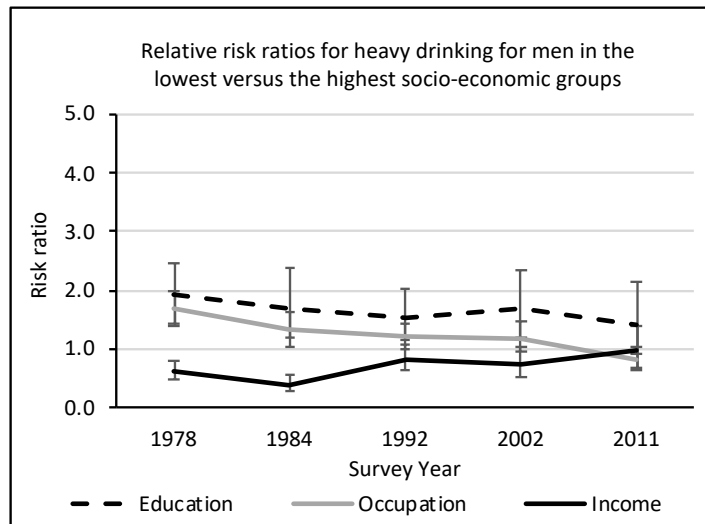
Figure 6.5: Changes over time for the relationship between heavy drinking and SEP for men for selected survey years.

The findings suggest that education appeared to be the more important predictor of heavy drinking for men, for all survey years, except for 1984, when income appeared to be the strongest predictor as the gap between the lowest and highest groups was widest as measured by education and income for these particular survey years. The least important predictor of heavy drinking appeared to be income for all survey years with the exception of 1984 and 2002, when occupation appeared to be the least important predictor.

Between 1978 and 2011, the relationship between heavy drinking and SEP weakened for men as measured by all three SEP indicators. This indicates that between 1978 and 2011, the gap between the lowest and highest socio-economic groups narrowed over time, with inequalities in heavy drinking decreasing between these groups. These trends were statistically significant for occupation between 1978 and 1984 ($p<0.05$) and between 2002 and 2011 ($p<0.05$) and for income between 1978 and 1984 ($p<0.05$) and between 1984 and 1992 ($p<0.05$).

Table 6.7 and Figure 6.6 show a very mixed relationship between heavy drinking and education and occupation for women between 1978 and 2011, with differences between the lowest and highest groups only statistically significant as measured by occupation in 1978 and by education in 2002. However, between 1978 and 2011, women in the lowest income households had a lower risk of being a heavy drinker compared to women in the highest income households. The findings suggest that income appeared to be the more important predictor of heavy drinking for women as the gap between the highest and lowest income households was widest as measured by income for all survey years analysed. The least important predictor of heavy drinking appeared to be occupation between 1984 and 2002 and education in 1978 and 2011.

Table 6.7 Relationship (risk ratios and 95% confidence intervals) between heavy drinking and SEP indicators, plus age (grouped) from log binomial regression models for women for selected survey years.

SEP indicator	1978 RR (95% CI)	1984 RR (95% CI)	1992 RR (95% CI)	2002 RR (95% CI)	2011 RR (95% CI)
Education					
No qualifications	0.90 (0.72-1.13)	1.01 (0.74-1.39)	0.87 (0.66-1.17)	**1.45*** (1.03-2.03)	0.94 (0.63-1.40)
Occupation					
Manual	**0.79**** (0.69-0.92)	1.00 (0.82-1.22)	0.91 (0.76-1.10)	1.04 (0.85-1.27)	0.87 (0.69-1.09)
Income					
Lowest income group	**0.59***** (0.48-0.73)	**0.39***** (0.29-0.53)	**0.54***** (0.41-0.72)	**0.54***** (0.40-0.73)	**0.64***** (0.47-0.89)

Note: **Bold text** shows statistical significance while asterisks show level of significance (***p<0.001, **p<0.01, *p<0.05;); Reference categories for predictor variables: Degree level or above; Non-manual occupation; Highest income group; Reference group for outcome variable: other drinkers and non-drinkers.
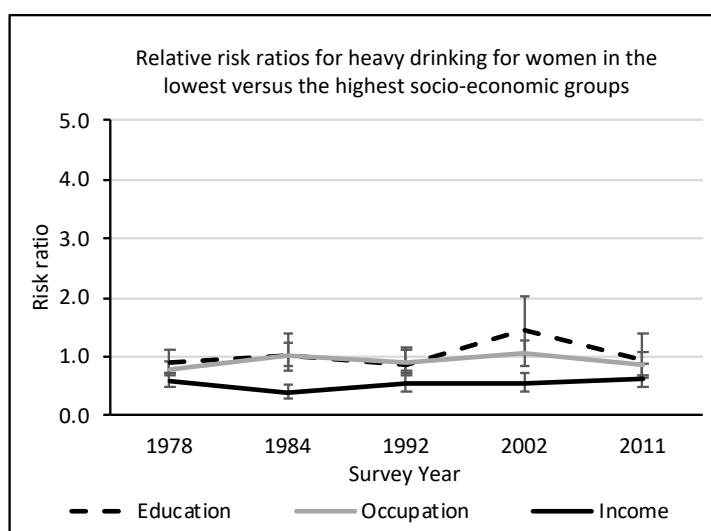
Figure 6.6: Changes over time for the relationship between heavy drinking and SEP for women for selected survey years.

Between 1978 and 2011, the relationship between heavy drinking and SEP weakened for women to a small degree by all three SEP indicators. This suggests that between 1978 and 2011, the gap between the lowest and highest socio-economic groups narrowed slightly, with inequalities in heavy drinking decreasing between these groups. These trends were statistically significant for education between 1992 and 2002 (*p*<0.05) and between 2002 and 2011 (*p*<0.05) and for income between 1978 and 1984 (*p*<0.05) and between 1984 and 1992 (*p*<0.05).

6.5.1   Sensitivity analyses

Sensitivity analyses were conducted to test the robustness of some of the findings and are discussed below.

6.5.1.1 Non-linear effects of age (grouped) covariate

For the main analyses, the variable age (grouped) was included in the analytic models as it has been shown that the relationship between alcohol consumption and age is non-linear, with differences existing between certain age groups in terms of alcohol consumption (Chaiyasong *et al.,* 2018; ONS, 2013). Sensitivity analyses were run replicating the main analytic models but excluding age (grouped) to determine whether taking age (grouped) into account substantially improved the fit of the model. The sensitivity analyses showed that adding the age (grouped) covariate noticeably improved the fit of the models.

6.5.1.2 Alcohol unit threshold for heavy drinking outcome variable

As discussed in Chapter 4 (section 4.4.2.2), the heavy drinking variable for men and women was derived using the top 10% of men and the top 10% of women who had consumed the most units on average during the week. This resulted in the unit threshold for heavy drinkers varying for men and women for each survey year as shown in Table 5.9 below. These thresholds were used in the analyses.

Table 6.8 Unit thresholds for heavy drinkers for men and women for each survey year.

Survey Year	Men	Women
1978	52 units or above	14 units or above
1984	42 units or above	15 units or above
1992	42 units or above	17 units or above
2002	44 units or above	22 units or above
2011	44 units or above	22 units or above

An alternative would have been to have derived the heavy drinking outcome measure using the UK government's definition for harmful drinking which was greater than 50/35 units a week for men/women, respectively. However, cell counts for a heavy drinking outcome variable based on the 50/35 unit thresholds were considered to be too low for the findings to be meaningful. While the unit thresholds used in the analyses for men were relatively close to the 50 units defined for harmful drinking, the unit thresholds for women were noticeably lower than the 35 units defined for harmful drinking. Therefore, in order to test the robustness of the unit thresholds used in the analyses, the regression analyses were re-run using the 35/50 unit thresholds and the results compared to the results

from using the unit thresholds in Table 6.8. The findings showed that when using the 35/50 unit thresholds, the relationship between the SEP indicators and heavy drinking was considerably weaker when compared to the relationship between the SEP indicators and heavy drinking as defined by the top 10% of men and women who had consumed the most units in a week

6.6   Summary

Three hypotheses were proposed for the drinking element of the project and are re-iterated as follows:

Hypothesis 1: Cultural factors have a bigger influence than material factors on drinking behaviour due to social identity, social distinction and social norms.

Hypothesis 2: Material factors have a bigger influence than cultural factors on drinking behaviour due to disadvantaged material circumstances.

Hypothesis 3: The relative importance of cultural factors compared to material factors on drinking behaviour will have increased between 1973 and 2011.

The first set of analyses examined the relationship between weekly alcohol consumption and SEP and found that for men, income appeared to be the more important predictor of weekly alcohol consumption with men in the lowest income households drinking significantly less alcohol per week compared to men in the highest income households. Although education was found to be a predictor of weekly alcohol consumption in 1978 and 1984 and occupation was found to be a predictor of weekly alcohol consumption in 1978, education and occupation were not found to be predictors of weekly alcohol consumption in subsequent survey years. Between 1978 and 2011, the gap between the lowest and highest socio-economic groups narrowed, indicating a decrease in inequalities in weekly alcohol consumption. These findings appear to support a materialist explanation for weekly alcohol consumption, although the influence of material factors appears to have decreased for men across the period of analysis.

Income also appeared to be the more important predictor of weekly alcohol consumption for women with those in the lowest income households drinking significantly less alcohol per week compared to women in the highest income households. Although occupation was found to be a predictor of weekly alcohol consumption in 1978 and 1984, occupation was not found to be a predictor of weekly alcohol consumption in subsequent survey years, whilst education was not found to be a predictor of weekly alcohol consumption for any of the survey years analysed. Between 1978 and 2011, the gap between the lowest and highest socio-economic groups widened indicating an increase in inequalities in weekly

alcohol consumption. Similar to the results reported for men, these findings also appear to support a materialist explanation for weekly alcohol consumption although the influence of material factors appears to have increased for women across the period of analysis.

The findings for weekly alcohol consumption are consistent with Hypothesis 2 as material factors had a bigger influence than cultural factors on drinking behaviour with lower levels of weekly alcohol consumption amongst men and women in the lowest income households.

The second set of analyses examined the relationship between heavy drinking and SEP and found that for men, education appeared to be the more important predictor of heavy drinking with those with no qualifications at a higher risk of being a heavy drinker compared to those educated to degree level or above. However, this relationship was not statistically significant in 2011. Although occupation and income were found to be predictors of heavy drinking in 1978 and 1984, they were not found to be predictors of heavy drinking in subsequent survey years. Between 1978 and 2011, the gap between the lowest and highest socio-economic groups narrowed indicating a decrease in inequalities in heavy drinking. These findings appear to support a cultural explanation for heavy drinking although the influence of cultural factors decreased to a small extent for men across the period of analysis.

Income appeared to be the more important predictor of weekly alcohol consumption for women with those in the lowest income households at a lower risk of heavy drinking compared to women in the highest income households. Although occupation and education were found to be predictors of heavy drinking in 1978 and 2002 respectively, they were not found to predict heavy drinking for any other survey year analysed. Between 1978 and 2011, the gap between the lowest and highest socio-economic groups narrowed very slightly indicating a decrease in inequalities in heavy drinking, although the decrease was very similar for all socio-economic indicators. These findings appear to support a materialist explanation for heavy drinking with the influence of material factors decreasing very slightly for women across the period of analysis.

The findings for heavy drinking for men are consistent with Hypothesis 1 as cultural factors had a bigger influence than material factors on drinking behaviour with men in the lowest educational groups being at a greater risk of being heavy drinkers. However, these findings were not consistent with Hypothesis 3 as the influence of cultural factors on heavy drinking decreased between 1978 and 2011. The findings for heavy drinking for women were consistent with Hypothesis 2 as material factors had a bigger influence than cultural factors on heavy drinking although women in the lowest income households were at a lower risk of heavy drinking compared to women in the highest income households.

When comparing the alcohol consumption findings to the smoking behaviour findings, overall, it would appear that education was the strongest predictor for most of the smoking outcome measures whereas income was the strongest predictor for most of the drinking outcome measures. The findings for whether the strongest socio-economic predictors of smoking and drinking behaviours strengthened or weakened over time was mixed. In light of these different patterns, the discussion will consider the inequalities in these two types of health-related behaviour. The findings reported in this chapter are discussed in more detail in Chapter 7, along with possible explanations in relation to the existing literature in the field.

Chapter 7: Discussion and Conclusions

7.1   Research project summary

Social inequalities in health which are linked to socio-economic position (SEP) have been persistent and enduring in England and are argued to have widened over time (e.g. (Mackenbach, et al., 2003; Thomas, et al., 2010; Marmot, 2010). Whilst there are a number of different explanations for health inequalities, variations in patterns of health-related behaviours have increasingly been highlighted as playing an important role in explaining persistent and widening inequalities in health (Mackenbach, 2012). Different SEP indicators such as education, income and occupation capture different factors therefore it was important to investigate the separate effects of these indicators as it can help to explain what mechanisms might underpin inequalities in smoking and drinking behaviour and how they might have changed over time. The overall aim of this study was to investigate the relative importance of the contribution of material and cultural factors for smoking and drinking behaviour and how these might have changed between 1973 and 2011.

The project examined the socio-economic patterning of a number of different elements of smoking behaviour using three different socio-economic indicators, over a period of 38 years. The findings were then compared to alcohol consumption behaviour using the same socio-economic indicators, over a similar period of time. All analyses were conducted separately for men and women to see if there were any notable gender differences in terms of material and cultural influences on smoking and drinking behaviour. The aims of the research project were as follows:

1. To provide sociological explanations about long-term trends in the social patterning of smoking behaviour;
2. To determine how far social inequalities in drinking behaviour are similar to or distinctive from social inequalities in smoking behaviour?

The project was designed to address the following research questions:

1. To what extent has the relationship between different indicators of socio-economic position and cigarette smoking behaviour changed between 1973 and 2011?
2. To what extent is the relationship between different indicators of socio-economic position and drinking similar to or distinctive from the relationship between different indicators of socio-economic position and smoking?

Tables 7.1 and 7.2 give an overview of the results of the analyses and shows which socio-economic indicator was the strongest predictor for each element of smoking and drinking behaviour and whether the predictor strengthened or weakened over time.

Table 7.1 Summary of the results for each smoking outcome measure

	1973	1984	1992	2002	2011	Whether the predictor strengthened (s) or weakened (w) over time
Male smoker	E	E	E	E	E	Education(s)
Female smoker	E	E	E	E	E	Education(s)
Male ex-smoker	E	E	E	E	E	Education(w)
Female ex-smoker	E	I	I	E	E	Education(w) Income(s)
Male never-smoker	E	E	E	E	E	Education(w)
Female never-smoker	E	E	I	E	E	Education(s) Income(s)
Male smoking uptake	E	N/A	E	E	E	Education(w)
Female smoking uptake	E	N/A	E	E	E	Education(w)
Male heavy smoker	E	I	E	O	E	Education(s) Occupation(s) Income(s)
Female heavy smoker	E	E	I (ns)	E	E	Education(s) Income(s)
Male first cigarette within 15 minutes	N/A	N/A	I	I	E	Education(s) Income(w)
Female first cigarette within 15 minutes	N/A	N/A	E	E	I	Education(s) Income(s)
Male difficulty not smoking for one day	N/A	N/A	E	I (ns)	I	Education(w) Income(s)
Female difficulty not smoking for one day	N/A	N/A	I	E	E	Education(s) Income(w)
Male not wanting to give up smoking	N/A	N/A	E (ns)	O (ns)	E (ns)	Education(s) Occupation(w)
Female not wanting to give up smoking	N/A	N/A	I (ns)	I (ns)/ O (ns)	E (ns)/ O (ns)	Education(s) Occupation(w) Income(w)

Cell contents indicate which socio-economic indicator was the strongest predictor for each outcome measure (E=education; O=occupation; I=income) and whether that particular indicator strengthened (s) or weakened (w) over time. N/A indicates that data was not available for certain smoking outcomes for a survey year. "ns" indicates that results for the indicator were not statistically significant. The colour of the cells has been included to highlight differences between the analysis outcomes.

Table 7.2 Summary of the results for each drinking outcome measure

	1978	1984	1992	2002	2011	Whether the predictor strengthened (s) or weakened (w) over time
Male weekly alcohol consumption	I	I	I	I	I	Income(w)
Female weekly alcohol consumption	I	I	I	I	I	Income(s)
Male heavy drinking	E	E	E	E	E (ns)	Education(w)
Female heavy drinking	I	I	I	I	I	Income(w)

Cell contents indicate which socio-economic indicator was the strongest predictor for each outcome measure (E=education; O=occupation; I=income) and whether that particular indicator strengthened (s) or weakened (w) over time. "ns" indicates that results for the indicator were not statistically significant. The colour of the cells has been included to highlight differences between the analysis outcomes.

These results relate to the regression models fitted with education, income, occupation and age (grouped) as a single block in order to adjust for the influence of all three socio-economic indicators. The cell contents indicate which socio-economic factor (E=education; O=occupation; I=income) was the strongest predictor for each smoking and drinking outcome measure for each survey year and whether the relationship between the strongest predictor and outcome measure strengthened (s) or weakened (w) over time. Where two socio-economic indicators are included within one cell, both were found to be equally strong predictors for that particular outcome measure. Cells that contain "(ns)" indicate that the results for that outcome were not statistically significant, otherwise all findings in the table were found to be statistically significant. Where data was not available for analysis for some of the smoking outcome measures in certain survey years, these cells are marked as N/A in the table.

Overall, the results in the tables suggest that when all three socio-economic indicators were mutually adjusted for, education appeared to have the strongest relationship with most of the smoking outcome measures, while income appeared to have the strongest relationship with most of the drinking outcome measures. The results for whether the strongest socio-economic predictors of smoking and drinking behaviour strengthened or weakened over time were more mixed. The following sections discuss these results in greater detail with reference to the study research questions.

7.2 To what extent has the relationship between socio-economic position and cigarette smoking behaviour changed?

Figure 7.1 was first introduced in Chapter 5 (Section 5.1) and illustrates the different elements of smoking behaviour that were analysed in this project and how these elements are linked and cluster together.
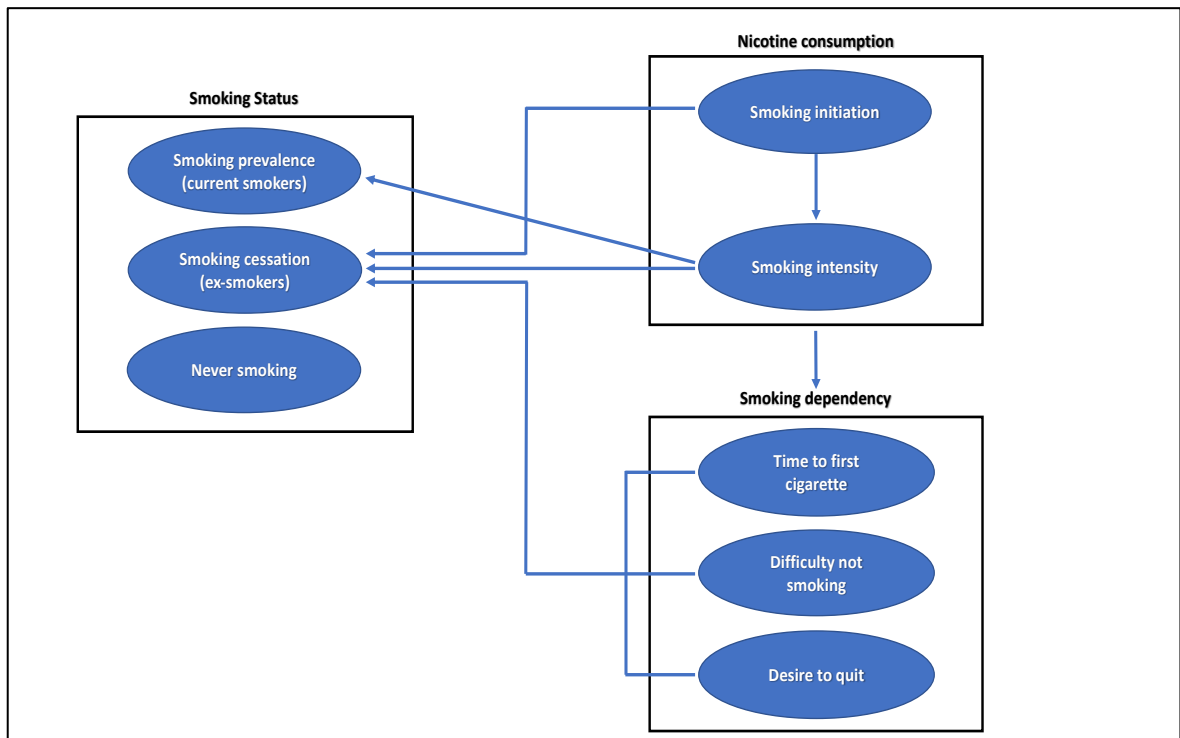
Figure 7.1 Relationship between the different elements of smoking behaviour

Smoking status was comprised of three elements of smoking behaviour: smoking prevalence which was measured by current smokers; smoking cessation which was measured by ex-smokers and never smoking. These three elements are linked as rates of smoking cessation and never smoking determine the rates of smoking prevalence found within a population. In terms of the results for the relationship between SEP and smoking status behaviours, Table 7.1 shows that overall, education tended to be the strongest predictor between 1973 and 2011, with men and women with no qualifications more likely to be current smokers and less likely to quit or to be a never smoker compared to men and women educated to degree level or above. The results for whether the education indicator strengthened or weakened between 1973 and 2011 for the smoking status elements was mixed.

The gap between the lowest and highest educational groups for men and women widened over time in terms of prevalence, whilst educational differences between the lowest and highest socio-economic groups for men and women in terms of smoking cessation appeared to narrow slightly. However, one possible explanation for the narrowing of the education gap for cessation and the widening of the education gap for prevalence between 1973 and 2011, is that the analysis for cessation compared ex-smokers to current smokers (and excluded never smokers). Therefore, because there would have been a higher proportion of adults educated to degree level or above who did not smoke, there would be fewer smokers in the higher educated group to quit. Meanwhile the gap between the lowest and highest educational groups in terms of never smoking, was found to narrow slightly over time for men, but widened to a small extent for women.

Figure 7.1 illustrates the nicotine consumption cluster which comprised two elements of smoking behaviour: smoking initiation which was measured by smoking uptake before age 16 and smoking intensity which was measured by heavy smoking (defined as more than 20 cigarettes a day). These elements are inter-linked as the earlier an individual starts to smoke, the more likely they are to smoke heavily. In terms of the results for the relationship between SEP and nicotine consumption behaviours, Table 7.1 shows that overall, education tended to be the strongest predictor between 1973 and 2011, with men and women with no qualifications more likely to start smoking regularly before age 16 and to be heavy smokers compared to men and women educated to degree level or above. The gap between the lowest and highest educational groups for men and women appeared to narrow over time in terms of smoking uptake, but appeared to widen in terms of heavy smoking. The gap between the lowest and highest educational groups in terms of smoking uptake and heavy smoking were found to change between 1973 and 2011 to a greater extent for women than for men. However, the wide confidence intervals (CI) for female smoking uptake in 1973 and for female heavy smoking in 2011 may have influenced these particular findings, making it unclear as to whether there was a marked difference between these groups (see Chapter 5, sections 5.5. and 5.5.2 for more detail).

Smoking dependency was comprised of three elements of smoking behaviour: time to first cigarette, which was measured by smoking within 15 minutes of waking; perceived difficulty of not smoking for one day and not wanting to give up smoking. In terms of the results for the relationship between SEP and the smoking dependency behaviours, Table 7.1 shows that the findings were quite mixed. For time to first cigarette and difficulty not smoking for one day, education generally tended to be the strongest predictor for women, between 1992 and 2011, with those with no qualifications more likely to smoke their first cigarette within 15 minutes of waking and to have difficulty not smoking for one day compared to women educated to degree level or above. The gap between the lowest and highest educational groups for women, for these elements of smoking behaviour, appeared to widen over time. The results for the relationship between SEP and time to first cigarette for men, suggested that income tended to be the stronger predictor, with those living in the lowest income households more likely to smoke their first cigarette within 15 minutes of waking compared to those living in the highest income households. The gap between the lowest and highest income households for men, for this particular smoking behaviour, appeared to narrow between 1992 and 2011. The findings for the relationship between SEP and difficulty not smoking for one day, for men, also suggested that income was the stronger predictor, although only 2011 showed statistically significant differences between the lowest and highest income households for this particular smoking behaviour. The gap between the lowest and highest income households for men, for difficulty not smoking appeared to widen between 1992 and 2011. In terms of the results for the relationship between SEP and not wanting to give up smoking, no

statistically significant differences were found between the lowest and highest groups for men or for women as measured by any of the socio-economic indicators, for any of the survey years analysed.

As a widely used measure of SEP, occupational social class was also used in the analysis of smoking inequalities and whilst it was acknowledged that this particular socio-economic indicator is very closely related to both income and education, it was possible that by including occupation in the model, it might capture something over and above education or income in terms of social class and social status or occupational cultures (see Chapter 4 Section 4.3 for a discussion on this). However, the findings from the analyses suggest that overall, occupation tended to be the weakest predictor for most of the smoking outcome measures. Therefore, it is possible that the occupational social class indicator (SEG) did not capture elements of status and social class or occupational cultures.

To briefly summarise the main findings for smoking behaviour, between 1973 and 2011, education appeared to be the strongest predictor for the majority of the smoking outcome measures for men and women when compared to occupation and income. Educational differences between the highest and lowest groups for men and women in terms of smoking prevalence, heavy smoking and smoking within 15 minutes of waking were all found to increase over time although the trend in this pattern appeared to be more inconsistent when considering the other elements of smoking behaviour. There are several possible different explanations for inequalities in smoking behaviour. The two main explanations are the material and cultural explanations and were discussed in Chapter 2 (Section 2.4), although it is also possible that artefacts might help to explain smoking inequalities. The remainder of Section 7.2 discusses the project findings in light of these different explanations.

7.2.1   Materialist explanation

The findings in Table 7.1 suggested that there was some evidence of an income effect on some elements of smoking behaviour, although, the income effect was not found to be as strong as the education effect on smoking. A materialist explanation can help to explain why an income effect was seen. There are two possible pathways through which material factors could potentially work. The first pathway suggests that the material circumstances of people's lives such as living and working conditions and material deprivation directly influences and shapes smoking behaviour, with people using smoking as a means of coping with stressful and disadvantaged circumstances. The second pathway is linked to the cost of smoking and suggests that because smoking is an expensive habit, poorer people might smoke less or there might be a lower proportion of poorer smokers relative to richer smokers due to the expense incurred from buying tobacco. This latter pathway may have become more important over time as the cost of tobacco significantly increased across the period of analysis (see Chapter 2 Section 2.4.1), therefore, smoking is likely to increase financial hardship for low-income families and may drive

households into poverty. However, it is widely acknowledged that those in the least affluent socio-economic groups smoke more than those in the most affluent socio-economic groups and that there are a higher proportion of poorer smokers compared to richer smokers. Therefore, it would appear that the cost pathway does not work in the way that has been suggested, as the cost of smoking for the poorest smokers does not appear to have a dramatic effect on smoking behaviour. (see Chapter 2, Section 2.4.1 for more discussion on this).

The study findings suggest that material influences on smoking were weaker than cultural influences on smoking and therefore the material explanation appears to have limited explanatory power for inequalities in smoking behaviour. There are a number of possible explanations for this. Whilst an income effect was found, it is possible that the stress pathway is more powerful than the cost pathway and therefore, may have attenuated the overall effect of income, thereby reducing its explanatory power. This could have potentially worked in two ways. The first is that the stress and cost pathways work in opposing directions, with the more powerful effects of the stress pathway reducing the effects of the cost pathway. The second is that it has been suggested that the stress and cost pathways work in a self-perpetuating cycle, with poorer smokers using smoking to deal with the stresses associated with material deprivation, but with the cost of smoking increasing material hardship, which in turn creates further stress for poorer smokers to deal with (Nyakutsikwa, et al., 2021). Therefore, as the stress pathway increases, it interacts in this self-perpetuating cycle, which in turn reduces its power. Further qualitative research could help to disentangle the importance of the effects of the stress and cost pathways and in which direction they work i.e. whether the two pathways oppose each other or whether they work in a self-perpetuating cycle.

The limited power of the material explanation might also be a reflection of the indicator that was used in the study to measure material influences. Household income was used to measure the influence of material circumstances on smoking behaviours as it is the socio-economic indicator that most directly measures material resources (Shaw, et al., 2007). Income is clearly linked to material circumstances as it provides the means by which people can pay for 'necessities' such as rent, mortgage, bills, food etc., however, income may not capture all of the components of people's material circumstances such as wealth or other sources of support that people might have access to. Therefore, whilst similar levels of household income tend to be attributed to similar levels of household material circumstances, it is possible that living conditions between these households may differ. Studies that have looked at the relationship between income and material well-being have shown that levels of income do not always correlate with people's living conditions (Perry, 2002; McKay & Collard, 2003). For example, households that report a low income, may still have a reasonable standard of living because they have accumulated wealth or assets over time. This is more likely to be the case for older people who tend to have lower

incomes due to retirement. However, this particular problem was not considered to have biased the findings in this study as adults aged 65 and over were excluded from the analysis. Income is widely used as a measure of material resources in many studies and has been shown to generally be a reliable indicator when capturing people's living conditions, including in studies that have investigated the effects of material circumstances on health-related behaviours (Graham, 1989; Droomers, et al., 1999; Beard, et al., 2019).

Linked to the idea that income may not pick up some of the effects of broader material circumstances on smoking behaviour, is that with the exception of the 1973 survey, respondents were asked about current income, how much they received and when they were last paid. This question only provides a snapshot of current income at one specific point in time and therefore income may only be capturing a household's material resources available at the time of interview. As well as having a cumulative effect over the lifecourse (Shaw, et al., 2007), income is also known to fluctuate over time, with increases and decreases more noticeable for those towards the lower end of the income distribution scale as a result of less stable employment (Lynch & Kaplan, 2000). Therefore, measurement of income at one point in time may not fully capture a more prolonged exposure to low income that might increase material disadvantage, which could in turn, influence smoking behaviour.

One other possible reason that income might have had less explanatory power in terms of smoking behaviour, is that education and income are linked. Education level influences a person's access to material resources, with a higher level of education likely to be linked to a higher position in the labour market and a higher level of income. Therefore, the effect of income on smoking may have been confounded by the education indicator. However, the independent effect of income on smoking behaviour was mutually adjusted for by including education and income (along with occupation) in the final regression models. Whilst income was found to have some effect on some elements of smoking behaviour, its influence was not generally found to be as strong as the influence of education on smoking.

7.2.2   Cultural explanation

As discussed in Chapter 2 Section 2.4.3, there are three possible theories associated with a cultural explanation for smoking behaviour: Social identity/social distinction; the diffusion of innovative behaviours and the effects of social norms and social networks.

The findings in Table 7.1 show that overall, education was generally found to be the strongest predictor for most of the smoking outcome measures, therefore these results would appear to support a cultural explanation for smoking behaviour, with the influence of cultural factors becoming increasingly more

important over time for certain elements of smoking behaviour. There are a number of different theories that might help to explain why education as a proxy indicator of culture appeared to have the most explanatory power in this project and why the education gap increased over time.

7.2.2.1 Social identity/social distinction

This theory relates to the idea that smoking or not smoking is linked to social identity with social groups using smoking or not smoking as a way of expressing and reinforcing 'social distinction', so that relationships of superiority and inferiority can be established or emphasized between different social groups. When looking at the findings for the smoking status behaviours (prevalence, cessation and never smoking), a very clear pattern was found with men and women in the lowest educational groups more likely to be smokers and less likely to quit or to be never smokers. This relationship is also apparent for the nicotine consumption behaviours, with those in the lowest educational groups more likely to have started smoking regularly before 16 years and to be heavy smokers. In terms of the smoking dependency behaviours, men and women in the lowest educational groups were more likely to have smoked their first cigarette within 15 minutes of waking and women were more likely to find it difficult to not smoke for one day. The patterns for the remaining smoking behaviours as measured by education were inconsistent.

According to Bourdieu (1984) lifestyle (or health-related behaviour) is a way for a person to express their social identity or status, with their choice of particular health-related behaviours indicating to others which social class they belong to. For example, those in the most advantaged socio-economic groups use not smoking as a legitimate indicator of their 'affluent' status so as to distinguish themselves from the poor (who are more likely to smoke) and which then establishes and reinforces their more 'superior' position in the social hierarchy. People's choice of lifestyle behaviour or 'tastes' vary between different socio-economic groups and are not just a result of conscious decisions but are linked to 'habitus', (practices, preferences and tastes), which is influenced and acquired through the social context in which people are embedded. Therefore, people living in similar social contexts tend to develop similar habitus' and share similar lifestyles, with lifestyles used to signify social position or class (Bourdieu, 1984). Different social groups have different amounts of 'cultural capital', which include symbolic elements such as particular tastes and preferences that they acquire by belonging to a certain social class. Cultural capital is the component that links choice of health-related behaviour to a person's social position (Abel, 2008).

Whilst habitus and cultural capital can be used to explain why those in the least disadvantaged socio-economic groups are less likely to smoke, it can also be used to explain why those in the most disadvantaged socio-economic groups are more likely to smoke. For example, smoking may be part of

the daily practice of those who are most disadvantaged but rather than being a conscious behaviour, smoking is influenced and guided by daily routines and social practices (Williams, 1995) and by what is considered to be appropriate behaviour for this group. Research by Katainen (2010) explored social class differences in accounts of smoking between middle-class and working-class smokers and suggested that smoking was a cultural practice, embedded in a working-class habitus and one that was rarely questioned within a working-class context. It is also possible that whilst less disadvantaged groups might regard not smoking as a means of distinguishing themselves from more disadvantaged groups, the latter groups might use smoking as a means of distinguishing themselves in some contexts to indicate "independence, toughness and freedom from convention" (Pampel, et al., 2010, p.7).

The concept of habitus might also be important where smoking behaviour has become taken for granted and routinized in the form of habits, which are passed on from generation to generation, possibly through education (Bartley, 2004). Therefore, children who grow up in a socially advantaged context where education is considered important, might work harder at school and as a result are more likely to stay in the same social position, where a healthy lifestyle might also be part of the 'habitus' of this social group (Lynch, et al., 1997). Therefore, the link between social position and not smoking is underpinned by a particular set of habits that are acquired over time. Similarly, children growing up in a socially disadvantaged household where family members smoke, are likely to be influenced by their habitus and are at a greater risk of becoming smokers themselves. This idea is supported by evidence of the influence of smoking by parents, siblings and other household members on children and that contact with other smokers within a household increases the likelihood of smoking uptake (Leonardi-Bee, et al., 2011). When thinking about the relationship between culture (as measured by education) and smoking behaviour, it is suggested that education is capturing something that income and occupation are not, which underpins a person's desire to smoke or not to smoke and which may be linked to a person's habitus.

The cultural influences on smoking prevalence in this study were found to strengthen over time with the gap between the lowest and highest educational groups increasing between 1973 and 2011. One possible explanation for this is that the introduction of policies designed to reduce smoking and to convey the social unacceptability of such a habit has resulted in an increasing stigmatization of smoking behaviour over time, which could lead to a greater proportion of people quitting. Policies designed to de-normalize smoking behaviour have certainly become more dominant in more recent times (DH 1998, 2004, 2010), therefore, if smoking behaviour is linked to social identity and social distinction, it is possible that the stigmatization of smoking behaviour may have had a greater effect on those in the highest educational groups, with a higher proportion of quitting amongst these groups compared to lower rates of quitting among the lowest educational groups.

Studies that have looked at differences in smoking cessation and SEP provide evidence to support the idea that smokers in the most disadvantaged socio-economic groups are less likely to successfully quit smoking when compared to smokers in the least disadvantaged socio-economic groups (Jefferis, et al., 2004; Davy, 2007; Kotz & West, 2009). However, it has also been suggested that the effects of the stigmatization of smoking are differentially experienced across different groups (Stuber, et al., 2008) and that those in more advantaged groups might feel a greater pressure to change their behaviour accordingly. For example, one qualitative study found that British smokers in a more advantaged SEP were more likely to change their behaviour as a result of the stigmatization of smoking compared to smokers in a less advantaged SEP (Farrimond & Joffe, 2006). One particular study found that whilst smokers in a more advantaged socio-economic group were conscious of the social pressures of not smoking, they had also noticed a decrease in smoking within their particular community and social group over time. However, smokers in a disadvantaged socio-economic did not feel the same social pressures of not smoking and had not noticed any decrease in smoking amongst their community or social group. They did however, report that most of the people they knew, smoked and that in addition their workplaces supported such a behaviour as they provided regular smoking breaks (Paul, et al., 2010). Therefore, it is suggested that the social context for more disadvantaged smokers appears to be more conducive to smoking behaviour compared to less disadvantaged smokers, which might help to explain differences in smoking behaviour.

The educational influences on heavy smoking and smoking within 15 minutes of waking were also found to have strengthened across the period of analysis which might be explained by a reduction in the proportion of smokers in the highest socio-economic groups who were smoking heavily, as they may have cut back on the amount they usually smoked due to the denormalization of smoking behaviour. If these smokers were reducing their nicotine intake, it is also possible that they may not have felt the 'need' to smoke so soon after waking. An alternative explanation for this finding is that there was an increase in the proportion of smokers in the lowest educational groups who were smoking more heavily which resulted in their nicotine intake increasing and a need to smoke sooner after waking.

It has been suggested that socio-economic differences in health-related behaviour may be important in explaining widening inequalities in health in developed countries such as England (Mackenbach, 2012), therefore, the finding that some of the smoking behaviours in this study strengthened over time appear to provide some support for this. Opportunities to distinguish between socio-economic groups using visible signs of material prosperity have reduced over time (Abel, 2008; Bourdieu, 1984), therefore, non-material factors such as cultural capital may have an increased importance for health with smoking or not smoking being used as a marker of social position. This might reflect a shift in the idea that social

identity has become tied to a person's position in the consumption process rather than their position in the production process (Hinote & Cockerham, 2015). If the findings in this study showed that differences as measured by occupation had weakened over time, whilst differences as measured by education had strengthened over time, this might lend further support to this idea. Although, occupational differences were found to weaken over time for a number of the smoking behaviours, this was not the case for all smoking behaviours, therefore this provides only limited support.

The educational influences on smoking cessation in this study were found to weaken to a small extent between 1973 and 2011, whilst the educational influences on never smoking were more mixed. There are a number of possible explanations for the slight weakening of cultural influences on smoking cessation. The first was highlighted in section 7.2 and suggested that the smaller change to the educational gap over time might be due to the composition of the highest and lowest educational groups (ex-smokers were compared to current smokers but never smokers were excluded). Consequently, there would be a higher proportion of adults educated to degree level or above in the sample but there would be fewer smokers within this group to quit. The second explanation is that, if non-material factors such as cultural capital have become increasingly important in explaining differences in health-related behaviours between different socio-economic groups (Abel, 2008), it might be expected that the relationship between education and smoking cessation would have strengthened over time. However, it is possible that cultural influences on smoking cessation weakened rather than strengthened because there was an increase in never smoking for the highest educational groups rather than an increase in smoking cessation. Whilst the findings from this project showed that the changes between the highest and lowest educational groups widened slightly for women in terms of never smoking, they were found to narrow slightly for men.

7.2.2.2 Diffusion of innovations

This theory is linked to the diffusion of innovations whereby those in more advantaged socio-economic groups are quicker to adopt new behaviours (e.g. health-promoting behaviour such as not smoking) before those in less advantaged socio-economic groups and with men adopting new behaviours before women within these different socio-economic groups (Rogers, 1995). Smoking has been described as diffusing through a population in stages with the most advantaged socio-economic groups taking up smoking but also quitting, before the least advantaged socio-economic groups and with men adopting these behaviours before women within these groups. This theory is linked to the theory of social distinction as it highlights the importance of symbolic boundaries, which are used to emphasize status-based differences between different socio-economic groups. This happens through the adoption and diffusion of innovative behaviours such as healthy lifestyles and not smoking and may be used by more advantaged socio-economic groups to distinguish themselves from less advantaged socio-economic

groups (Pampel, 2002; Cockerham, 2005). The diffusion of innovations theory can also help to explain why inequalities in smoking exist, as it has been suggested that due to the lag in the uptake and quitting of smoking by those in the most disadvantaged socio-economic groups, a widening of smoking inequalities is often found (Lopez, et al., 1994).

The educational influences on smoking prevalence appeared to strengthen over time and whereas inequalities did not appear to widen between 2002 and 2011 for men, they continued to widen across this period for women. Heavy smoking and first cigarette within 15 minutes of waking were also found to strengthen for men and women, across the period of analysis, although by 2011, inequalities in both of these elements of smoking behaviours were greater for women than for men. Therefore, it is possible that these findings might be a reflection of the differential patterns in smoking behaviours between men and women, with women tending to adopt 'new' behaviours later than men and being in a less advanced stage of the smoking epidemic.

The progression of the smoking epidemic is not the only factor that might help to explain inequalities in smoking. Mackenbach (2012) has suggested that tobacco control may also have played a part in the widening of smoking inequalities through the differential penetration of tobacco control and health promotion policies designed to change lifestyle health-related behaviour. These policies have been evident in the UK since the early 2000's and therefore it is possible that they have been more effective at influencing the health-related behaviours of those in the most advantaged socio-economic groups compared to those in the least advantaged groups (Graham, 2012). This may also have had the effect of creating further inequalities in smoking behaviour. Whilst it has been suggested that policies directed at behaviour change have been taken up more quickly by those in more advantaged groups (Bauld, et al., 2011), evidence for the differential effects of tobacco control policies on different socio-economic groups appears to be less clear (Mackenbach, 2019; Hill, et al., 2014; Hiscock, et al., 2012).

7.2.2.3 Social norms/social networks

This theory proposes that social norms and social networks influence smoking behaviour with individuals following or being influenced by the behaviour of those in their social networks. For example, smoking is more likely to be a behaviour that is considered to be normal or acceptable amongst more disadvantaged socio-economic groups as a higher proportion of people in this group are more likely to smoke. However, smoking is more likely to be de-normalized amongst less disadvantaged socio-economic groups, as a higher proportion of people in this group are more likely to be non-smokers. Higher rates of smoking amongst more disadvantaged groups could be due to the influence of other smokers at home, at work and within social networks, where smoking is considered the 'norm'. This is likely to encourage and sustain smoking behaviour and to make it more difficult for people to

quit. Evidence suggests that smoking behaviour tends to spread across social networks and that quitting occurs amongst groups of inter-connected individuals around similar times. As a result, smokers becoming an increasingly marginalized group (Christakis & Fowler, 2008). It has been found that smokers who inhabit social contexts where there are a higher proportion of other smokers, are less likely to succeed in their attempts to quit (Hitchman, et al., 2014).

In terms of smoking uptake, the findings from this study showed that men and women with no qualifications were more likely to have started to smoke regularly before age 16 compared to men and women educated to degree level or above. This might be explained in terms of social norms whereby children and adolescents in more disadvantaged socio-economic groups are more likely to live with smokers and in a household where smoking behaviour is considered to be the 'norm'. However, children in less disadvantaged socio-economic groups are less likely to live with smokers and are more likely to be embedded in a social milieu where smoking rates are lower and smoking behaviour is de-normalized. Smoking often starts during the early teenage years with factors such as exposure to parental and sibling smoking, smoking by friends and peer group members and easy access to cigarettes increasing the risk of smoking initiation (RCP, 2010). Research on smoking behaviour has shown that social norms are likely to influence smoking uptake amongst children and adolescents with those living with smokers or who have friends who smoke, more likely to become smokers themselves (East, et al., 2021; Alves, et al., 2016; Leonardi-Bee, et al., 2011; Pampel, 2010).

The differences between the highest and lowest educational groups for smoking uptake appeared to narrow over time for both men and women. This might be explained by an increasing (and greater) reduction in smoking uptake before 16 years amongst more advantaged socio-economic groups, due to the increasing unacceptability of smoking amongst these groups. This could result in a lower uptake in smoking behaviour by children and adolescents in these groups, although there was a lack of available evidence to support this.

The findings for desire to quit smoking did not appear to show any statistically significant differences between the lowest and highest educational groups for any of the survey years, for men or for women. This would suggest that the three theories for cultural influences are not working through people's desire to quit smoking. One of the difficulties with trying to measure the desire to quit is that the motivation to quit is not an easy concept to measure reliably, as it can change over time and in different situations. For example, the motivation to quit might be quite high in the doctor's surgery but considerably less when socializing with friends, particularly if they are smokers themselves (Jarvis & Wardle, 1999). It has also been suggested that smokers in disadvantaged socio-economic groups may be less concerned about the adverse effects of smoking due to having a time present orientation (living in

the moment rather than thinking about the future consequences of smoking). As a result, smokers in these groups are more likely to focus on the more immediate, shorter-term challenges, which are likely to obscure the long-term benefits of quitting, such as a healthier life and a higher level of disposable income (Peretti-Watel, et al., 2013; Marsh & McKay, 1994). It is also possible that responses to the desire to quit survey question in the GHS/GLF might have been influenced by social desirability, with smokers in more advantaged socio-economic groups expressing a desire to quit because they wanted to and smokers in less advantaged socio-economic groups expressing a desire to quit because they felt they ought to be quitting.

Overall, there appeared to be no substantial gender differences in relation to the influence of material or cultural factors on the different smoking behaviours, with cultural factors appearing to have the strongest influence on most of the smoking outcome measures for both men and women. There was some variation between men and women in terms of whether cultural influences strengthened or weakened over time, however, where more marked differences in relation to cultural or material influences or variations in trends were found, these have been highlighted in the discussion above.

7.2.3   Artefactual explanations

It is possible that relative changes to the composition of the different socio-economic groups may have influenced the findings in this project. For example, there have been a number of changes to education over time in England, including changes to school leaving age and educational qualifications as well as a significant expansion of and participation in further and higher education (see Chapter 4, Section 4.3.2 for more detail). This has resulted in a dramatic increase in the proportion of people achieving degrees (Connelly, et al., 2016) and would suggest that the cultural significance of having a degree in 2011, is less than the cultural significance of having a degree in the 1970s. If, as has been suggested in this thesis, that a cultural explanation for smoking behaviour is about social distinction, the significant increase in the relative size of the highest educational groups could have influenced the findings. If so, it would be expected that the gap between the highest and lowest educational groups would narrow over time. There is some evidence that educational influences weakened between 1973 and 2011, for smoking cessation and smoking uptake before age 16, for both men and women, therefore, it is possible that changes to the composition of the highest educational groups might have had some effect on the findings. However, educational influences were also found to strengthen between 1973 and 2011, for smoking prevalence, heavy smoking and first cigarette within 15 minutes of waking, for both men and women. Therefore, it is possible that the relative size of the group with no educational qualifications changed in a corresponding way between 1973 and 2011 and became quite a small and disadvantaged group, which might have influenced the findings.

It is also possible that the relative changes to the composition of the different occupational groups may have influenced the project findings. Over time, there has been an increase in service jobs and a decrease in unskilled and semi-skilled manual occupations, which has led to an increase in the relative size of the non-manual group and a decrease in the relative size of the manual group (Davy, 2007; Galobardes, et al., 2006). As a result, the manual group is likely to have become a smaller and more socially disadvantaged group across the period of analysis. If this was the case then it would be expected to see a widening of the gap between the lowest and highest educational groups between 1973 and 2011. Whilst there was some evidence of a widening gap for some of the smoking behaviours, there was also evidence of a narrowing gap for some of the behaviours. However, occupation tended to be the weakest predictor for most of the smoking outcome measures, therefore, any influence from the changing composition of the occupational groups were unlikely to have affected the main project findings.

Income data is sensitive information that people may be reluctant to provide, therefore it is subject to greater non-response than other socio-economic indicators. Research that specifically examines the socio-economic characteristics of respondents with missing income data appears to be limited, although there is some evidence to suggest that those in a lower SEP are less likely to complete income data (Kim, et al., 2007). If a significant proportion of income data was missing (>5%) for those in the poorest household income groups, these groups would be underrepresented and the strength of the relationship between household income and the smoking behaviours would be underestimated, which could bias the project findings. Whilst less than 5% of household income data was missing for 1973, more than 5% of income data was missing for the other survey years (see Appendix 4, Tables A4.1 and A4.2 for details). In particular, there was a noticeably greater proportion of missing data for 1984 (33%), which was likely to have been due to the introduction of a significantly more detailed income section in 1979. The missing income data for 1984 is likely to have resulted in some underestimation of the relationship between household income and the smoking outcome measures, although looking at the pattern for the income estimates between 1984 and the later survey years, there does not appear to be any significant deviation from the more general trends observed. Therefore, it is possible that the missing income data, is unlikely to influence the income estimates to such a degree that it would significantly influence the project findings.

Chapter 4, Section 4.2.1, highlighted the changes to the survey response rates between 1973 and 2011, noting that there had been a decrease in response rates from 2002. Whilst this is unlikely to affect the comparison of the different SEP indicators and smoking behaviour within a single survey year, it could affect the comparison of changes over time. This is because it is known that smokers, those who are very wealthy and those who are very poor are less likely to respond to surveys (Boniface, et al., 2017;

Galea & Tracy, 2007; Goyder et al., 2002). This could bias the estimates for the relationship between SEP and smoking downwards, with the gap between the lowest and highest groups narrowing in 2002 and 2011. However, the findings showed more generally a widening of the gap between the lowest and the highest educational groups despite the potential bias from the decrease in response rates in 2002 and 2011 and therefore, any bias is unlikely to have significantly affected the project findings.

In light of the most powerful explanations for smoking behaviour, the conceptual framework for the relationship between SEP and cigarette smoking in Chapter 2 Section 2.6 was revised and is illustrated in Figure 7.2 below.
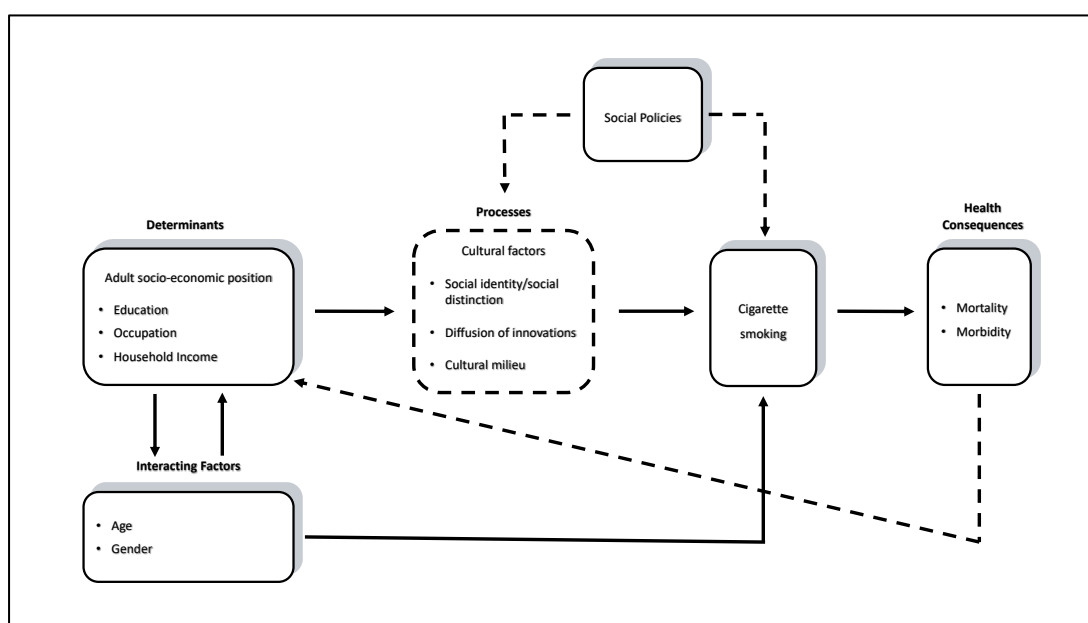
Figure 7.2: Revised conceptual framework for the relationship between socio-economic position and cigarette smoking.

7.3   How similar or distinctive are the relationships between SEP and alcohol consumption and SEP and cigarette smoking

The focus of the alcohol element of the project was to investigate the social patterning of harmful alcohol consumption rather than the health outcomes associated with alcohol-related harm. Two different measures of alcohol consumption were used to explore the relationship between SEP and drinking. These were weekly alcohol consumption, which was measured by estimated usual weekly consumption in units and heavy drinking, which was measured by the top 10% of men and the top 10% of women who had consumed the most units in a week. In terms of the findings for the relationship between SEP and weekly alcohol consumption, Table 7.2 (at the beginning of the chapter) shows that overall, income was the strongest predictor between 1978 and 2011, with men and women in the lowest income households consuming less alcohol per week compared to men and women in the

highest income households. The results for whether the income indicator strengthened or weakened between 1978 and 2011 for weekly alcohol consumption, showed that the gap between the lowest and highest income households appeared to narrow over time for men, but appeared to widen over time for women.

The income results for weekly alcohol consumption controlled for education and occupation, however, it was found that whilst men in the lowest income households consumed less alcohol per week than men in the highest income households, the social gradient was reversed for most survey years for the education and occupation indicators, with men with no qualifications or in manual occupations more likely to consume more alcohol per week than men educated to degree level or above or in non-manual occupations.

In terms of the results for the relationship between SEP and heavy drinking, Table 7.2 shows that education was the strongest predictor for men between 1978 and 2011, with those with no qualifications more likely to be heavy drinkers compared to those educated to degree level or above. However, for women, income was found to be the strongest predictor of heavy drinking between 1978 and 2011, with those in the lowest income households less likely to be heavy drinkers compared to those in the highest income households. The gap between the lowest and highest education and income groups for men and women respectively, appeared to narrow between 1978 and 2011.

Similar to the findings for weekly alcohol consumption, although men in the lowest educational (and occupational) groups were more likely to be heavy drinkers compared to men in the highest educational (and occupational) groups, the social gradient was reversed for all survey years as measured by income (controlling for education and occupation), with men in the lowest income households less likely to be heavy drinkers than men in the highest income households, although statistically significant differences between these groups were only found in 1978 and 1984. This pattern was not generally found for women. Although women in the lowest income households were less likely to be heavy drinkers than women in the highest income households, the social gradient as measured by education and occupation was quite mixed, with many of the results not showing any statistically significant differences between these groups.

As for the smoking analysis, occupational social class was used in the analysis of drinking inequalities in case it might capture something over and above education or income in terms of social class and social status or occupational cultures. However, similar to the smoking findings, the alcohol results suggested that occupation was generally found to be the weakest predictor for both of the drinking outcome measures. Occupation is closely related to income and education therefore it is possible that the

influence of occupation on drinking behaviour was reduced after controlling for the effects of education and income or that the occupational social class indicator (SEG) did not pick up any elements of social class and social status or occupational cultures over and above the income and education indicators.

To briefly summarise the main findings for drinking behaviour, between 1978 and 2011, income appeared to be the strongest predictor of weekly alcohol consumption for men and women and for heavy drinking for women, whilst education appeared to be the strongest predictor of heavy drinking for men. Across the period of analysis, income differences between the highest and lowest groups in terms of weekly alcohol consumption, were found to decrease over time for men and to increase over time for women, whilst for heavy drinking, educational differences and income differences were found to decrease over time for men and women respectively.

When comparing the overall findings from the analysis of drinking behaviour to the overall findings from the analysis of smoking behaviour, education appeared to be the strongest predictor for the majority of the smoking outcome measures, whilst income appeared to be the strongest predictor for the majority of the drinking outcome measures. Therefore, it was concluded that the relationship between SEP and cigarette smoking was distinctive from the relationship between SEP and alcohol consumption. There are several possible different explanations for inequalities in drinking behaviour. The two main explanations are the material and cultural explanations and were discussed in Chapter 3 (Section 3.4), although it is also possible that artefacts might help to explain drinking inequalities. The remainder of Section 7.3 discusses the project findings in light of these different explanations.

7.3.1   Materialist explanation

Income was generally found to be the strongest predictor for most of the drinking outcome measures which would suggest that material influences were the dominant explanatory factor for drinking behaviours. As discussed in Chapter 3 Section 3.4.1, it was suggested that there are two possible pathways through which material factors could potentially influence drinking behaviour. These are the coping with stress pathway and the cost pathway. The findings are discussed in relation to the different pathways below. However, although these pathways are the same as the material pathways for smoking (see Section 7.2.1), there are some differences in terms of how they are likely to influence smoking and drinking outcome measures. These will be discussed in more detail below.

The coping with stress pathway suggests that the material circumstances of people's lives such as their living and working conditions directly influences and shapes drinking behaviour, with people using alcohol as a means of coping with stressful and disadvantaged circumstances. This pathway is most likely to affect those in the poorest socio-economic groups, however, for an income effect to be seen

which would support a material deprivation pathway, it would be expected that those in the lowest income households would consume more alcohol than those in the highest income households due to experiencing greater levels of material deprivation. However, the results from this project showed that men and women in the lowest income households consumed less alcohol per week than men and women in the highest income households and that women in the lowest income households were less likely to drink heavily than women in the highest income households. The findings for patterns of weekly drinking would appear to be supported by the literature which shows that those in the lowest socio-economic groups consume less alcohol per week and are less likely to exceed daily recommended levels than those in the highest socio-economic groups (NHS Digital, 2012c). It was also found that men and women in the lowest income households were less likely to be heavy drinkers compared to men and women in the highest income households, although for men, statistically significant differences between the lowest and highest groups were only found in 1978 and 1984. The project findings do not appear to be entirely supported by the literature which suggests that binge and heavy drinking practices tend to be associated with deprivation (Beard, et al., 2019; Giskes, et al., 2011; Bellis et al, 2016). However, some studies have found that the relationship between SEP and binge or heavy drinking for women appears to be more mixed (Wood & Bellis, 2017; Probst, et al., 2014; Jefferis, et al., 2007). Research on the relationship between deprivation and increased alcohol consumption has also suggested the evidence is more mixed with some studies finding that this relationship is more evident for men than for women (Baumann, et al., 2007; Droomers, et al., 1999).

It is possible that the results for heavy drinking might have been influenced by the way in which heavy drinking was defined in the project. Heavy drinkers were defined as the top 10% of women (and the top 10% of men) who consumed the most units on average during the week, for each survey year. Alternatively, the heavy drinking variable could have been derived using the government's definition for harmful drinking (>35 units and >50 units a week for women and men respectively) however, the cell counts were found to be too low for heavy drinking to be defined in this way and therefore the findings would not have been meaningful (see Chapter Section 4.4.2.2 for a discussion on this). Whilst the heavy drinking unit thresholds for women met or exceeded the government recommended maximum weekly amount of 14 units (unit thresholds ranged from 14 to 22 units across the period of analysis), it is possible that these unit thresholds may not have fully captured female heavy drinking and that the relationship between SEP and heavy drinking was underestimated.

It is also possible that there was only a small proportion of women in the most disadvantaged socio-economic groups who reported heavy drinking as heavy drinkers tend to be more difficult to contact or less willing to be interviewed (Boniface, et al., 2017). Therefore, these groups may be under-represented in the data. However, the low cell counts for heavy drinking for women might also be due

to heavy drinking being a more concealed behaviour, with alcohol consumption under-reported due to social desirability bias (ONS, 2013). Social desirability bias can be linked to cultural influences on drinking behaviour and is discussed in this context in Section 7.3.2.

The finding that women in the lowest income households were less likely to be heavy drinkers despite being more likely to experience greater levels of material deprivation, might also be influenced by household income being used as an indicator of material circumstances as it may not have captured the broader effects of material deprivation (see Section 7.2.1 for a discussion on this).

When considering how similar or distinct the relationship between SEP and smoking and drinking behaviours were in relation to the influence of material deprivation, it is suggested that this pathway should work in the same direction for both behaviours with those who experience the greatest levels of disadvantage, more likely to use smoking and drinking as a way of coping with material circumstances. Although the smoking findings from this study showed a stronger relationship with education, there was evidence to suggest that men and women in the lowest income households were more likely to smoke in response to difficult material circumstances (see section 7.2.1) compared to men and women in the highest income households. However, alcohol consumption showed the opposite pattern with men and women in the lowest income groups consuming less alcohol or less likely to be heavy drinkers than those in the highest income households. Therefore, this would suggest that the cost pathway for a materialist explanation had a more powerful influence on the drinking outcome measures than it did on the smoking outcome measures.

The cost pathway is related to the cost of alcohol and suggests that poorer people are less likely to drink or to drink less compared to richer people due to the expense incurred from drinking. Alcohol has become more affordable since the early 1980s (see Chapter 3 Section 3.4.1 for a discussion on this), therefore the cost pathway may have become more important for poorer socio-economic groups, with alcohol consumption increasing amongst these groups over time. Therefore, it is possible that the gap between the least and the most affluent socio-economic groups might have narrowed over time in terms of drinking. Studies show that those in the most affluent socio-economic groups are more likely to drink alcohol and to exceed daily and weekly recommended levels compared to those in the least affluent socio-economic groups (Giskes et al., 2011; NHS Digital 2008, 2012b) therefore, this would suggest that cost has a noticeable effect on drinking behaviour in terms of material influences.

For an income effect to be seen which would support the cost pathway for a materialist explanation, it would be expected that those in the highest income households would consume more alcohol per week and be more likely to drink heavily compared to those in the lowest income households. The findings

from this study would appear to provide support for this explanation as men and women in the highest income households were more likely to consume higher levels of alcohol than men and women in the lowest income households. It was also found that women in the highest income households were more likely to be heavier drinkers than women in the lowest income households. Although education was the stronger predictor for male heavy drinking, the results suggested that men in the highest income households were more likely to be heavy drinkers than men in the lowest income households, although statistically significant differences between the lowest and highest groups were only found in 1978 and 1984.

Between 1978 and 2011, the influence of household income on average weekly consumption was found to decrease for men but to increase for women, whilst the influence of household income on heavy drinking was found to decrease for women. Evidence shows that the affordability of alcohol is strongly related to patterns of consumption although the extent to which affordability influences consumption is dependent on people's levels of income (PHE, 2016). Therefore, it is possible that the decrease in the influence of income between 1978 and 2011, for weekly consumption for men and for heavy drinking for women was a reflection of the increase in the affordability of alcohol, which contributed to an increase in consumption amongst men and women in the lowest income households for these drinking behaviours.

Studies have shown that the increase in the consumption of alcohol since the 1980s, was predominantly driven by an increase in the consumption by women (Sheron & Gilmore, 2016; Meng, et al., 2014). However, this does not explain why the influence of household income was found to increase for women in terms of average weekly consumption across the period of analysis. This finding suggests that the gap between the lowest and highest income households widened and therefore it is possible that as alcohol increased in affordability, women in the highest income households who had more disposable income to spend on alcohol, increased their average weekly consumption to a greater extent than women in the lowest income households. This finding might also be linked to cultural influences as women might have been consuming more alcohol, not just because they could afford to but because they felt they could due to becoming more liberated and socially empowered over time (Plant & Plant, 2006). However, it is also possible that the increase of the income effect on weekly drinking for women was due to a decrease in consumption by women in the lowest income households. One possible explanation for this is that smoking became less affordable across the period of analysis and as women in the lowest income groups were more likely to be smokers, it might have been easier for these women to cut back on drinking rather than on smoking, because smoking is addictive.

When considering how similar or distinct the relationship between SEP and smoking and drinking behaviours were in relation to the influence of cost, this pathway should work in the same direction for both behaviours, with poorer people either not smoking or drinking, or smoking or drinking less as they are less likely to be able to afford to smoke and drink. However, the findings from this study showed that men and women in the lowest income households were more likely to smoke even though they were less likely to be able to afford the habit but they consumed less alcohol and were less likely to be heavy drinkers compared to those in the highest income households. Therefore, in terms of the influence of the cost pathway, the project findings suggested that this worked in the opposite direction for smoking when compared to drinking. This presents somewhat of a paradox, as between 1978 and 2011, the affordability of smoking decreased while the affordability of drinking increased. Further research could help to unpack why the cost pathway appears to work differently for smoking when compared to drinking.

7.3.2   Cultural explanation

The findings in table 7.2 show that with the exception of heavy drinking for men, education was not found to be the strongest predictor of the different drinking outcome measures and that education appeared to play a smaller role in influencing drinking behaviour compared to the influence of income. Therefore, these results suggest that cultural influences do not appear to be as important as material influences on drinking behaviour. However, education was found to be the strongest predictor of heavy drinking for men suggesting that cultural influences had the most explanatory power for this behaviour. However, the findings for men showed a reversed social gradient for heavy drinking as measured by education compared to the gradients found for weekly and heavy drinking as measured by income. This is discussed along with the possible cultural theories that might help to explain why education appeared to have the most explanatory power for heavy drinking for men.

7.3.2.1 Social identity/social distinction

Similar to the social identity/social distinction theory for smoking behaviour described in Section 7.2.2.1, this theory proposes that styles of drinking are linked to social identity and are guided by particular 'tastes' or preferences shared by different social groups. Particular groups may also use this behaviour to express and reinforce 'social distinction' from other socio-economic groups to establish relationships of superiority and inferiority (Bourdieu, 1984). When looking at the project findings for heavy drinking for men, a very clear pattern was found which suggested that men with no educational qualifications were more likely to be heavy drinkers than men educated to degree level or above. If Bourdieu's (1984) theory of social identity/social distinction is applied to heavy drinking, it is suggested that although people in the most advantaged and the least advantaged socio-economic groups consume alcohol, it is

likely to be consumed in different ways, so as to signify social class. For example, those in the most advantaged socio-economic groups are less likely to drink heavily but to consume alcohol more moderately (albeit more frequently) and to consume certain beverage types (e.g. wine), in order to signify their higher social position and to 'distinguish' themselves from more disadvantaged socio-economic groups, who are more likely to drink more heavily albeit less frequently.

The choice of lifestyle behaviours or 'tastes' differs between socio-economic groups and is linked to habitus and influenced through the social context in which people are embedded. Therefore, heavy drinking for men with no educational qualifications may be explained by cultural influences where this behaviour may be more normalized amongst more disadvantaged socio-economic groups. However, there is some evidence to suggest that those in less disadvantaged socio-economic groups see their drinking practices as being linked to their social position and therefore even when they are engaged in heavier drinking, it is likely to be more controlled and not like the "vulgar excesses of the problem drinker" (Brierley-Jones *et al.*, 2014, p.1061). Whilst qualitative research that explains how socio-economically disadvantaged groups use alcohol to embody social class appears to be scarce, quantitative research supports the project findings that men in the most disadvantaged groups are more likely to drink more heavily than men in the least disadvantaged groups (Beard *et al.,* 2019*;* Bellis *et al.,* 2016; Giskes *et al.,* 2011; Van Oers *et al.*, 1999). Qualitative research that explores why more disadvantaged socio-economic groups adopt heavier drinking practices and why less disadvantaged groups appear to control heavy drinking and how these practices might link to social class could help to shed light on the cultural influences on heavy drinking behaviour.

The influence of education on heavy drinking for men was found to have weakened between 1978 and 2011, which might be a reflection of the changes to educational qualifications across the period of analysis which has seen a greater proportion of people educated to degree level or above (Connelly, et al., 2016). As the composition of the highest educational groups has increased in size relative to the composition of the lowest educational groups over time, this has resulted in a narrowing of the gap between the lowest and highest educational groups. The impact of changes to the composition of the educational groups on the project findings is discussed in more detail in relation to the smoking findings in Section 7.2.3.

7.3.2.2 Diffusion of innovative behaviours

This theory is linked to the diffusion of innovations which proposes that those in more advantaged socio-economic groups are quicker to adopt new innovations before those in less advantaged socio-economic groups (Rogers, 1995). However, unlike the diffusion of innovations theory for smoking behaviour, this theory is not about the diffusion of drinking behaviour through a population but is about

the diffusion of innovative behaviour in terms of taking up health messages via health-promotion policies (Mackenbach, 2012). These types of policies have been implicit in UK government policy since the early 2000's (DH 2010, 2004) and it has been suggested that those in more advantaged groups tend to adopt policies directed at behaviour change (such as moderate alcohol consumption) more quickly than those in more disadvantaged groups (Bauld, et al., 2011). This theory is also linked to the theory of social identity/social distinction as it emphasizes the importance of using symbolic boundaries to show differences in terms of status or social class by adopting healthier lifestyle behaviours by more advantaged socio-economic groups, as a form of social distinction (Cockerham, 2005; Pampel, 2002).

In order for this theory to be supported, it would be expected that the educational indicator for heavy drinking would strengthen between 1978 and 2011. However, the findings for heavy drinking for men showed that the strength of the educational indicator weakened between 1978 and 2011 and therefore these findings do not appear to provide evidence to support the differential uptake of health-promotion policies between the lowest and highest educational groups. Further research could help to explain whether those in more socially advantaged groups are more likely to take up health messages in health-promotion policies more quickly than those in less socially advantaged groups.

7.3.2.3 Social norms/social networks

This theory suggests that social norms influence drinking practices with individuals following or being influenced by the behaviour of those in their social networks, therefore, it is possible that the finding in this project that men with no qualifications were more likely to be heavy drinkers compared to those educated to degree level or above, could be because heavy drinking is a behaviour that is considered normal or acceptable amongst individuals in the most disadvantaged groups. Studies that have explored the influence of social norms on alcohol consumption have suggested that social norms influence individual's drinking practices, including the amount consumed, with some of the strongest influences on drinking behaviour amongst adolescents and young adults coming from the influence of friends and peers (Abbey, et al., 1993; Sudhinaraset, et al., 2016). It has also been suggested that binge or heavy drinking is spread through social networks of close friends (Fone, et al., 2013; Boardman, et al., 2001) which can further normalize these behaviours amongst disadvantaged socio-economic groups.

With the exception of heavy drinking for men, the findings in this project suggested that cultural influences appeared to have less explanatory power for drinking behaviours and in particular for women. Self-reporting of health-related behaviour has the potential for reporting bias with the possibility that alcohol might be under-reported due to social-desirability bias (the desire to present oneself in a favourable light). It is also possible that heavy drinking might be subject to greater under-reporting which might help to explain why the cell counts for heavy drinking for women in this project

were low. One particular study on a sample of English drinkers found that although heavy drinking for men and women and weekly alcohol consumption for women were associated with greater underreporting, the differences were only found to be modest and any differences in reporting between socio-economic groups were unlikely to be a significant source of bias (Boniface, et al., 2013). Similarly, whilst some research has found that the reporting of alcohol consumption is subject to underestimation due to poor recollection of drinking occasions or by underestimating the size of drinks and the number of drinks consumed (Boniface, et al., 2013; Bellis et al., 2016; Bellis, et al., 2009; Gmel & Rehm, 2004), it is unlikely to bias reporting to a significant extent. Therefore, if social desirability bias is unable to explain why cultural influences appeared to have less explanatory power for drinking behaviours in this project, it is possible that income is capturing an aspect of culture that education is not picking up or that income is a better reflection of drinking culture than education.

It would appear that there is some uncertainty in terms of explaining how alcohol might contribute to greater harm to health for those in the most disadvantaged socio-economic groups, both from the literature reviewed in Chapter 3 and from the findings in this project. However, it has been suggested that disadvantaged groups are more exposed to other health challenges such as the clustering and/or co-occurrence of other health-related behaviours such as smoking (poor diet and little physical activity) and therefore individuals in these groups are more likely to experience a multiplicative effect on their health (Bellis, et al., 2016). It has also been suggested that men and women from disadvantaged socio-economic groups who drink similar quantities of alcohol to men and women who are less disadvantaged, may have important differences in their drinking histories which may already have had a significant effect on their health (Bellis, et al., 2016). Those in less disadvantaged socio-economic groups are more likely to have healthier lifestyles such as not smoking, a healthier diet and greater levels of physical activity, which are able to provide a more protective effect on their health, which might offset higher levels of drinking.

When considering how similar or distinct the relationship between SEP and smoking and drinking behaviours were in relation to cultural influences, men in the lowest educational groups were more likely to smoke and to smoke more than men in the highest educational groups whilst men in the lowest educational groups were also more likely to be heavy drinkers than men in the highest educational groups. This would suggest that the relationship between SEP and these particular smoking and drinking behaviours were similar. However, the educational effect on heavy drinking was found to weaken for men between 1978 and 2011, whilst the educational effect on smoking prevalence and heavy smoking was found to strengthen for men between 1973 and 2011.

Whilst there appeared to be no substantial gender differences in relation to the influence of material and cultural factors on weekly alcohol consumption, there was a difference in relation to the influence of these factors on heavy drinking. Cultural factors appeared to have the strongest influence on heavy drinking for men whereas material factors appeared to have the strongest influence on heavy drinking for women. There was some variation between men and women in terms of whether material and cultural and material influences strengthened or weakened over time for the relevant behaviours, however, where there were more marked differences in relation to these trends, they have been highlighted in the discussion above.

7.3.3   Artefactual explanations

There were a number of methodological changes to how alcohol was measured and recorded (see Chapter 3, Section 4.4.2 for more detail) between 2006 and 2008 in the original survey data. This was to take into account changes to the strengths of drinks and differing glass sizes over time, therefore it is possible that the alcohol consumption data prior to 2006 may have been underestimated, which might have biased the project findings. It is also possible that due to these changes (most notably wine) the findings might have more effectively captured the drinking practices of those on higher incomes and in higher socio-economic groups. However, as the findings for this study looked at the changes in alcohol consumption over a significant period of time, it is possible that the impact of these changes may have been reduced.

It is also possible that unit thresholds may not have been able to fully capture heavy drinking, although this was likely to have affected women more than men. The unit thresholds for heavy drinking were discussed in section 7.3.1 in relation to the project findings, however, it is possible that the thresholds set for this variable might have underestimated the relationship between SEP and heavy drinking.

The impact of missing income data might also have biased the project findings, particularly as material influences appeared to have more explanatory power for drinking behaviours compared to cultural influences. The potential effect of the missing income data for the project findings is discussed in Section 7.2.3, in relation to the smoking findings for the project.

In light of the most powerful explanations for drinking behaviour, the conceptual framework for the relationship between SEP and alcohol consumption in Chapter 3 Section 3.6 was revised and is illustrated in Figure 7.3 below. Whilst material influences were generally found to be more important in explaining differences in drinking behaviours, cultural influences were found to be more important in explaining heavy drinking for men. Therefore, cultural influences have been included in the revised

conceptual framework to reflect this, although they are considered to have a weaker link to drinking behaviours than material influences.
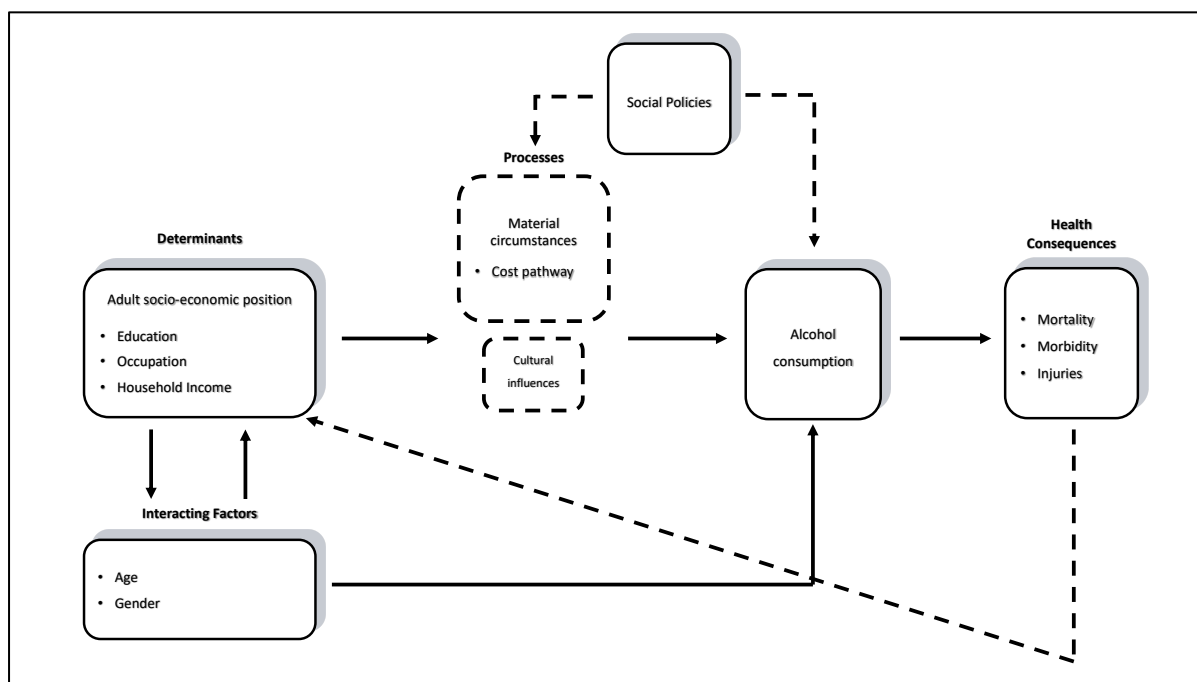
Figure 7.3: Revised conceptual framework for the relationship between socio-economic position and alcohol consumption.

7.4   Strengths and limitations of research project

There were two main strengths to this project. The first is that it investigated the separate effects of different socio-economic indicators on different elements of smoking and drinking to gain a better understanding of the potentially different underlying mechanisms that might influence socio-economic inequalities in smoking and drinking behaviour.

The second strength of this project is that to the best of my knowledge, this is the first British study to conduct this type of comparison over such a long historical period of 38 years. During this time there has been a dramatic decline in smoking prevalence and a more recent decline in alcohol consumption as well as a widening of inequalities in smoking and drinking behaviour. The time element is important in understanding how the different mechanisms that underpin smoking and drinking behaviour might have changed between 1973 and 2011. This period has also seen some significant changes to smoking policies and health policies in England, including the introduction of tougher tobacco control measures and an increasing emphasis on policies designed to help individuals take responsibility for their health-related behaviour (DH, 2004; 2010).

There were a number of limitations to this project which are discussed in the remainder of this section.

One of the limitations of the dataset used in this project was that the variety of changes made to the survey income questions made it difficult to ensure that the income data was comparable across the period of analysis (these changes are described in more detail in section 4.3.1). Whilst it was considered that these changes were likely to have only had a limited effect on the research findings, it is possible that the influence of material factors could have been underestimated in this study. It is also possible that this underestimation could have been further exacerbated by the proportion of missing income data, particularly if smokers living in low income households were underrepresented in the project samples. The use of additional measures of material well-being such as housing tenure, overcrowding and car availability, in addition to household income, might have provided further evidence of the influence of material resources on shaping smoking and drinking behaviour.

A second limitation of the dataset was that a number of changes were made within the alcohol industry, during the period of analysis which influenced how estimates of alcohol consumption were calculated. These included the introduction of new types of alcoholic drinks; changes to the volumes in which alcoholic drinks were sold and an increase in alcoholic strength for drinks such as beer and wine. These changes made it difficult to ensure comparability of the alcohol consumption variables over time and therefore, it is possible that the relationship between SEP indicators and alcohol consumption were underestimated, particularly prior to 2006 when methodological changes were introduced to take account of this. This underestimation might have been more salient for the consumption of wine, which saw the greatest change in unit conversion and in particular for women as they tend to consume more wine than men (Goddard, 2007).

Education was used as a proxy indicator for culture, however this measure may not have captured the influence of cultural factors as well as other more specific variables related to culture. For example, measures such as people's choices of books, music, sports (watched or participated in), clothing, food or cultural pursuits (e.g. cinema, theatre, classical concerts etc) could have provided indicators to measure the cultural influence on smoking and drinking behaviour, had they been available to use. It is also possible that other measures including locus of control, parochialism and orientation towards the future could be used to measure the influence of cultural factors on smoking and drinking as these indicators have been found to represent other dimensions of culture (Stronks et al., 1997).

The research project analysed selected years from the GHS/GLF surveys between 1973 and 2011, as opposed to analysing all survey years across this period, therefore, it is not possible to say with complete certainty that all of the patterns observed in this study showed a true widening or narrowing of the relationship between SEP and smoking and drinking behaviour. However, the findings in this

project appear to show similar patterns in terms of the relationship between SEP and smoking and drinking behaviour to those reported in other UK studies (e.g. NHS Digital, 2010; 2018).

The most recent data used in this study was from 2011, after which the GHS/GLF survey series was discontinued. However, the period from 2010 has been characterised by a decade of austerity with significant cuts to public expenditure in the areas of public health, welfare, working conditions and education (Marmot et al., 2020a). These cuts have been accompanied by a stalling in life expectancy and a widening of inequalities in health (Raleigh, 2020; Marmot et al., 2020a; Marshall et al., 2019), therefore it could be expected that inequalities in health-related behaviours such as smoking and alcohol consumption are likely to also have widened further between 2011 and 2020. This raises the question of how relevant the project findings are for current policy development? Despite the 'time lag' in terms of the latest dataset used, the implications for policy from the project findings are still considered to be relevant for more recent years as marked socio-economic inequalities in both smoking and drinking behaviours still exist in the UK today. However, the project has highlighted that cultural factors appear to be one of the more powerful explanations for inequalities in health-related behaviours and that social distinction theory in relation to this should be explored further.

Whilst the focus of the research project was to explore the explanatory power of cultural and material influences on smoking and drinking behaviour, it is acknowledged that education is a strong determinant of employment opportunities and income (Shaw et al., 2007) and therefore, this made it difficult to completely isolate the precise effects of cultural and material factors on smoking and drinking behaviour. However, by including income and education in the same regression model, it was possible to see the independent effects of these SEP indicators on the smoking and drinking outcome measures.

This research project looked specifically at the cultural and material explanations for social inequalities in smoking and drinking behaviour and the extent to which they might have contributed to health inequalities. Whilst the widening of smoking inequalities provides some explanatory power for the contribution of health-related behaviour to health inequalities, it is possible that other explanations may also contribute to the increase in inequalities in health. For example, evidence exists to support a psychosocial explanation for health-related behaviour which suggests that people use health-related behaviour such as smoking to cope with having less income and lower status (Marsh and MacKay, 1994; Stronks et al., 1997; Marmot, 2004; Wilkinson and Pickett, 2009). Whilst this explanation was not included in this study due to a lack of suitable variables in the datasets, it is possible that the indirect effects of relative material deprivation were also working to influence smoking and drinking behaviour.

This might be important as income inequalities have widened across the period of analysis (Mackenbach, 2019).

The findings from the study suggested that cultural factors appeared to have the strongest influence on smoking behaviours, however, it is possible that by using educational level to measure the cultural influences on smoking and drinking behaviours, that the effects of education and the cultural significance of having a degree could have weakened over time. This is because the greater take up of higher education during the latter part of the 20th century has increased the size of the highest educational groups relative to the size of the lowest educational groups. As a result of these changes, education will not have the same social/cultural meaning for younger cohorts now as it did for older cohorts. Although there was some evidence of a weakening of educational influences for smoking cessation and uptake, educational influences were found to have strengthened for smoking prevalence, heavy smoking and time to first cigarette, which might suggest that the effects of the changes to educational level may have been limited.

Self-reported measures of smoking and drinking behaviours were used in the study analyses, however, it is likely that the smoking and drinking data in the GHS/GLF datasets is underestimated. One of the main reasons for this underestimation is social desirability bias, as respondents may wish to avoid being perceived in a negative light when asked about their smoking and/or drinking behaviour. In the case of smoking, it is possible that social desirability has increased over time as smoking has become less socially acceptable and more stigmatized during the last 2-3 decades, possibly due to the contribution that tobacco control and health policies have made to the de-normalisation of smoking behaviour. If social desirability bias is greater in a given year, for example, amongst smokers who are educated to degree level compared to smokers who have no qualifications, then the gap between these two groups will appear to be bigger than it actually is. It is also possible that if levels of social desirability bias change over time, then this will affect the estimation of the trend in the size of the gap between the highest and lowest educated smokers. Similarly, alcohol consumption data and in particular, heavy drinking estimates may also have been influenced by social desirability bias as described above. Therefore, it is acknowledged that differential levels of social desirability bias and any changes in this over time might have affected the study findings although this was not something that could be explored with this data.

There are many potential indirect effects between the different variables that were used in this research project and which might have indirectly influenced the study findings. For example, the pathway between SEP and material factors and smoking and drinking behaviour may be indirectly influenced by stress, with smoking or drinking (particularly heavy drinking) being used as a means of coping with the direct effects of material disadvantage. However, it was not possible to include factors that could

measure stress in the regression models to test mediation due to a lack of suitable variables available in the datasets.

7.5   Ideas for further research

The findings from this study suggested that the relationship between SEP and smoking behaviour, was strongest as measured by education which suggested that non-material influences such as cultural influences might be an important explanatory factor in smoking behaviour. The findings also appeared to show a strengthening and weakening of smoking inequalities suggesting that the consumption thesis may have some explanatory power in the contribution of health-related behaviours to inequalities in health. If, as was argued in Chapter 4, that education level can be used as a proxy indicator of cultural position, the relationship between SEP and smoking behaviour should be explored in more detail using qualitative interviews to examine smoking behaviour in the context of people's daily lives. This research should try to unpick the different theories for cultural influences on smoking as well as the power of material circumstances so as to explain why cultural factors appear to have a greater importance than material factors on smoking behaviour. Qualitative research could also help to disentangle the importance of the effects of the stress and cost pathways and whether they work in opposing directions or whether they work in a self-perpetuating cycle. This type of research might help to explain why the cost pathways worked in a different direction for smoking than for drinking. The research should use in-depth interviews and/or ethnographic methods to explore the social contexts in which smoking takes place so as to reveal the meaning behind people's actions. Adults from disadvantaged and affluent SEP's should be interviewed to explore differences between these groups and other important interacting factors such as age and gender should also be examined. It is also suggested that never and ex-smokers should be included in the qualitative research to help better understand the cultural and material influences that motivate people to not take-up smoking but also what motivates smokers to quit, particularly as it appears that evidence on the effectiveness of tobacco control interventions between different socio-economic groups appears to be limited.

Qualitative research could also help to explain why those in more disadvantaged socio-economic groups are more likely to adopt heavier drinking practices and why those in less disadvantaged groups appear to control their heavier drinking practices, as literature in this area appears to be very limited. This can help to shed light on the cultural influences of heavy drinking behaviour and how these elements of drinking might link to social class. In addition, research that explores the relationship between alcohol consumption, ill health and life expectancy might help to explain the puzzle whereby those in the most deprived socio-economic groups suffer significantly greater alcohol-related mortality and morbidity, despite reporting similar or lower levels of alcohol consumption than those in more affluent socio-economic groups (Bellis, et al., 2016). This is important as levels of drinking are still high amongst the

most affluent socio-economic groups, although they appear to experience less health problems than those in the poorest socio-economic groups.

Since 2010, austerity policies involving deep spending cuts to a variety of areas including welfare, education, working conditions and public health are argued to have contributed to a slow-down in health improvements and a widening of health inequalities and have most notably had far-reaching impacts on the poorest people in the UK (Marmot, et al., 2020a). These inequalities have been emphasized and exacerbated by the recent COVID-19 pandemic (Marmot, et al., 2020b), with smoking (and alcohol)-related disease largely overlooked (RCP, 2021) and a stalling of progress in meeting targets to reduce smoking (Sloggett, 2021). Therefore, further research should also look at the effects of austerity policies and the recent pandemic on health-related behaviour and its contribution to widening inequalities in health. It is possible that due to the significant decline in smoking during the last 50 years smoking may not be the best behaviour for exploring health-related behaviour as in the current climate it might not be contributing to health inequalities to the same extent as other health-related behaviours. Therefore, food consumption might be a better indicator for looking at the contribution of health-related behaviour to health inequalities in current times.

7.6   Policy recommendations

The findings from this research project suggested that cultural factors appeared to have the strongest influence on smoking behaviour while material factors appeared to have the strongest influence on drinking behaviour. Whilst the findings were more mixed in terms of whether the strongest socio-economic indicators strengthened or weakened over time, there was some support for the explanatory power of the consumption thesis as inequalities for some elements of smoking behaviour were found to have widened across the period of analysis. If, as was suggested by the study findings, that social distinction theory might be an important explanation for inequalities in smoking behaviour, this has implications for the types of policies that could be used to address inequalities in health and health-related behaviours.

Since the late 1990s, tobacco control policies and health policies in England have been designed to reduce smoking prevalence by adopting primarily a behavioural approach and placing an emphasis on adopting healthier lifestyles through informed choice, whilst signalling the social unacceptability of smoking behaviour. The findings from this study found that cultural influences on smoking behaviour widened across the period which might provide some evidence to suggest that tobacco and health policies have been more effective at reducing smoking prevalence amongst those in more advantaged socio-economic groups compared to disadvantaged socio-economic groups. It is possible that the increase in cultural influences on smoking behaviour is linked to the need for social distinction with, for

example, advantaged groups socially distinguishing themselves from disadvantaged groups where smoking might be regarded as an indicator of social identity. If this is the case, then the differential adherence to health promotion policies as a result of the stigmatization of smoking behaviour is likely to increase smoking inequalities further.

One of the problems with the 'choice' agenda adopted by English tobacco control and health policies is that it is presumes that everyone has the same opportunities and resources when it comes to making choices in terms of one's health-related behaviours. However, it does not take into account the fact that health-related behaviours are embedded in social and economic circumstances with different cultural (and material factors) facilitating or constraining smoking behaviour (Spencer, 2007). As Stead et al., (1999) concluded in their study on smoking amongst disadvantaged groups:

> "A poorly resourced and stressful environment, strong community norms, isolation from wider societal norms, and limited opportunities for respite and recreation appear to combine not only to foster smoking but also to discourage or undermine cessation".

It is important for policy-makers to acknowledge the association between social disadvantage and smoking behaviour and to be aware that the behavioural approach to tobacco control is highly likely to have contributed to persistent and widening smoking inequalities as it would appear to have been more successful for those in more advantaged socio-economic groups. Therefore, rather than focusing on changing behaviour through the stigmatization of smokers and smoking, tobacco control policy interventions should be designed to help individuals to quit smoking, to reduce the amount that smokers smoke and to reduce smoking uptake amongst groups where the cultural value of smoking promotes and maintains this behaviour.

In addition to reducing smoking prevalence through policies designed to change behaviour, UK tobacco control policies have also included a variety of measures such as increasing the tax on tobacco, providing information on the health risks of smoking, restricting tobacco advertising and banning smoking in public places. However, none of these measures are designed to address the inequalities in people's life chances or the differences in their living standards and it is factors such as these which increase the risk of those smoking amongst disadvantaged socio-economic groups (Graham, 2012). Therefore, policies should be designed to address the wider influences on smoking inequalities such as reducing poverty and improving living and working conditions (Spencer and Dowler, 2007; Graham, 2012). Life chances and living conditions are also linked to material factors and whilst the evidence for the effects of material factors on smoking in this study were smaller than the effects of cultural factors, the research findings provided evidence that disadvantaged material circumstances influence smoking

behaviour. Therefore, policies aimed at reducing smoking should be designed to address the material circumstances of those in disadvantaged socio-economic groups.

Tobacco policies are often designed to make smoking less affordable and although evidence exists to suggest that price and taxation can be an effective way to reduce tobacco use amongst poorer socio-economic groups, this measure is regressive as the increasing cost of buying cigarettes is likely to push disadvantaged individuals further into poverty. The poverty experienced by poor smokers may have been further exacerbated by the austerity measures introduced during the last decade, therefore strategies such as making e-cigarettes more affordable or available on prescription might be an alternative approach to reducing smoking as evidence suggests that e-cigarettes are a common aid to quitting and are considered to be a less harmful alternative to smoking tobacco for those who find it difficult to stop smoking (PHE, 2018).

The study findings show that smoking is still disproportionately concentrated amongst the most disadvantaged smokers. These smokers are likely to be hardened smokers and less resistant to tobacco control measures, therefore, additional measures designed to reduce smoking prevalence further amongst these groups should include (Lindson et al., 2017; Hiscock et al., 2012):

- Targeting smoking cessation interventions towards those who are in the most disadvantaged groups and towards disadvantaged areas where smoking rates remain high;
- The expansion of smoking cessation interventions including NHS Stop Smoking Services and the availability of NRT, most of which have been significantly reduced as a result of cuts to English Public Health expenditure;
- Providing continued support to disadvantaged individuals who have quit to reduce the chances of them starting to smoke again;
- Tailoring policies to prevent the uptake of smoking amongst children and adults in disadvantaged groups.

The findings for the relationship between harmful alcohol consumption and SEP showed that generally, material factors appeared to have the strongest influence on harmful drinking behaviour and that the cost pathway appeared to have the greatest explanatory power for this finding. Since the 1970s, alcohol control policies have tended to be directed at the population as a whole rather than specifically addressing inequalities in alcohol consumption and to an extent have been characterised by voluntary agreements between the government and the alcohol industry. Policy measures designed to deal with alcohol misuse were strengthened in the late 1990s and 2000s, including the improvement of services for treating problem drinking, increasing alcohol taxation above inflation, the introduction of new

licensing regulations to address under-age drinking and the banning of irresponsible promotion of alcohol. However, the English government's approach to tackling alcohol misuse has largely been ineffective as the availability and affordability of alcohol rose between the early 1970s and 2010 and was accompanied by corresponding increases in the overall level of consumption and inequalities in alcohol-related mortality and morbidity (Angus et al, 2017; PHE, 2016: NHS Digital, 2016).

The study findings suggested that material influences on harmful drinking narrowed over time, which provides evidence to support the idea that the cost pathway has become more important, as alcohol consumption may have increased amongst the poorest groups due to the increased affordability of alcohol. If the cost pathway is important in explaining inequalities in harmful drinking, this has implications for the types of policies that might be introduced to tackle inequalities in health and harmful drinking. Evidence suggests that increases in the cost of alcohol are associated with decreases in consumption levels and associated harms to health (Gellet, 2007; Booth et al., 2008a). However, one of the difficulties with increasing the cost of alcohol is that alcohol expenditure in low income households is likely to exacerbate poverty further. In order to minimise alcohol expenditure, low-income and heavy drinkers are more likely to purchase off-trade or cheap alcohol (Crawford et al., 2012; Ludbrook et al., 2012), therefore one particular price-related measure that could be introduced to reduce the purchase of cheap alcohol is minimum unit pricing (MUP). It has been suggested that MUP is not only likely to reduce alcohol-related harm but is also likely to reduce alcohol-related inequalities as those on low incomes who consume alcohol at harmful levels, tend to buy a greater proportion of cheap alcohol (Holmes et al., 2014). Whilst recommendations were made for the introduction of a MUP policy in England in 2010, no plans have been made to introduce this measure yet (House of commons, 2020).

One of the other factors that is linked to the cost of alcohol is outlet density because outlets who are located within close proximity to each other are more likely to provide cheaper products due to local competitive markets (IAS, 2016). Studies have shown that deprived neighbourhoods are more likely to have a higher density of alcohol outlets (Shortt et al., 2015;) and a higher prevalence of alcohol-related mortality and morbidity (Richardson et al., 2015). Therefore, the density and/or availability of these outlets, particularly within disadvantaged areas, should be taken into account when considering whether to grant or refuse licenses to sell alcohol in these areas.

Measures designed to address inequalities in harmful drinking are notably absent from English alcohol policies (Wood and Bellis, 2017), therefore policies should incorporate measures that are specifically designed to address inequalities in alcohol-related mortality and morbidity if both inequalities in harmful drinking and inequalities in health are to be reduced.

The policy recommendations discussed in this section thus far highlight the need for policies to independently address socio-economic inequalities in smoking and drinking behaviours. However, evidence suggests that smoking and heavy drinking behaviour, the latter of which is linked to higher hospitalization rates for heavy drinkers from deprived backgrounds, tends to co-occur and/or cluster in individuals and are more likely to be found amongst men and women in the most disadvantaged groups (Meader et al., 2016; Buck and Frosini, 2012). Whilst there was some evidence from the analysis in this study to suggest that smoking and drinking were differentially influenced by cultural and material factors (respectively), a more combined policy approach might also be needed, which might focus on addressing the clustering of multiple health-related behaviours in order to reduce inequalities in health.

7.7   Conclusion

The overall aims of this project were to provide sociological explanations about long-term trends in the social patterning of smoking behaviour, and to determine how far social inequalities in drinking behaviour are similar to or distinctive from social inequalities in smoking behaviour. The project makes a significant and important contribution to the existing literature on inequalities in smoking and drinking and to social inequalities in health by shedding light on explanations for socio-economic differences in smoking and drinking behaviours. For example, the project findings suggested that cultural influences were more important in explaining socio-economic differences in smoking behaviour. If the denormalization and stigmatization of smoking has had a greater influence on more advantaged socio-economic groups, with higher rates of quitting and never smoking compared to more disadvantaged groups, it is possible that as smoking continues to decline, it will become increasingly concentrated amongst more disadvantaged groups, which is likely to contribute to inequalities in smoking-related disease and mortality. There was some evidence of a smaller effect of material influences on smoking behaviour, therefore if disadvantaged individuals continue to smoke despite being less able to afford to, the rising cost of cigarettes could push these individuals further into poverty, thereby contributing to income inequalities as well as health inequalities.

The project findings also suggested that material influences were more important in explaining differences in drinking behaviour and that the cost pathway appears to have more explanatory power. If disadvantaged socio-economic groups are more responsive to price changes, then it is possible that the increased affordability of alcohol may to lead to an increase in levels of consumption amongst these groups, which is likely to contribute to inequalities in alcohol-related morbidity and mortality. The findings also suggested that there had been a widening of inequalities between the lowest and highest socio-economic groups for some of the smoking and drinking behaviours, which could contribute further to health inequalities. This is important as widening health inequalities have been further exacerbated by austerity measures and the recent COVID-19 pandemic (Marmot, et al., 2020b), therefore the

findings from this project will become more important in highlighting the factors that underpin smoking and drinking inequalities.

Evidence suggests that heavy drinking and smoking co-occur and cluster in individuals and are more likely to be found amongst those in the most disadvantaged socio-economic groups, with smoking and drinking the most common risk cluster of health-related behaviours (Meader, et al., 2016). It has been suggested that the accumulation of these and other health-related behaviours are thought to be a contributing factor in poorer morbidity and mortality amongst disadvantaged groups which further exacerbates inequalities in health (Bellis, et al., 2016). The co-occurrence and clustering of health-related behaviours might also help to explain why those in advantaged socio-economic groups tend to exceed government alcohol guidelines but do not appear to experience the harm to health that disadvantaged groups do, possibly due to offsetting any damaging effects of drinking through healthier behaviours such as not smoking, eating a healthy diet and exercising (Mackenbach, 2019; Bellis, et al., 2016). The clustering of drinking and smoking amongst those who are disadvantaged is not only important in terms of increasing the harm to health but is also likely to exacerbate poverty through spending on both alcohol and cigarettes (Nyakutsikwa, et al., 2021).

The findings from this project inform the wider debate about social inequalities in health and the relative influences of consumption-related factors and therefore have implications for policy. The findings suggested that disadvantaged individuals may be more resistant to changing risky health-related behaviours than those who are more socially advantaged, therefore, policies and public health campaigns that rely on individuals to change their behaviour are likely to exacerbate smoking, drinking and health inequalities further. The behaviourist approach to tackling smoking and drinking inequalities, which places emphasis on individual responsibility through informed choice and which has been evident in government policy since the early 2000s, does not take into account the material and cultural influences which drive smoking and drinking behaviour or the wider impacts of the cost of these behaviours on poverty. The project findings suggested that inequalities in smoking and drinking behaviours had widened between 1973 and 2011. It is also possible that these inequalities have continued to widen during the last decade. However, recent policy documents show that inequalities do not appear to be central to either the tobacco control or the alcohol misuse policy agenda (HM Government, 2020; DH, 2017).

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Appendices

Appendix 1: Abbreviations

CHD   Coronary Heart Disease

CI   Confidence Interval

DH   Department of Health

HoH   Head of Household

HRP   Household Reference Person

NS-Sec   National Statistics Socio-Economic Classification

ONS   Office for National Statistics

OPCS   Office of Population Censuses and Surveys

RCP   Royal College of Physicians

RGSC   Registrar General's Social Classes

RR   Relative Risk

RYO   Roll-your-own tobacco

SEG   Socio-economic group

SEP   Socio-economic position

UKDS   UK Data Service

ULP   Ultra-low price cigarettes

Appendix 2: Dataset details

Table A2.1 Details of datasets used in analyses (Chapter 4)

Survey Year	Number of adults (16+ years) in original GHS/GLF datasets	Achieved sample of households in original GHS/GLF datasets	Household middle response rate (%)	Number of adults aged 18-64 in final datasets for analysis
1973	26,695	12,852	81	16,044
1978	24,025	11,815	82	15,788
1984	21,676	9,803	81	12,838
1992	21,973	10,046	83	12,752
2002	15,972	8,620	69	10,604
2009	18,988	8,206	71	3,280
2010	18,367	7,961	69	3,407
2011	18,156	7,934	71	<u>3,577</u>
				10,264

Notes:

1. Figures in column 2 are for the number of adults in the original dataset for Great Britain.

2. The household middle response rate is used as a performance index for GHS/GLF and includes full interviews and some partial household interviews.

Appendix 3: Alcohol consumption measures

Table A3.1: Data for calculating usual weekly alcohol consumption for survey years analysed (Chapter 4)

Drinking frequency		*Multiplying factor*	
1978/1984	1992/2002/2011	1978/1984	1992/2002/2011
Most days	Almost every day	6.5	7.0 (usual day's consumption *7)
	5 or 6 days a week		5.5 (usual day's consumption *5.5)
3-4 per week	3 or 4 days a week	3.5	3.5 (usual day's consumption *3.5)
1-2 per week	Once or twice a week	1.5	1.5 (usual day's consumption *1.5)
1-2 per month	Once or twice a month	0.375	0.375 (1.5/4) (usual day's consumption *0.375)
1-2 per 6 months	Once every couple of months	0.058	0.115 (6/52) (usual day's consumption *0.115)
1-2 per year	Once or twice a year	0.029	0.029 (1.5/52) (usual day's consumption *0.029)

Table A3.2: Previous and revised units used for calculating alcohol consumption (Chapter 4)

Type of drink and volume	Original conversion factor (units)	New conversion factor (units)
Normal strength beer, lager, cider		
half pint	1.0	1.0
small can/bottle	1.0	1.5
large can/bottle	1.5	2.0
very large can		2.5
Strong beer, lager, cider (ABV≥ 6%)		
half pint	1.5	2.0
small can/bottle	1.5	2.0
large can/bottle	2.3	3.0
very large can/bottle		3.5
Table wine		
glass – 125ml		1.5
glass – 175ml		2.0
glass – 250ml/small can		3.0
glass – size unspecified	1.0	2.0
bottle	6.0	9.0
Fortified wine		
small glass	1.0	1.0
bottle		13.0
litre		17.0
Spirits		
single	1.0	1.0
bottle		30.0
litre		40.0
Alcopops/coolers		
bottle	1.5	1.5

Source: Goddard, E. (2007) Estimating alcohol consumption from survey data: updated method of converting volumes to uni

Appendix 4: Missing data

Table A4.1: Missing data for each of the predictor and outcome variables for men (Chapter 4)

	GHS 1973		GHS 1978		GHS 1984		GHS 1992		GHS 2002		GHS 2009/2010/2011	
	No of cases missing	% of total cases	No of cases missing	% of total cases	No of cases missing	% of total cases	No of cases missing	% of total cases	No of cases missing	% of total cases	No of cases missing	% of total cases
Predictor variables												
Education	1	0.01	18	0.23	9	0.14	1	0.02	1	0.02	24	0.50
Household Income	360	4.6	749	9.6	2,151	34.1	505	8.1	638	12.6	664	13.5
Socio-economic group	24	0.30	24	0.31	19	0.30	6	0.10	5	0.10	0	0.00
Outcome variables												
Smoking status	94	1.19	-	-	23	0.36	11	0.18	8	0.16	7	0.20
Age started smoking	29	0.37	-	-	4	0.06	17	0.27	29	0.57	19	0.12
Number of cigarettes smoked	43	0.55	-	-	14	0.22	14	0.22	2	0.04	13	0.30
Desire to quit smoking	-	-	-	-	-	-	5	0.08	0	0.00	5	0.10
Time to first cigarette	-	-	-	-	-	-	9	0.14	3	0.02	10	0.30
Difficulty not smoking	-	-	-	-	-	-	5	0.08	8	0.16	5	0.10
Weekly alcohol consumption	-	-	24	0.31	2	0.03	5	0.10	10	0.20	31	0.60
Heavy drinking	-	-	24	0.31	2	0.03	5	0.10	10	0.20	31	0.60
Age	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Gender	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Table A4.2: Missing data for each of the predictor and outcome variables for women (Chapter 4)

	GHS 1973		GHS 1978		GHS 1984		GHS 1992		GHS 2002		GHS 2009/2010/2011	
	No of cases missing	% of total cases	No of cases missing	% of total cases	No of cases missing	% of total cases	No of cases missing	% of total cases	No of cases missing	% of total cases	No of cases missing	% of total cases
Predictor variables												
Education	1	0.01	31	0.39	15	0.23	2	0.03	2	0.04	25	0.4
Household Income	394	4.8	435	5.4	2,114	32.4	493	7.6	632	11.4	663	12.3
Socio-economic group	30	0.37	28	0.35	19	0.29	9	0.14	21	0.38	0	0.00
Outcome variables												
Smoking status	112	1.37	-	-	19	0.29	11	0.17	5	0.09	6	0.20
Age started smoking	20	0.25	-	-	5	0.08	18	0.28	13	0.24	9	0.20
Number of cigarettes smoked	21	0.26	-	-	15	0.23	15	0.23	0	0.00	7	0.10
Desire to quit smoking	-	-	-	-	-	-	2	0.03	0	0.00	1	0.10
Time to first cigarette	-	-	-	-	-	-	7	0.11	4	0.07	5	0.10
Difficulty not smoking	-	-	-	-	-	-	5	0.08	7	0.13	2	0.10
Weekly alcohol consumption	-	-	44	0.55	2	0.03	2	0.03	12	0.20	26	0.50
Heavy drinking	-	-	44	0.55	2	0.03	2	0.03	12	0.20	26	0.50
Age	0	0.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Gender	0	0.0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Appendix 5: Observed rates for smoking behaviours by SEP indicators for men and women

Table A5.1: Smoking prevalence (%) rates by SEP indicators (Chapter 5)

Year		Educational level			Occupation		Income				
		Degree level or above	Below degree level	No quals	Non-manual	Manual	Highest income group	4th	3rd	2nd	Lowest income group
1973	Men	32.2	49.8	60.6	44.8	59.1	48.5	53.2	54.1	59.0	59.2
	Women	32.0	36.2	49.0	38.4	48.5	42.6	46.1	45.3	48.3	46.5
1984	Men	22.6	34.0	48.8	28.4	44.8	28.5	32.6	38.1	41.2	52.1
	Women	23.6	30.8	42.7	28.6	41.0	27.5	30.9	33.3	34.9	47.2
1992	Men	17.4	32.9	40.3	24.2	37.9	21.6	29.2	30.6	35.9	43.3
	Women	18.4	28.9	36.9	24.7	34.6	20.1	25.3	28.5	31.2	41.4
2002	Men	17.0	32.4	40.1	23.5	36.3	21.3	30.3	30.7	29.5	37.6
	Women	17.1	29.7	36.5	21.9	35.5	17.7	21.9	26.1	31.3	40.2
2011	Men	15.3	27.2	45.0	18.7	33.1	14.4	21.7	27.9	32.5	36.7
	Women	12.7	26.2	35.4	17.2	30.3	13.4	16.3	21.7	30.5	34.1

Table A5.2: Smoking cessation (%) rates by SEP indicators (Chapter 5)

Year		Educational level			Occupation		Income				
		Degree level or above	Below degree level	No quals	Non-manual	Manual	Highest income group	4th	3rd	2nd	Lowest income group
1973	Men	27.1	21.4	21.2	26.4	19.3	25.2	22.2	21.3	19.1	17.8
	Women	13.9	11.7	10.6	13.7	9.5	12.4	12.1	11.5	9.6	9.0
1984	Men	27.9	27.4	28.1	30.3	26.5	28.5	29.7	28.1	28.0	22.1
	Women	18.7	16.1	18.1	19.6	15.7	20.3	18.4	17.7	17.4	14.8
1992	Men	29.7	24.1	32.1	29.1	26.8	29.5	28.8	28.8	26.5	22.6
	Women	21.0	17.4	20.3	19.9	18.1	20.7	20.0	20.7	18.5	15.3
2002	Men	23.8	22.9	27.1	25.4	23.1	24.4	22.9	23.6	24.1	23.7
	Women	19.9	18.7	18.7	20.7	17.2	22.7	21.3	17.6	18.3	16.2
2011	Men	21.6	24.4	23.5	24.7	21.7	25.3	25.4	23.1	20.5	20.1
	Women	20.3	20.2	21.3	21.9	19.3	22.2	22.5	21.3	19.0	16.4

Table A5.3: Never smoking (%) rates by SEP indicators (Chapter 5)

Year		Educational level			Occupation		Income				
		Degree level or above	Below degree level	No quals	Non-manual	Manual	Highest income group	4th	3rd	2nd	Lowest income group
1973	Men	40.8	28.8	18.3	28.8	21.6	26.3	24.6	24.6	21.9	23.1
	Women	54.1	52.0	40.4	47.9	42.0	45.0	41.7	43.2	42.1	44.5
1984	Men	49.5	38.6	23.2	41.3	28.7	43.0	37.7	33.8	30.8	25.8
	Women	57.6	53.0	39.2	51.9	43.3	52.2	50.7	49.0	47.7	38.0
1992	Men	52.9	43.1	27.6	46.7	35.3	48.9	42.0	40.6	37.6	34.1
	Women	60.6	53.7	42.8	55.4	47.3	59.2	54.7	50.8	50.3	43.2
2002	Men	59.2	44.8	32.8	51.1	40.7	54.3	46.8	45.7	46.4	38.7
	Women	63.0	51.6	44.8	57.4	47.3	59.6	56.8	56.3	50.5	43.7
2011	Men	63.1	48.4	31.6	56.6	45.1	60.3	52.9	49.0	47.0	43.2
	Women	67.1	53.5	43.3	61.0	50.4	64.5	61.1	57.0	50.5	49.5

Table A5.4: Smoking uptake before age 16 (%) rates by SEP indicators (Chapter 5)

Year		Educational level			Occupation		Income				
		Degree level or above	Below degree level	No quals	Non-manual	Manual	Highest income group	4th	3rd	2nd	Lowest income group
1973	Men	15.3	30.7	39.0	27.3	38.4	26.9	32.4	37.7	38.3	38.6
	Women	3.8	10.5	21.1	10.8	22.0	11.2	16.7	21.1	20.8	19.1
1984*	Men	-	-	-	-	-	-	-	-	-	-
	Women	-	-	-	-	-	-	-	-	-	-
1992	Men	29.6	37.2	50.9	35.6	44.6	31.8	37.7	45.3	42.8	46.8
	Women	14.8	29.3	34.0	22.9	34.8	17.4	23.6	31.3	31.7	37.2
2002	Men	28.9	41.4	54.4	37.9	45.0	34.1	37.9	42.7	42.5	47.3
	Women	20.4	38.0	41.3	29.2	40.3	24.6	29.9	36.5	36.7	42.7
2011	Men	26.8	43.9	55.7	35.4	48.3	34.0	39.5	43.5	46.8	42.5
	Women	29.9	42.6	51.2	35.6	44.8	29.9	37.1	43.8	44.9	44.1

*Data only collected for current smokers and not ex-smokers for smoking initiation in 1984, therefore variable not included in analysis as not comparable to other survey data

Table A5.5: Heavy smoking (%) rates by SEP indicators (Chapter 5)

Year		Educational level			Occupation		Income				
		Degree level or above	Below degree level	No quals	Non-manual	Manual	Highest income group	4th	3rd	2nd	Lowest income group
1973	Men	39.8	50.7	53.3	48.3	53.3	54.5	53.4	51.3	51.0	47.2
	Women	23.7	28.2	33.6	28.0	34.4	30.4	31.7	33.4	34.4	31.1
1984	Men	41.2	46.3	49.1	45.4	47.9	48.3	51.1	48.3	44.1	42.0
	Women	28.3	32.1	38.6	34.1	36.9	40.0	35.4	28.5	35.2	38.5
1992	Men	35.9	36.6	54.2	37.9	46.7	35.4	42.7	42.3	46.2	44.6
	Women	27.8	28.9	40.6	27.2	38.4	24.8	29.3	33.2	38.7	36.3
2002	Men	32.4	34.3	47.3	31.4	42.7	36.1	29.6	35.6	43.0	42.4
	Women	14.8	24.5	37.5	22.3	30.0	20.6	16.5	23.4	26.0	34.3
2011	Men	16.1	31.0	42.3	22.5	36.4	17.4	22.6	27.8	42.3	32.3
	Women	12.6	18.4	36.7	17.6	23.8	17.5	14.4	17.4	27.7	21.8

Table A5.6: First cigarette within 15 minutes of waking (%) rates by SEP indicators (Chapter 5)

Year		Educational level			Occupation		Income				
		Degree level or above	Below degree level	No quals	Non-manual	Manual	Highest income group	4th	3rd	2nd	Lowest income group
1992	Men	21.9	26.7	40.2	27.5	33.6	21.8	29.2	28.4	31.3	39.8
	Women	21.2	26.0	40.7	25.2	36.2	23.4	24.8	28.6	35.4	35.3
2002	Men	22.0	31.6	44.0	26.6	37.8	20.9	23.0	37.5	37.3	43.0
	Women	21.1	27.3	47.3	25.8	36.8	20.1	23.7	31.9	32.7	38.7
2011	Men	21.7	32.6	48.8	24.6	41.5	20.9	29.1	28.9	43.8	39.9
	Women	16.1	31.8	42.6	25.6	35.8	9.8	25.4	25.7	42.9	35.3

Table A5.7: Difficulty not smoking for one day (%) rates by SEP indicators (Chapter 5)

Year		Educational level			Occupation		Income				
		Degree level or above	Below degree level	No quals	Non-manual	Manual	Highest income group	4th	3rd	2nd	Lowest income group
1992	Men	48.5	48.7	62.3	53.5	54.6	49.0	52.8	52.9	58.5	54.3
	Women	54.9	57.5	68.6	55.4	66.8	51.1	63.0	61.1	61.8	66.3
2002	Men	44.7	56.0	60.7	52.0	58.1	45.3	52.1	57.8	58.3	59.7
	Women	42.6	58.5	67.7	54.6	62.3	49.0	52.1	57.0	58.9	65.6
2011	Men	49.3	57.7	65.4	49.7	63.5	35.3	54.7	59.8	65.6	63.2
	Women	45.9	58.0	68.2	52.7	62.2	49.0	56.1	53.1	61.1	61.8

Table A5.8: Does not want to give up smoking (%) rates by SEP indicators (Chapter 5)

Year		Educational level			Occupation		Income				
		Degree level or above	Below degree level	No quals	Non-manual	Manual	Highest income group	4th	3rd	2nd	Lowest income group
1992	Men	29.5	27.9	26.2	28.5	26.6	29.5	27.1	25.3	27.8	27.2
	Women	26.8	26.6	26.4	29.4	24.8	31.1	24.8	28.4	23.9	25.0
2002	Men	27.8	25.0	26.6	24.3	27.7	27.6	28.0	22.6	24.9	26.7
	Women	18.8	25.8	22.9	22.4	25.7	22.6	20.6	25.1	26.0	21.7
2011	Men	25.0	26.5	30.7	27.0	27.9	28.2	28.9	21.8	24.1	31.6
	Women	22.9	25.1	27.6	26.7	23.7	21.8	23.3	19.1	31.0	26.0

Appendix 6: Prevalence rate ratios for smoking status behaviours by SEP indicators for men and women

Table A6.1: Relationship (risk ratios (RR) and 95% confidence intervals) between smoking prevalence and SEP for men (Chapter 5)

SEP indicator		1973 RR 95% CI Model 1	1973 RR 95% CI Model 2	1984 RR 95% CI Model 1	1984 RR 95% CI Model 2	1992 RR 95% CI Model 1	1992 RR 95% CI Model 2	2002 RR 95% CI Model 1	2002 RR 95% CI Model 2	2011 RR 95% CI Model 1	2011 RR 95% CI Model 2
Education	Degree level or above	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Below degree level	**1.56*** 1.40-1.75**	**1.47*** 1.31-1.66**	**1.49*** 1.31-1.69**	**1.31** 1.13-1.53**	**1.81*** 1.59-2.06**	**1.63*** 1.41-1.88**	**1.91*** 1.67-2.18**	**1.75*** 1.50-2.04**	**1.78*** 1.54-2.06**	**1.48*** 1.25-1.74**
	No qualifications	**1.90*** 1.71-2.12**	**1.72*** 1.53-1.94**	**2.27*** 2.01-2.56**	**1.85*** 1.59-2.17**	**2.54*** 2.23-2.89**	**2.09*** 1.79-2.44**	**2.70*** 2.33-3.12**	**2.36*** 1.98-2.81**	**3.24*** 2.77-3.80**	**2.37*** 1.95-2.88**
Occupation	Non-manual	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Manual	**1.33*** 1.26-1.39**	**1.15*** 1.08-1.21**	**1.59*** 1.47-1.71**	**1.18** 1.07-1.30**	**1.57*** 1.45-1.71**	**1.19*** 1.08-1.31**	**1.57*** 1.43-1.72**	**1.19** 1.07-1.33**	**1.79*** 1.59-2.00**	**1.24** 1.09-1.42**
Income	Highest income group	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Second highest income group	**1.12** 1.04-1.20**	1.02 0.95-1.09	**1.15* 1.00-1.33**	1.00 0.87-1.16	**1.33*** 1.16-1.54**	1.13 0.98-1.31	**1.40*** 1.19-1.64**	1.17 0.99-1.37	**1.50*** 1.21-1.86**	**1.31* 1.06-1.63**
	Third income group	**1.14*** 1.06-1.22**	0.99 0.93-1.07	**1.35*** 1.18-1.54**	1.12 0.97-1.28	**1.41*** 1.22-1.63**	1.11 0.96-1.29	**1.43*** 1.22-1.68**	1.08 0.92-1.28	**1.93*** 1.57-2.37**	**1.52*** 1.23-1.88**
	Fourth lowest income group	**1.25*** 1.17-1.34**	1.05 0.98-1.13	**1.46*** 1.28-1.66**	1.11 0.96-1.27	**1.65*** 1.44-1.89**	**1.22** 1.06-1.41**	**1.41*** 1.20-1.67**	1.01 0.84-1.20	**2.27*** 1.85-2.78**	**1.61*** 1.30-2.00**
	Lowest income group	**1.26*** 1.17-1.36**	1.07 0.99-1.15	**1.86*** 1.64-2.11**	**1.35*** 1.18-1.55**	**1.99*** 1.74-2.28**	**1.46*** 1.26-1.68**	**1.77*** 1.51-2.08**	**1.24* 1.05-1.47**	**2.60*** 2.14-3.17**	**1.73*** 1.39-2.15**

Reference group for smoking prevalence is ex-smoker or never smoker. **Bold text** shows statistical significance while asterisks show level of significance (***$p<0.001$, **$p<0.01$, *$p<0.05$;)
Model 1 was fitted with single SEP indicators (adjusting for age); Model 2 was fitted with all three SEP indicators (adjusting for age)

Table A6.2: Relationship (risk ratios (RR) and 95% confidence intervals) between smoking prevalence and SEP for women (Chapter 5)

SEP indicator		1973 RR 95% CI Model 1	1973 Model 2	1984 RR 95% CI Model 1	1984 Model 2	1992 RR 95% CI Model 1	1992 Model 2	2002 RR 95% CI Model 1	2002 Model 2	2011 RR 95% CI Model 1	2011 Model 2
Education	Degree level or above	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Below degree level	1.10 0.97-1.26	1.11 0.96-1.12	1.28*** 1.12-1.47	1.25* 1.05-1.49	1.49*** 1.30-1.72	1.38*** 1.18-1.60	1.72*** 1.51-1.95	1.48*** 1.28-1.71	2.03*** 1.76-2.36	1.75*** 1.48-2.07
	No qualifications	1.58*** 1.39-1.78	1.49*** 1.30-1.71	1.87*** 1.64-2.14	1.57*** 1.31-1.89	2.22*** 1.93-2.56	1.73*** 1.46-2.04	2.49*** 2.17-2.86	1.85*** 1.57-2.20	3.29*** 2.79-3.88	2.40*** 1.95-2.94
Occupation	Non-manual	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Manual	1.27*** 1.20-1.34	1.14*** 1.07-1.22	1.44*** 1.34-1.55	1.26*** 1.14-1.39	1.39*** 1.29-1.51	1.14** 1.04-1.25	1.64*** 1.50-1.79	1.25*** 1.13-1.38	1.72*** 1.54-1.93	1.20** 1.06-1.36
Income	Highest income group	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Second highest income group	1.09* 1.00-1.19	0.98 0.90-1.07	1.13 0.97-1.32	0.99 0.85-1.15	1.25** 1.07-1.46	1.13 0.97-1.33	1.22* 1.01-1.47	1.05 0.87-1.27	1.21 0.95-1.53	1.03 0.82-1.31
	Third income group	1.09* 1.00-1.19	0.94 0.86-1.03	1.22** 1.05-1.41	1.00 0.86-1.17	1.43*** 1.23-1.66	1.20* 1.03-1.40	1.48*** 1.24-1.77	1.15 0.95-1.39	1.62*** 1.30-2.02	1.24 0.99-1.56
	Fourth lowest income group	1.17*** 1.08-1.28	0.99 0.90-1.07	1.28** 1.11-1.48	1.01 0.87-1.17	1.56*** 1.35-1.81	1.30** 1.11-1.52	1.79*** 1.51-2.12	1.31** 1.09-1.58	2.27*** 1.85-2.79	1.58*** 1.27-1.95
	Lowest income group	1.15** 1.06-1.25	0.98 0.90-1.07	1.76*** 1.54-2.00	1.33*** 1.15-1.53	2.06*** 1.80-2.36	1.65*** 1.43-1.92	2.28*** 1.94-2.67	1.63*** 1.35-1.96	2.48*** 2.02-3.04	1.72*** 1.38-2.13

Reference group for smoking prevalence is ex-smoker or never smoker. ***p<0.001, **p<0.01, *p<0.05
Model 1 was fitted with single SEP indicators (adjusting for age); Model 2 was fitted with all three SEP indicators (adjusting for age)

Table A6.3: Relationship (risk ratios (RR) and 95% confidence intervals) between smoking cessation and SEP for men (Chapter 5)

SEP indicator		1973 RR 95% CI Model 1	1973 RR 95% CI Model 2	1984 RR 95% CI Model 1	1984 RR 95% CI Model 2	1992 RR 95% CI Model 1	1992 RR 95% CI Model 2	2002 RR 95% CI Model 1	2002 RR 95% CI Model 2	2011 RR 95% CI Model 1	2011 RR 95% CI Model 2
Education	Degree level or above	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Below degree level	**0.72*** 0.63-0.81**	**0.81** 0.71-0.92**	**0.89** 0.81-0.97**	0.95 0.85-1.07	**0.78*** 0.73-0.84**	**0.82*** 0.76-0.89**	**0.78*** 0.72-0.85**	**0.84*** 0.76-0.92**	**0.87** 0.80-0.95**	0.96 0.88-1.06
	No qualifications	**0.55*** 0.49-0.62**	**0.68*** 0.59-0.78**	**0.63*** 0.58-0.69**	**0.73*** 0.63-0.84**	**0.66*** 0.61-0.72**	**0.74*** 0.67-0.82**	**0.63*** 0.56-0.70**	**0.71*** 0.62-0.81**	**0.58*** 0.49-0.68**	**0.72** 0.59-0.87**
Occupation	Non-manual	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Manual	**0.67*** 0.62-0.73**	**0.77*** 0.70-0.84**	**0.73*** 0.68-0.78**	0.93 0.84-1.03	**0.77*** 0.72-0.82**	**0.90** 0.83-0.97**	**0.74*** 0.68-0.81**	**0.84** 0.76-0.93**	**0.71*** 0.64-0.78**	**0.82** 0.73-0.92**
Income	Highest income group	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Second highest income group	**0.85** 0.75-0.95**	0.99 0.88-1.12	0.96 0.86-1.08	1.03 0.92-1.16	**0.89* 0.81-0.97**	0.95 0.87-1.03	**0.85* 0.75-0.97**	0.98 0.86-1.11	**0.89* 0.79-0.99**	0.96 0.86-1.07
	Third income group	**0.83** 0.73-0.93**	1.01 0.89-1.15	**0.85** 0.75-0.96**	0.93 0.82-1.06	**0.86** 0.78-0.95**	0.97 0.88-1.07	**0.80** 0.71-0.91**	0.92 0.81-1.04	**0.77*** 0.68-0.88**	0.89 0.78-1.02
	Fourth lowest income group	**0.72*** 0.63-0.82**	0.91 0.79-1.04	**0.80** 0.71-0.91**	0.94 0.82-1.07	**0.76*** 0.68-0.84**	**0.88* 0.78-0.98**	**0.84** 0.74-0.95**	0.98 0.87-1.11	**0.65*** 0.56-0.75**	**0.78** 0.66-0.93**
	Lowest income group	**0.64*** 0.54-0.75**	**0.83* 0.71-0.99**	**0.61*** 0.52-0.71**	**0.74*** 0.63-0.88**	**0.63*** 0.56-0.71**	**0.75*** 0.66-0.85**	**0.71*** 0.61-0.81**	0.91 0.79-1.05	**0.62*** 0.53-0.72**	**0.79** 0.69-0.94**

Reference group for smoking cessation is smoker. ***p<0.001, **p<0.01, *p<0.05
Model 1 was fitted with single SEP indicators (adjusting for age); Model 2 was fitted with all three SEP indicators (adjusting for age)

Table A6.4: Relationship (risk ratios (RR) and 95% confidence intervals) between smoking cessation and SEP for women (Chapter 5)

SEP indicator		1973 RR 95% CI Model 1	1973 RR 95% CI Model 2	1984 RR 95% CI Model 1	1984 RR 95% CI Model 2	1992 RR 95% CI Model 1	1992 RR 95% CI Model 2	2002 RR 95% CI Model 1	2002 RR 95% CI Model 2	2011 RR 95% CI Model 1	2011 RR 95% CI Model 2
Education	Degree level or above	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Below degree level	0.85 0.68-1.05	0.89 0.71-1.12	**0.84* 0.73-0.97**	0.87 0.74-1.03	**0.81*** 0.72-0.90**	**0.86* 0.76-0.96**	**0.78*** 0.70-0.86**	**0.86** 0.78-0.96**	**0.77*** 0.70-0.84**	**0.84** 0.76-0.94**
	No qualifications	**0.55*** 0.45-0.67**	**0.69** 0.55-0.87**	**0.63*** 0.55-0.72**	**0.78** 0.65-0.93**	**0.62*** 0.55-0.69**	**0.74*** 0.65-0.85**	**0.57*** 0.50-0.65**	**0.68*** 0.58-0.80**	**0.57*** 0.50-0.66**	**0.75** 0.63-0.89**
Occupation	Non-manual	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Manual	**0.63*** 0.56-0.71**	**0.71*** 0.62-0.82**	**0.69*** 0.62-0.76**	**0.76*** 0.67-0.86**	**0.77*** 0.71-0.85**	**0.90* 0.81-0.99**	**0.68*** 0.61-0.75**	**0.81** 0.72-0.91**	**0.71*** 0.65-0.79**	**0.84** 0.75-0.95**
Income	Highest income group	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Second highest income group	0.91 0.76-1.09	1.08 0.89-1.30	0.87 0.73-1.03	0.97 0.81-1.15	**0.87* 0.77-0.99**	0.92 0.81-1.05	0.90 0.79-1.03	1.00 0.88-1.14	0.95 0.85-1.08	1.05 0.93-1.18
	Third income group	0.89 0.74-1.07	1.12 0.92-1.36	**0.81* 0.68-0.96**	0.92 0.77-1.10	**0.83** 0.73-0.94**	0.92 0.80-1.05	**0.74*** 0.64-0.85**	**0.85* 0.74-0.99**	**0.81** 0.71-0.93**	0.96 0.83-1.10
	Fourth lowest income group	**0.73** 0.60-0.89**	0.94 0.76-1.16	**0.76** 0.64-0.90**	0.94 0.78-1.13	**0.72*** 0.63-0.83**	**0.82** 0.71-0.95**	**0.68*** 0.59-0.79**	**0.83* 0.72-0.96**	**0.63*** 0.55-0.73**	**0.81* 0.68-0.95**
	Lowest income group	**0.69** 0.57-0.84**	0.89 0.72-1.11	**0.54*** 0.45-0.65**	**0.69*** 0.56-0.84**	**0.56*** 0.49-0.65**	**0.67*** 0.57-0.79**	**0.56*** 0.47-0.65**	**0.70*** 0.59-0.83**	**0.59*** 0.50-0.69**	**0.78** 0.65-0.94**

Reference group for smoking cessation is smoker. ***$p<0.001$, **$p<0.01$, *$p<0.05$
Model 1 was fitted with single SEP indicators (adjusting for age); Model 2 was fitted with all three SEP indicators (adjusting for age)

Table A6.5: Relationship (risk ratios (RR) and 95% confidence intervals) between never smoking and SEP for men (Chapter 5)

	SEP indicator	1973 RR 95% CI Model 1	1973 Model 2	1984 RR 95% CI Model 1	1984 Model 2	1992 RR 95% CI Model 1	1992 Model 2	2002 RR 95% CI Model 1	2002 Model 2	2011 RR 95% CI Model 1	2011 Model 2
Education	Degree level or above	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Below degree level	**0.67*** 0.61-0.75	**0.70*** 0.63-0.78	**0.74*** 0.69-0.80	**0.80*** 0.73-0.89	**0.77*** 0.72-0.82	**0.83*** 0.77-0.90	**0.75*** 0.70-0.80	**0.77*** 0.71-0.82	**0.76*** 0.71-0.81	**0.80*** 0.74-0.86
	No qualifications	**0.50*** 0.45-0.55	**0.51*** 0.45-0.58	**0.52*** 0.47-0.57	**0.60*** 0.52-0.68	**0.57*** 0.52-0.62	**0.63*** 0.56-0.70	**0.61*** 0.55-0.68	**0.63*** 0.55-0.71	**0.51*** 0.44-0.59	**0.55*** 0.46-0.64
Occupation	Non-manual	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Manual	**0.76*** 0.70-0.82	**0.91* 0.83-1.00	**0.71*** 0.66-0.76	**0.87** 0.79-0.96	**0.76*** 0.72-0.81	**0.88** 0.82-0.95	**0.82*** 0.77-0.88	0.96 0.89-1.04	**0.80*** 0.75-0.86	0.95 0.88-1.03
Income	Highest income group	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Second highest income group	0.93 0.83-1.04	1.05 0.93-1.18	0.91 0.82-1.01	1.01 0.91-1.12	**0.85*** 0.78-0.93	0.92 0.84-1.01	**0.85*** 0.77-0.93	0.93 0.84-1.02	**0.88** 0.81-0.96	0.95 0.87-1.04
	Third income group	0.90 0.80-1.01	1.07 0.95-1.21	**0.80*** 0.72-0.90	0.93 0.83-1.05	**0.83*** 0.75-0.90	0.95 0.87-1.05	**0.84*** 0.77-0.93	0.95 0.87-1.05	**0.80*** 0.73-0.88	**0.89* 0.81-0.98
	Fourth lowest income group	**0.79*** 0.70-0.90	0.99 0.87-1.13	**0.75*** 0.66-0.85	0.95 0.83-1.08	**0.77*** 0.70-0.85	0.93 0.84-1.03	**0.87** 0.79-0.95	1.02 0.92-1.13	**0.77*** 0.70-0.86	0.94 0.85-1.05
	Lowest income group	0.88 0.76-1.01	1.09 0.93-1.27	**0.62*** 0.54-0.71	**0.81* 0.69-0.95	**0.69*** 0.62-0.77	**0.84** 0.75-0.94	**0.74*** 0.66-0.82	**0.87* 0.77-0.99	**0.70*** 0.63-0.78	**0.86** 0.76-0.96

Reference group for never smoking is ex-smoker or smoker. ***$p<0.001$, **$p<0.01$, *$p<0.05$
Model 1 was fitted with single SEP indicators (adjusting for age); Model 2 was fitted with all three SEP indicators (adjusting for age)

Table A6.6: Relationship (risk ratios (RR) and 95% confidence intervals) between never smoking and SEP for women (Chapter 5)

SEP indicator		1973 RR 95% CI Model 1	1973 RR 95% CI Model 2	1984 RR 95% CI Model 1	1984 RR 95% CI Model 2	1992 RR 95% CI Model 1	1992 RR 95% CI Model 2	2002 RR 95% CI Model 1	2002 RR 95% CI Model 2	2011 RR 95% CI Model 1	2011 RR 95% CI Model 2
Education	Degree level or above	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Below degree level	0.98 0.90-1.07	0.97 0.89-1.06	**0.90** 0.84-0.97	**0.90*** 0.83-0.99	**0.87*** 0.82-0.93	**0.91** 0.85-0.97	**0.82*** 0.77-0.86	**0.85*** 0.80-0.91	**0.79*** 0.76-0.84	**0.83*** 0.78-0.88
	No qualifications	**0.76*** 0.70-0.83	**0.76*** 0.69-0.84	**0.69*** 0.64-0.75	**0.73*** 0.66-0.81	**0.71*** 0.66-0.76	**0.79*** 0.72-0.85	**0.71*** 0.66-0.77	**0.79*** 0.72-0.87	**0.64*** 0.58-0.70	**0.68*** 0.61-0.77
Occupation	Non-manual	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Manual	**0.88*** 0.84-0.93	0.96 0.91-1.02	**0.83*** 0.78-0.87	**0.89** 0.83-0.96	**0.85*** 0.81-0.89	**0.92** 0.87-0.98	**0.82*** 0.84-1.03	**0.91** 0.85-0.97	**0.83*** 0.78-0.87	**0.92*** 0.86-0.99
Income	Highest income group	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Second highest income group	0.92 0.85-1.00	0.98 0.90-1.07	0.96 0.88-1.06	1.05 0.95-1.15	**0.93*** 0.86-0.99	0.97 0.90-1.05	0.95 0.88-1.03	1.01 0.93-1.10	0.95 0.88-1.02	1.01 0.94-1.09
	Third income group	0.94 0.86-1.02	1.01 0.93-1.10	0.93 0.85-1.02	1.04 0.94-1.15	**0.85*** 0.79-0.92	0.93 0.86-1.01	0.94 0.87-1.02	1.04 0.95-1.12	**0.88** 0.81-0.95	0.99 0.91-1.07
	Fourth lowest income group	**0.90** 0.83-0.97	0.99 0.91-1.08	**0.91*** 0.83-1.00	1.04 0.94-1.15	**0.85*** 0.78-0.91	0.93 0.85-1.01	**0.84*** 0.77-0.91	0.94 0.86-1.03	**0.78*** 0.72-0.85	**0.90*** 0.82-0.98
	Lowest income group	0.95 0.88-1.03	1.05 0.97-1.14	**0.72*** 0.65-0.80	**0.85** 0.75-0.96	**0.72*** 0.66-0.78	**0.78*** 0.72-0.86	**0.73*** 0.67-0.80	**0.81*** 0.73-0.90	**0.76*** 0.70-0.83	**0.85** 0.77-0.95

Reference group for never smoking is ex-smoker or smoker. ***$p<0.001$, **$p<0.01$, *$p<0.05$
Model 1 was fitted with single SEP indicators (adjusting for age); Model 2 was fitted with all three SEP indicators (adjusting for age)

Appendix 7: Prevalence rate ratios for nicotine consumption behaviours by SEP indicators for men and women

Table A7.1: Relationship (risk ratios (RR) and 95% confidence intervals) between smoking uptake before age 16 and SEP for men (Chapter 5)

		1973 RR 95% CI		1984* RR 95% CI		1992 RR 95% CI		2002 RR 95% CI		2011 RR 95% CI	
SEP indicator		**Model 1**	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**
Education	Degree level or above	1.00	1.00	-	-	1.00	1.00	1.00	1.00	1.00	1.00
	Below degree level	**1.94*** 1.53-2.44	**1.78*** 1.39-2.28	-	-	**1.23** 1.07-1.41	**1.17* 1.01-1.35**	**1.43*** 1.23-1.66	**1.45*** 1.23-1.73	**1.62*** 1.37-1.92	**1.57*** 1.30-1.90
	No qualifications	**2.61*** 2.08-3.27	**2.30*** 1.80-2.93	-	-	**1.76*** 1.54-2.01	**1.62*** 1.39-1.89	**1.80*** 1.53-2.11	**1.80*** 1.49-2.19	**2.09*** 1.73-2.53	**1.97*** 1.57-2.48
Occupation	Non-manual	1.00	1.00	-	-	1.00	1.00	1.00	1.00	1.00	1.00
	Manual	**1.41*** 1.29-1.54	**1.13* 1.03-1.25**	-	-	**1.26*** 1.15-1.37	1.02 0.92-1.13	**1.15** 1.04-1.27	0.95 0.85-1.07	**1.37*** 1.21-1.54	**1.16* 1.02-1.33**
Income	Highest income group	1.00	1.00	-	-	1.00	1.00	1.00	1.00	1.00	1.00
	Second highest income group	**1.21** 1.06-1.37	1.07 0.94-1.21	-	-	**1.19* 1.02-1.39**	1.07 0.91-1.26	1.12 0.93-1.34	1.02 0.85-1.22	1.17 0.95-1.45	1.04 0.84-1.28
	Third income group	**1.40*** 1.24-1.50	**1.17* 1.03-1.33**	-	-	**1.42*** 1.23-1.65	**1.23* 1.05-1.44**	**1.26** 1.06-1.50	1.11 0.92-1.32	**1.27* 1.03-1.56**	1.02 0.83-1.26
	Fourth lowest income group	**1.42*** 1.26-1.61	**1.16* 1.02-1.32**	-	-	**1.35*** 1.16-1.57	1.14 0.97-1.34	**1.24* 1.03-1.48**	1.06 0.88-1.29	**1.37** 1.12-1.69	1.06 0.85-1.31
	Lowest income group	**1.46*** 1.27-1.68	**1.18* 1.03-1.36**	-	-	**1.49*** 1.28-1.72	**1.26** 1.07-1.48	**1.34** 1.13-1.59	1.11 0.92-1.35	**1.23* 1.00-1.52**	0.98 0.78-1.22

*Data only collected for current smokers and not ex-smokers for smoking initiation in 1984, therefore variable not included in analysis as not comparable to other survey data
Reference group for smoking uptake is started smoking after 16 years. **Bold text** shows statistical significance while asterisks show level of significance (***$p<0.001$, **$p<0.01$, *$p<0.05$;)
Model 1 was fitted with single SEP indicators (adjusting for age); Model 2 was fitted with all three SEP indicators (adjusting for age)

Table A7.2: Relationship (risk ratios (RR) and 95% confidence intervals) between smoking uptake before age 16 and SEP for women (Chapter 5)

SEP indicator		1973 RR 95% CI Model 1	1973 RR 95% CI Model 2	1984* RR 95% CI Model 1	1984* RR 95% CI Model 2	1992 RR 95% CI Model 1	1992 RR 95% CI Model 2	2002 RR 95% CI Model 1	2002 RR 95% CI Model 2	2011 RR 95% CI Model 1	2011 RR 95% CI Model 2
Education	Degree level or above	1.00	1.00	-	-	1.00	1.00	1.00	1.00	1.00	1.00
	Below degree level	2.57** 1.32-4.99	2.10* 1.08-4.07	-	-	1.75*** 1.37-2.23	1.50** 1.15-1.94	1.77*** 1.48-2.12	1.62*** 1.33-1.98	1.39*** 1.19-1.62	1.28** 1.07-1.53
	No qualifications	6.40*** 3.37-12.18	4.56*** 2.38-8.72	-	-	2.72*** 2.13-3.46	2.16*** 1.64-2.83	2.31*** 1.91-2.80	1.98*** 1.59-2.47	1.88*** 1.58-2.24	1.77*** 1.42-2.20
Occupation	Non-manual	1.00	1.00	-	-	1.00	1.00	1.00	1.00	1.00	1.00
	Manual	1.98*** 1.68-2.34	1.42*** 1.19-1.69	-	-	1.48*** 1.31-1.66	1.20** 1.05-1.36	1.40*** 1.26-1.57	1.15* 1.02-1.31	1.23** 1.09-1.38	1.03 0.90-1.18
Income	Highest income group	1.00	1.00	-	-	1.00	1.00	1.00	1.00	1.00	1.00
	Second highest income group	1.53** 1.18-1.99	1.27 0.98-1.65	-	-	1.37* 1.06-1.77	1.22 0.94-1.57	1.21 0.96-1.53	1.05 0.83-1.32	1.19 0.94-1.51	1.08 0.84-1.38
	Third income group	1.86*** 1.45-2.39	1.41** 1.10-1.82	-	-	1.75*** 1.38-2.22	1.40** 1.09-	1.53*** 1.22-1.91	1.23 0.98-1.54	1.40** 1.12-1.75	1.18 0.93-1.50
	Fourth lowest income group	1.81*** 1.41-2.31	1.29* 1.00-1.66	-	-	1.80*** 1.43-2.28	1.34* 1.05-1.72	1.46** 1.18-1.81	1.12 0.90-1.40	1.48*** 1.20-1.84	1.22 0.96-1.54
	Lowest income group	1.77*** 1.38-2.28	1.26 0.97-1.62	-	-	2.01*** 1.61-2.51	1.46** 1.14-1.86	1.70*** 1.39-2.09	1.21 0.97-1.51	1.36** 1.09-1.69	1.07 0.83-1.37

*Data only collected for current smokers and not ex-smokers for smoking initiation in 1984, therefore variable not included in analysis as not comparable to other survey data
Reference group for smoking uptake is started smoking after 16 years. ***$p<0.001$, **$p<0.01$, *$p<0.05$
Model 1 was fitted with single SEP indicators (adjusting for age); Model 2 was fitted with all three SEP indicators (adjusting for age)

Table A7.3: Relationship (risk ratios (RR) and 95% confidence intervals) between heavy smoking and SEP for men (Chapter 5)

SEP indicator		1973 RR 95% CI		1984 RR 95% CI		1992 RR 95% CI		2002 RR 95% CI		2011 RR 95% CI	
		Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Education	Degree level or above	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Below degree level	**1.26**** **1.08-1.48**	**1.31**** **1.10-1.55**	1.17 0.99-1.39	1.17 0.95-1.44	1.09 0.91-1.32	1.08 0.88-1.32	1.07 0.87-1.32	0.94 0.74-1.19	**1.94***** **1.39-2.72**	1.33 0.92-1.93
	No qualifications	**1.29**** **1.11-1.50**	**1.36***** **1.15-1.61**	1.16 0.98-1.37	1.16 0.93-1.45	**1.43***** **1.18-1.72**	**1.31*** **1.06-1.61**	**1.29*** **1.03-1.61**	1.05 0.80-1.37	**2.39***** **1.67-3.42**	**1.59*** **1.06-2.38**
Occupation	Non-manual	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Manual	**1.07*** **1.00-1.15**	1.07 0.99-1.15	1.05 0.95-1.16	1.07 0.93-1.22	**1.22**** **1.09-1.37**	1.11 0.98-1.25	**0.82**** **1.10-1.47**	**1.26*** **1.05-1.50**	**1.54***** **1.25-1.91**	1.23 0.97-1.57
Income	Highest income group	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Second highest income group	0.98 0.90-1.07	0.93 0.85-1.02	1.05 0.89-1.24	1.01 0.85-1.20	1.18 0.96-1.44	1.11 0.90-1.37	0.87 0.67-1.12	1.01 0.93-1.10	1.32 0.81-2.15	1.11 0.67-1.82
	Third income group	0.92 0.84-1.00	**0.87**** **0.79-0.95**	0.99 0.84-1.17	0.93 0.78-1.10	1.12 0.91-1.38	1.05 0.85-1.29	0.95 0.74-1.21	1.04 0.95-1.12	**1.63*** **1.03-2.57**	1.35 0.84-2.15
	Fourth lowest income group	0.92 0.84-1.01	**0.87**** **0.79-0.95**	0.91 0.77-1.09	0.86 0.72-1.04	**1.24*** **1.02-1.52**	1.12 0.91-1.38	1.17 0.92-1.47	0.94 0.86-1.03	**2.30***** **1.48-3.57**	**1.67*** **1.04-2.69**
	Lowest income group	**0.84**** **0.76-0.94**	**0.78***** **0.69-0.87**	0.87 0.73-1.03	**0.83*** **0.68-1.00**	1.19 0.97-1.45	1.07 0.87-1.32	1.09 0.87-1.37	0.95 0.74-1.23	**1.83**** **1.17-2.85**	1.40 0.87-2.25

Reference group for heavy smoking are lighter smokers (those that smoke 0-19 cigarettes a day). ***$p<0.001$, **$p<0.01$, *$p<0.05$
Model 1 was fitted with single SEP indicators (adjusting for age); Model 2 was fitted with all three SEP indicators (adjusting for age)

Table A7.4: Relationship (risk ratios (RR) and 95% confidence intervals) between heavy smoking and SEP for women (Chapter 5)

	SEP indicator	1973 RR 95% CI Model 1	Model 2	1984 RR 95% CI Model 1	Model 2	1992 RR 95% CI Model 1	Model 2	2002 RR 95% CI Model 1	Model 2	2011 RR 95% CI Model 1	Model 2
Education	Degree level or above	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Below degree level	1.16 0.89-1.52	1.13 0.85-1.50	1.24 0.96-1.60	1.26 0.93-1.70	1.12 0.87-1.43	1.07 0.82-1.39	**1.72** 1.25-2.36	**1.55*** 1.07-2.22	1.48 1.00-2.19	1.38 0.90-2.12
	No qualifications	**1.40** 1.09-1.80	**1.32*** 1.00-1.73	**1.41** 1.11-1.79	**1.37*** 1.01-1.86	**1.44** 1.13-1.83	1.20 0.92-1.58	**2.15*** 1.53-3.02	**1.73** 1.16-2.59	**2.64*** 1.76-3.95	**2.44*** 1.53-3.88
Occupation	Non-manual	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Manual	**1.20** 1.08-1.33	1.11 0.99-1.25	1.11 0.99-1.25	1.15 0.97-1.36	**1.40*** 1.22-1.61	**1.25** 1.07-1.46	**1.29** 1.08-1.55	1.07 0.87-1.30	**1.34*** 1.04-1.72	1.21 0.91-1.60
Income	Highest income group	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Second highest income group	1.05 0.89-1.23	1.00 0.84-1.17	0.93 0.73-1.17	0.84 0.66-1.06	1.18 0.88-1.57	1.05 0.78-1.41	0.84 0.54-1.30	0.76 0.49-1.18	0.79 0.44-1.42	0.60 0.33-1.10
	Third income group	1.09 0.93-1.27	1.00 0.84-1.18	**0.75*** 0.58-0.95	**0.66** 0.51-0.85	**1.32*** 1.00-1.73	1.15 0.87-1.52	1.15 0.79-1.69	0.98 0.66-1.46	0.97 0.58-1.64	0.68 0.38-1.20
	Fourth lowest income group	1.11 0.95-1.29	1.02 0.86-1.20	0.94 0.75-1.17	0.79 0.62-1.01	**1.55** 1.20-2.02	1.31 1.00-1.72	1.30 0.90-1.87	1.06 0.72-1.56	1.55 0.99-2.45	0.95 0.56-1.59
	Lowest income group	1.03 0.88-1.21	0.96 0.81-1.14	1.04 0.85-1.28	0.87 0.69-1.09	**1.53** 1.19-1.97	1.26 0.95-1.66	**1.79** 1.28-2.50	1.42 0.99-2.03	1.32 0.83-2.11	0.77 0.46-1.31

Reference group for heavy smoking are lighter smokers (those that smoke 0-19 cigarettes per day). $***p<0.001$, $**p<0.01$, $*p<0.05$
Model 1 was fitted with single SEP indicators (adjusting for age); Model 2 was fitted with all three SEP indicators (adjusting for age)

Appendix 8: Prevalence rate ratios for smoking dependency behaviours by SEP indicators for men and women

Table A8.1: Relationship (risk ratios (RR) and 95% confidence intervals) between first cigarette within 15 minutes of waking and SEP for men (Chapter 5)

SEP indicator		1992 RR 95% CI		2002 RR 95% CI		2011 RR 95% CI	
		Model 1	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**
Education	Degree level or above	1.00	1.00	1.00	1.00	1.00	1.00
	Below degree level	1.25 0.96-1.64	1.17 0.88-1.56	**1.45** 1.11-1.89**	1.31 0.96-1.79	**1.49** 1.12-1.99**	1.25 0.90-1.72
	No qualifications	**1.75*** 1.34-2.29**	**1.56** 1.15-2.11**	**1.86*** 1.40-2.47**	**1.49* 1.05-2.12**	**2.16*** 1.60-2.92**	**1.65** 1.16-2.34**
Occupation	Non-manual	1.00	1.00	1.00	1.00	1.00	1.00
	Manual	**1.20* 1.03-1.40**	0.98 0.83-1.17	**1.37*** 1.16-1.62**	1.11 0.91-1.35	**1.64*** 1.34-2.01**	**1.31* 1.05-1.64**
Income	Highest income group	1.00	1.00	1.00	1.00	1.00	1.00
	Second highest income group	1.32 0.99-1.77	1.23 0.91-1.67	1.11 0.78-1.58	1.02 0.72-1.46	1.41 0.92-2.17	1.17 0.76-1.80
	Third income group	1.28 0.95-1.71	1.15 0.85-1.57	**1.72** 1.25-2.37**	**1.55** 1.12-2.14**	1.41 0.93-2.14	1.14 0.75-1.74
	Fourth lowest income group	**1.39* 1.05-1.84**	1.22 0.89-1.65	**1.73** 1.25-2.39**	**1.44* 1.02-2.02**	**2.09*** 1.41-3.08**	1.46 0.96-2.21
	Lowest income group	**1.77*** 1.36-2.32**	**1.59** 1.19-2.13**	**1.95*** 1.43-2.66**	**1.63** 1.16-2.28**	**1.94** 1.31-2.87**	1.50 1.00-2.25

Reference group for time to first cigarette is smokes first cigarette after 15 minutes of waking. ***p<0.001, **p<0.01, *p<0.05
Model 1 was fitted with single SEP indicators (adjusting for age); Model 2 was fitted with all three SEP indicators (adjusting for age)

Table A8.2: Relationship (risk ratios (RR) and 95% confidence intervals) between first cigarette within 15 minutes of waking and SEP for women (Chapter 5)

SEP indicator		1992 RR 95% CI Model 1	1992 RR 95% CI Model 2	2002 RR 95% CI Model 1	2002 RR 95% CI Model 2	2011 RR 95% CI Model 1	2011 RR 95% CI Model 2
Education	Degree level or above	1.00	1.00	1.00	1.00	1.00	1.00
	Below degree level	1.29 0.96-1.74	1.29 0.93-1.78	**1.31*** **1.00-1.71**	1.12 0.83-1.50	**1.96**** **1.41-2.74**	**1.53*** **1.08-2.16**
	No qualifications	**1.87**** **1.41-2.48**	**1.65**** **1.18-2.31**	**2.15**** **1.64-2.82**	**1.64**** **1.21-2.24**	**2.63**** **1.84-3.75**	**1.72**** **1.17-2.52**
Occupation	Non-manual	1.00	1.00	1.00	1.00	1.00	1.00
	Manual	**1.43**** **1.23-1.65**	**1.23*** **1.04-1.45**	**1.39**** **1.18-1.63**	1.13 0.94-1.35	**1.40**** **1.16-1.71**	1.10 0.90-1.35
Income	Highest income group	1.00	1.00	1.00	1.00	1.00	1.00
	Second highest income group	1.06 0.78-1.45	0.92 0.67-1.26	1.21 0.81-1.80	1.13 0.76-1.69	**2.55**** **1.32-4.94**	**2.16*** **1.12-4.18**
	Third income group	1.20 0.90-1.61	0.97 0.72-1.31	**1.59*** **1.10-2.29**	1.43 0.99-2.07	**2.61**** **1.37-4.94**	**2.10*** **1.11-3.98**
	Fourth lowest income group	**1.48**** **1.12-1.94**	1.12 0.83-1.51	**1.67**** **1.17-2.37**	1.43 0.99-2.07	**4.40**** **2.40-8.05**	**3.45**** **1.88-6.36**
	Lowest income group	**1.55**** **1.19-2.01**	1.18 0.88-1.57	**2.00**** **1.43-2.81**	**1.61**** **1.14-2.29**	**3.72**** **2.02-6.83**	**2.68**** **1.44-5.00**

Reference group for time to first cigarette is smokes first cigarette after 15 minutes of waking ***$p<0.001$, **$p<0.01$, *$p<0.05$
Model 1 was fitted with single SEP indicators (adjusting for age); Model 2 was fitted with all three SEP indicators (adjusting for age)

Table A8.3: Relationship (risk ratios (RR) and 95% confidence intervals) between difficulty not smoking for one day and SEP for men (Chapter 5)

SEP indicator		1992 RR 95% CI Model 1	Model 2	2002 RR 95% CI Model 1	Model 2	2011 RR 95% CI Model 1	Model 2
Education	Degree level or above	1.00	1.00	1.00	1.00	1.00	1.00
	Below degree level	1.06 0.91-1.23	1.06 0.91-1.24	**1.27**** **1.09-1.48**	1.17 0.97-1.40	**1.18*** **1.01-1.38**	1.03 0.87-1.22
	No qualifications	**1.23**** **1.06-1.42**	**1.21*** **1.03-1.43**	**1.31**** **1.10-1.56**	1.14 0.92-1.41	**1.28**** **1.07-1.52**	0.98 0.80-1.20
Occupation	Non-manual	1.00	1.00	1.00	1.00	1.00	1.00
	Manual	1.02 0.93-1.11	0.95 0.86-1.05	1.10 0.99-1.21	1.02 0.90-1.14	**1.25***** **1.11-1.41**	1.10 0.97-1.26
Income	Highest income group	1.00	1.00	1.00	1.00	1.00	1.00
	Second highest income group	1.09 0.92-1.28	1.06 0.90-1.26	1.15 0.95-1.40	1.09 0.89-1.33	**1.55**** **1.17-2.06**	**1.47*** **1.10-1.96**
	Third income group	1.06 0.90-1.25	1.03 0.87-1.21	**1.25*** **1.04-1.51**	1.18 0.97-1.43	**1.71***** **1.31-2.25**	**1.59*** **1.20-2.11**
	Fourth lowest income group	**1.19*** **1.02-1.39**	1.13 0.96-1.33	**1.26*** **1.04-1.53**	1.17 0.95-1.44	**1.86***** **1.43-2.44**	**1.69***** **1.27-2.26**
	Lowest income group	1.09 0.93-1.27	1.05 0.89-1.24	**1.27*** **1.06-1.53**	1.17 0.95-1.44	**1.80***** **1.38-2.35**	**1.70***** **1.28-2.26**

Reference group for difficulty not smoking are those that would find it easy to not smoke for one day. ***p<0.001, **p<0.01, *p<0.05
Model 1 was fitted with single SEP indicators (adjusting for age); Model 2 was fitted with all three SEP indicators (adjusting for age)

Table A8.4: **Relationship (risk ratios (RR) and 95% confidence intervals) between difficulty not smoking for one day and SEP for women (Chapter 5)**

	SEP indicator	1992 RR 95% CI		2002 RR 95% CI		2011 RR 95% CI	
		Model 1	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**
Education	Degree level or above	1.00	1.00	1.00	1.00	1.00	1.00
	Below degree level	1.11 0.97-1.28	1.03 0.89-1.19	**1.40*** 1.20-1.63**	**1.30** 1.09-1.54**	**1.24* 1.05-1.46**	1.18 0.97-1.43
	No qualifications	**1.22** 1.06-1.40**	1.08 0.93-1.25	**1.51*** 1.28-1.77**	**1.30** 1.07-1.58**	**1.44*** 1.21-1.72**	**1.29* 1.04-1.61**
Occupation	Non-manual	1.00	1.00	1.00	1.00	1.00	1.00
	Manual	**1.20*** 1.11-1.30**	**1.17*** 1.07-1.27**	**1.13** 1.03-1.24**	1.02 0.92-1.13	**1.17** 1.05-1.31**	1.12 0.99-1.26
Income	Highest income group	1.00	1.00	1.00	1.00	1.00	1.00
	Second highest income group	**1.24** 1.06-1.45**	1.17 0.99-1.37	1.08 0.88-1.33	1.00 0.81-1.24	1.14 0.89-1.46	1.05 0.81-1.37
	Third income group	**1.20* 1.03-1.39**	1.12 0.96-1.31	1.17 0.96-1.42	1.05 0.85-1.29	1.07 0.84-1.36	0.93 0.72-1.21
	Fourth lowest income group	**1.21* 1.04-1.41**	1.09 0.93-1.28	**1.22* 1.02-1.47**	1.09 0.89-1.33	1.23 0.98-1.53	1.03 0.81-1.32
	Lowest income group	**1.32*** 1.15-1.52**	**1.20* 1.03-1.39**	**1.38*** 1.16-1.64**	1.21 0.99-1.47	**1.28* 1.02-1.59**	1.11 0.87-1.41

Reference group for difficulty not smoking are those that would find it easy to not smoke for one day. ***$p<0.001$, **$p<0.01$, *$p<0.05$
Model 1 was fitted with single SEP indicators (adjusting for age); Model 2 was fitted with all three SEP indicators (adjusting for age)

Table A8.5: Relationship (risk ratios (RR) and 95% confidence intervals) between not wanting to give up smoking and SEP for men (Chapter 5)

SEP indicator		1992 RR 95% CI Model 1	Model 2	2002 RR 95% CI Model 1	Model 2	2011 RR 95% CI Model 1	Model 2
Education	Degree level or above	1.00	1.00	1.00	1.00	1.00	1.00
	Below degree level	0.93 0.75-1.17	0.93 0.73-1.19	0.92 0.72-1.17	0.83 0.64-1.08	1.28 0.94-1.73	1.31 0.93-1.86
	No qualifications	0.86 0.68-1.09	0.90 0.69-1.17	0.94 0.71-1.24	0.83 0.60-1.16	1.40 0.99-1.97	1.31 0.87-1.98
Occupation	Non-manual	1.00	1.00	1.00	1.00	1.00	1.00
	Manual	1.02 0.93-1.11	0.97 0.82-1.16	1.10 0.99-1.21	1.25 1.00-1.56	1.04 0.83-1.30	0.96 0.74-1.26
Income	Highest income group	1.00	1.00	1.00	1.00	1.00	1.00
	Second highest income group	0.96 0.74-1.24	0.96 0.74-1.26	1.05 0.78-1.41	1.00 0.73-1.36	1.05 0.70-1.58	1.02 0.68-1.53
	Third income group	0.89 0.68-1.16	0.90 0.69-1.18	0.85 0.62-1.16	0.79 0.56-1.11	0.96 0.63-1.44	0.89 0.58-1.35
	Fourth lowest income group	0.97 0.76-1.25	1.01 0.77-1.31	0.93 0.67-1.28	0.85 0.59-1.21	1.02 0.69-1.52	0.97 0.63-1.48
	Lowest income group	0.96 0.75-1.24	0.99 0.76-1.30	0.98 0.72-1.32	0.92 0.64-1.31	1.27 0.88-1.86	1.10 0.73-1.68

Reference group for desire to quit smoking is wants to give up. ***$p<0.001$, **$p<0.01$, *$p<0.05$
Model 1 was fitted with single SEP indicators (adjusting for age); Model 2 was fitted with all three SEP indicators (adjusting for age)

Table A8.6: Relationship (risk ratios (RR) and 95% confidence intervals) between not wanting to give up smoking and SEP for women (Chapter 5)

SEP indicator		1992 RR 95% CI Model 1	1992 RR 95% CI Model 2	2002 RR 95% CI Model 1	2002 RR 95% CI Model 2	2011 RR 95% CI Model 1	2011 RR 95% CI Model 2
Education	Degree level or above	1.00	1.00	1.00	1.00	1.00	1.00
	Below degree level	0.98 0.75-1.27	0.99 0.75-1.30	**1.37*** **1.04-1.82**	**1.42*** **1.04-1.95**	1.09 0.81-1.48	1.03 0.73-1.45
	No qualifications	0.94 0.72-1.22	0.99 0.73-1.33	1.10 0.80-1.52	1.14 0.78-1.65	1.19 0.82-1.71	1.06 0.70-1.62
Occupation	Non-manual	1.00	1.00	1.00	1.00	1.00	1.00
	Manual	**1.20***** **1.11-1.30**	0.88 0.75-1.04	**1.13**** **1.03-1.24**	1.15 0.93-1.42	0.91 0.72-1.15	0.94 0.72-1.21
Income	Highest income group	1.00	1.00	1.00	1.00	1.00	1.00
	Second highest income group	0.80 0.61-1.06	0.82 0.61-1.09	0.92 0.61-1.37	0.82 0.55-1.24	1.00 0.64-1.57	1.03 0.65-1.64
	Third income group	0.89 0.69-1.16	0.93 0.72-1.21	1.09 0.76-1.57	0.97 0.67-1.41	0.76 0.48-1.21	0.76 0.47-1.22
	Fourth lowest income group	**0.74*** **0.57-0.97**	0.79 0.60-1.04	1.09 0.77-1.54	0.96 0.68-1.37	1.07 0.71-1.60	1.10 0.70-1.71
	Lowest income group	**0.78*** **0.61-0.99**	0.81 0.62-1.06	0.94 0.67-1.32	0.85 0.59-1.22	0.94 0.63-1.41	1.02 0.66-1.59

Reference group for desire to quit smoking is wants to give up. ***$p<0.001$, **$p<0.01$, *$p<0.05$

Model 1 was fitted with single SEP indicators (adjusting for age); Model 2 was fitted with all three SEP indicators (adjusting for age)

Appendix 9: Observed rates for alcohol consumption behaviours by SEP indicators for men and women

Table A9.1: Median weekly alcohol consumption in units by gender and survey year (Chapter 6)

	GHS 1978		GHS 1984		GHS 1992		GHS 2002		GLF 2011	
Persons aged 18-64 years	**Men** (*n* =7,143)	**Women** (*n* =7,706)	**Men** (*n* = 5,656)	**Women** (*n* = 6,250)	**Men** (*n* =5,691)	**Women** (*n* = 6,287)	**Men** (*n* = 4,513)	**Women** (*n* = 5,233)	**Men** (*n* =3,783)	**Women** (*n* =4,643)
	11.5	1.9	10.4	2.6	11.0	3.0	11.6	3.9	9.4	3.0

Table A9.2: Median weekly alcohol consumption in units by SEP indicators by gender and survey year (Chapter 6)

SEP indicator		GHS 1978		GHS 1984		GHS 1992		GHS 2002		GLF 2011	
		Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Education	Degree level or above	9.8	3.1	10.5	4.5	11.8	4.2	12.5	5.4	10.0	4.6
	Below degree level	12.2	3.1	11.5	3.4	12.1	3.3	12.2	4.5	10.5	3.0
	No quals	11.3	1.5	9.1	1.6	9.0	1.4	8.5	1.1	5.3	1.0
Occupation	Non-manual	9.8	2.7	11.0	3.8	11.5	3.5	12.4	4.7	11.0	4.5
	Manual	12.2	1.6	9.5	1.7	10.2	1.9	10.8	3.0	7.6	1.7
Income	Highest income group	13.9	3.8	14.4	5.3	13.9	5.3	15.2	7.4	13.5	7.0
	4th	12.1	2.3	11.6	3.4	12.4	3.4	13.5	5.1	11.6	4.7
	3rd	10.2	1.9	10.3	2.4	11.3	3.0	12.2	3.9	8.9	2.5
	2nd	10.6	1.6	9.1	1.6	10.5	1.8	8.3	3.1	7.6	1.6
	Lowest income group	9.1	1.1	6.1	1.1	7.3	1.0	5.9	1.5	3.5	1.0

Table A9.3: Heavy drinking rates (%) by gender (Chapter 6)

Persons aged 18-64 years	GHS 1978		GHS 1984		GHS 1992		GHS 2002		GLF 2011	
	Men (*n* =7,143)	**Women** (*n* =7,706)	**Men** (*n* = 5,656)	**Women** (*n* = 6,250)	**Men** (*n* =5,691)	**Women** (*n* = 6,287)	**Men** (*n* = 4,513)	**Women** (*n* = 5,233)	**Men** (*n* =3,783)	**Women** (*n* =4,643)
Heavy drinkers	10.4	10.4	10.1	10.3	11.1	9.5	10.0	9.7	9.8	10.0
Other drinkers	85.7	80.9	84.4	80.6	83.8	81.0	82.5	78.0	77.7	72.4
No alcohol in last 12 months	4.0	8.6	5.4	9.1	5.1	9.5	7.5	12.3	12.4	17.6

Notes:

1. Alcohol consumption level was defined as follows:

- Heavy drinkers were the top 10% of each survey sample who consumed the most units, therefore weekly units for heavy drinkers varied for each survey year as follows:
    - o   1978 - 52 units or above for men and 14 units or above for women;
    - o   1984 - 42 units or above for men and 15 units or above for women;
    - o   1992 - 42 units or above for men and 17 units or above for women;
    - o   2002 - 44 units or above for men and 22 units or above for women;
    - o   2011 - 44 units or above for men and 22 units and above for women.
- Other drinkers were defined as those who drank less than the weekly unit amounts for heavy drinking;
- None were those who had not consumed any alcohol during the last 12 months.

2. Where base numbers are less than 50, the percentages reported are shown in brackets []. These should be interpreted with caution due to the possibility of relatively high sampling errors associated with small numbers.

Table A9.4: Heavy drinking rates (%) by SEP indicators for men (Chapter 6)

SEP indicator		GHS 1978			GHS 1984			GHS 1992			GHS 2002			GLF 2011		
		Heavy	Other	None	Heavy	Other	None	Heavy	Other	None	Heavy	Other	None	Heavy	Other	None
Education	Degree level or above	5.6	91.3	[3.1]	7.8	88.6	[3.6]	8.0	89.2	[2.8]	7.4	87.2	5.4	8.6	80.5	10.8
	Below degree level	11.2	85.4	3.4	11.4	85.0	3.6	12.6	82.8	4.7	11.4	81.5	7.1	10.4	78.7	10.9
	No quals	11.2	84.0	4.8	9.9	82.4	7.7	11.1	81.3	7.6	10.1	78.1	11.8	[10.6]	67.8	21.6
Occupation	Non-manual	7.0	89.8	3.2	9.1	87.0	3.8	9.7	86.9	3.5	9.3	85.9	4.8	10.2	80.9	8.8
	Manual	12.7	83.0	4.3	11.0	82.6	6.4	11.9	81.9	6.2	11.1	79.4	9.5	9.1	75.6	15.4
Income	Highest income group	10.6	87.1	[2.3]	13.7	84.1	[2.2]	10.6	86.9	[2.5]	10.4	86.7	[2.9]	9.5	86.1	[4.4]
	4th	11.2	86.2	[2.6]	10.4	86.4	[3.2]	12.8	84.2	[2.9]	11.5	84.9	[3.7]	10.5	83.3	[6.2]
	3rd	10.3	85.9	3.8	9.4	87.0	[3.6]	11.2	86.7	[2.1]	10.8	85.4	[3.8]	9.9	77.2	12.9
	2nd	10.6	84.9	4.6	8.6	85.1	6.3	10.5	82.4	7.0	8.0	81.5	10.4	9.6	74.0	16.4
	Lowest income group	8.3	82.9	8.8	7.2	80.0	12.8	11.1	77.5	11.4	9.6	73.5	16.9	10.7	64.1	25.2

Notes :

1. Heavy drinkers were defined as follows:
   - 1978 - 52 units or above for men and 14 units or above for women; 1984 - 42 units or above for men and 15 units or above for women; 1992 - 42 units or above for men and 17 units or above for women; 2002 - 44 units or above for men and 22 units or above for women; 2011 - 44 units or above for men and 22 units and above for women.
   - Other drinkers were defined as those who drank less than the weekly unit amounts for heavy drinking;
   - None were those who had not consumed any alcohol during the last 12 months.
2. Where base numbers are less than 50, the percentages reported are shown in brackets []. These should be interpreted with caution due to the possibility of relatively high sampling errors associated with small numbers.

Table A9.5: Heavy drinking rates (%) by SEP indicators for women (Chapter 6)

SEP indicator		GHS 1978			GHS 1984			GHS 1992			GHS 2002			GLF 2011		
		Heavy	Other	None	Heavy	Other	None	Heavy	Other	None	Heavy	Other	None	Heavy	Other	None
Education	Degree level or above	14.5	80.0	[5.5]	12.8	81.9	[5.3]	11.8	83.2	4.9	8.0	82.6	9.4	10.3	75.7	14.0
	Below degree level	12.3	82.2	5.5	13.3	81.3	5.4	10.5	81.7	7.8	11.7	78.4	9.9	10.6	73.4	16.0
	No quals	8.7	80.5	10.8	7.3	80.7	12.1	6.9	79.5	13.5	7.1	72.1	20.8	[7.5]	62.7	29.8
Occupation	Non-manual	12.5	80.9	6.6	12.1	81.5	6.4	10.6	82.6	6.8	9.3	80.9	9.8	11.3	75.2	13.5
	Manual	8.8	81.1	10.1	8.7	80.3	11.1	8.1	80.5	11.4	9.4	75.9	14.7	8.7	70.0	21.2
Income	Highest income group	16.1	79.5	4.4	17.5	77.9	[4.6]	14.1	82.3	[3.5]	11.9	82.3	5.8	14.4	78.0	7.6
	4th	9.6	83.1	7.3	11.1	83.4	[5.6]	10.5	83.3	6.3	9.6	81.9	8.5	11.3	78.7	10.1
	3rd	9.4	82.7	7.9	8.2	85.8	6.0	9.1	83.5	7.4	9.6	81.8	8.6	9.3	75.1	15.6
	2nd	8.9	81.0	10.1	6.9	83.0	10.1	7.9	80.8	11.2	9.7	76.1	14.2	8.7	68.6	22.7
	Lowest income group	8.7	78.6	12.7	6.8	76.4	16.8	7.0	75.5	17.5	8.8	71.0	20.2	8.1	60.9	31.0

Notes :

1. Heavy drinkers were defined as follows:
   - 1978 - 52 units or above for men and 14 units or above for women; 1984 - 42 units or above for men and 15 units or above for women; 1992 - 42 units or above for men and 17 units or above for women; 2002 - 44 units or above for men and 22 units or above for women; 2011 - 44 units or above for men and 22 units and above for women.
   - Other drinkers were defined as those who drank less than the weekly unit amounts for heavy drinking;
   - None were those who had not consumed any alcohol during the last 12 months.

2. Where base numbers are less than 50, the percentages reported are shown in brackets []. These should be interpreted with caution due to the possibility of relatively high sampling errors associated with small numbers.

Appendix 10: Relationship between alcohol consumption behaviours and SEP indicators for men and women - regression tables

Table A10.1: Relationship (unstandardized β coefficients and 95% confidence intervals) between estimated weekly alcohol consumption and SEP indicators, plus age (grouped) obtained from multiple linear regression models for men for selected survey years (Chapter 6)

	SEP indicator	1978 Model 1	1978 Model 2	1984 Model 1	1984 Model 2	1992 Model 1	1992 Model 2	2002 Model 1	2002 Model 2	2011 Model 1	2011 Model 2
Education	Below degree level	**4.33*** 2.64 - 6.02	**3.88*** 2.10 - 5.66	1.20 -0.27-2.66	**2.81** 1.00 – 4.61	1.30 -0.08 - 2.67	**2.13** 0.61 - 3.64	**1.83*** 0.33 - 3.33	**2.87** 1.15 - 4.60	**1.77*** 0.12 - 3.42	**2.91** 1.03 - 4.79
	No qualifications	**5.31*** 3.64 - 6.98	**4.60*** 2.71 - 6.48	0.99 -0.50–2.49	**3.43** 1.42 – 5.44	0.17 -1.36 – 1.70	1.80 -0.01 – 3.61	0.24 -1.73 - 2.21	2.34 -0.02 - 4.70	-1.18 -3.70 - 1.34	1.53 -1.41 - 4.46
Occupation	Manual	**4.44*** 3.32 - 5.56	**4.41*** 3.15 - 5.68	0.06 -1.02-1.14	1.39 -0.06 – 2.84	-0.11 -1.18 – 0.97	0.38 -0.92 – 1.67	0.46 -0.86 - 1.78	1.14 -0.46 - 2.75	**-2.10** -3.65 - -0.55	-1.83 -3.65 - 0.01
Income	Second highest income group	-0.35 -2.02 - 1.33	**-1.96*** -3.65 - -0.27	**-2.97** -4.79- -1.15	**-3.94*** -5.82- -2.06	-0.32 -2.04 – 1.40	-0.84 -2.58 – 0.90	-1.16 -3.23 - 0.91	-2.00 -4.12 - 0.11	-1.34 -3.73 - 1.04	-1.50 -3.85 - 0.86
	Third income group	**-2.59** -4.28 - -0.90	**-4.64*** -6.37 - -2.92	**-5.75*** -7.57- -3.92	**-7.17*** -9.10- -5.24	**-1.99*** -3.73 - -0.25	**-2.82** -4.62 - -1.02	-1.40 -3.47 - 0.67	**-2.82*** -5.00 - -0.65	**-3.35** -5.78 - -0.92	**-3.50** -5.99 - -1.01
	Fourth lowest income group	**-2.38** -4.11 - -0.66	**-5.18*** -6.98- -3.39	**-6.48*** -8.34- -4.62	**-8.19*** -10.21- -6.17	**-2.01*** -3.77 - -0.26	**-3.18** -5.05 - -1.31	**-4.65*** -6.80 - -2.50	**-6.08*** -8.41 - -3.75	**-4.62*** -7.14 - -2.09	**-4.68** -7.35 - -2.00
	Lowest income group	**-4.02*** -5.87 - -2.17	**-6.84*** -8.76 - -4.93	**-8.65*** -10.57- -6.73	**-10.80*** -12.97- -8.63	**-3.01** -4.83 - -1.19	**-3.88*** -5.84 - -1.93	**-4.42*** -6.60 - -2.24	**-5.48*** -7.92 - -3.04	**-4.04** -6.55 - -1.52	**-4.75** -7.53 - -2.00

Bold text shows statistical significance while asterisks show level of significance (***$p<0.001$, **$p<0.01$, *$p<0.05$;)
Reference categories: Degree level or above; Non-manual occupation; Highest income group
Model 1 was fitted with single SEP indicators (adjusting for age); Model 2 was fitted with all three SEP indicators (adjusting for age)

Table A10.2: Relationship (unstandardized β coefficients and 95% confidence intervals) between estimated weekly alcohol consumption and SEP indicators, plus age (grouped) obtained from multiple linear regression models for women for selected survey years (Chapter 6)

	SEP indicator	1978		1984		1992		2002		2011	
		Model 1	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**
Education	Below degree level	-0.59 -1.31 - 0.14	-0.07 -0.81 - 0.67	-0.46 -1.24-0.31	0.62 -2.26-1.49	**-0.99**** -1.65 - -0.33	-0.03 -0.74 – 0.68	0.48 -0.27 - 1.23	**1.33**** 0.49 - 2.17	-0.81 -1.76 - 0.15	0.28 -0.87 - 1.43
	No qualifications	**-1.26***** -1.95 - -0.58	-0.16 -0.91 - 0.59	**-1.79***** -2.55- -1.03	0.24 -0.70-1.18	**-2.15***** -2.87 - -1.43	-0.55 -1.38 – 0.28	**-1.58**** -2.53 - -0.62	0.29 -0.84 - 1.42	**-2.77***** -4.17 - -1.38	-0.79 -2.54 - 0.96
Occupation	Manual	**-1.10***** -1.50 - -0.71	**-0.53*** -0.96 - -0.10	**-1.93***** -2.40- -1.46	**-0.89**** -1.49- -0.29	**-1.16***** -1.63 - -0.69	-0.26 -0.79 – 0.27	**-0.87**** -1.51 - -0.22	-0.10 -0.86 - 0.66	**-2.24***** -3.16 - -1.31	**-1.15*** -2.24 - -0.05
Income	Second highest income group	**-1.96***** -2.60 - -1.32	**-1.82***** -2.47 - -1.16	**-2.64***** -3.51- -1.78	**-2.42***** -3.30- -1.54	**-1.30**** -2.07 - -0.53	**-0.97*** -1.75 - -0.18	**-2.42***** -3.51 - -1.33	**-2.61***** -3.69 - -1.52	**-1.82*** -3.31 - -0.34	**-1.69*** -3.24- 0.14
	Third income group	**-2.15***** -2.78 - -1.52	**-2.00***** -2.65 - -1.34	**-3.70***** -4.56- -2.84	**-3.40***** -4.30- -2.51	**-2.01***** -2.78 - -1.25	**-1.62***** -2.43 - -0.81	**-2.59***** -3.68 - -1.50	**-2.88***** -4.00 - -1.75	**-3.88***** -5.37 - -2.39	**-3.56***** -5.17 - -1.95
	Fourth lowest income group	**-2.77***** -3.39 - -2.14	**-2.51***** -3.17 - -1.85	**-4.28***** -5.13- -3.43	**-3.79***** -4.71- -2.87	**-2.76***** -3.53 - -2.00	**-2.23***** -3.06 - -1.41	**-3.24***** -4.31 - -2.18	**-3.77***** -4.91 - -2.64	**-4.76***** -6.22 - -3.31	**-4.19***** -5.83 - -2.56
	Lowest income group	**-2.78***** -3.38 - -2.18	**-2.57***** -3.22 - -1.93	**-4.00***** -4.84- -3.16	**-3.62***** -4.56 - -2.69	**-3.36***** -4.11 - -2.61	**-2.75***** -3.59 - -1.92	**-3.83***** -4.89 - -2.77	**-4.06***** -5.24 - -2.88	**-4.59***** -6.06 - -3.11	**-3.22***** -4.94 - -1.50

Bold text shows statistical significance while asterisks show level of significance (***p<0.001, **p<0.01, *p<0.05;)

Reference categories: Degree level or above; Non-manual occupation; Highest income group

Model 1 was fitted with single SEP indicators (adjusting for age); Model 2 was fitted with all three SEP indicators (adjusting for age)

Table A10.3: Relationship (risk ratios and 95% confidence intervals) between estimated heavy drinking and SEP indicators, plus age (grouped) obtained from log binomial regression models for men for selected survey years (Chapter 6)

	SEP indicator	1978		1984		1992		2002		2011	
		Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Education	Below degree level	**1.85***	**1.67***	**1.35***	**1.54****	**1.50***	**1.57***	**1.50***	**1.53****	1.20	**1.38***
		1.41 - 2.42	1.26 - 2.22	1.06 - 1.72	1.14-2.09	1.21-1.85	1.24-2.00	1.20-1.87	1.19-1.99	0.95 - 1.51	1.05 - 1.80
	No qualifications	**2.25***	**1.92***	**1.45****	**1.68****	**1.46****	**1.53****	**1.54****	**1.67****	1.19	1.39
		1.73 - 2.94	1.43 - 2.56	1.14-1.86	1.20-2.36	1.16-1.84	1.16-2.03	1.16-2.04	1.19-2.33	0.84 - 1.68	0.91 - 2.12
Occupation	Manual	**1.81***	**1.67***	**1.21***	**1.31***	**1.25****	1.20	**1.22***	1.17	0.88	0.81
		1.55 - 2.11	1.41 - 1.97	1.03-1.43	1.05-1.64	1.07-1.44	0.99-1.44	1.02-1.45	0.95-1.45	0.71 - 1.09	0.63 - 1.04
Income	Second highest income group	1.11	0.96	**0.76***	**0.65****	1.19	1.05	1.06	0.93	1.09	1.06
		0.91 - 1.35	0.79 - 1.17	0.59-0.98	0.50-0.84	0.94-1.49	0.83-1.33	0.81-1.38	0.71-1.21	0.80 - 1.49	0.77 - 1.45
	Third income group	0.96	**0.79***	**0.67****	**0.55*****	1.04	0.87	1.04	0.84	1.03	1.00
		0.78 - 1.19	0.64 - 0.98	0.51-0.87	0.42-0.72	0.82-1.32	0.68-1.12	0.80-1.36	0.64-1.11	0.74 - 1.42	0.72 - 1.41
	Fourth lowest income group	1.04	**0.79***	**0.63****	**0.50*****	0.98	**0.77***	0.77	**0.60****	0.98	0.93
		0.84 - 1.28	0.63 - 0.97	0.48-0.83	0.37-0.67	0.77-1.25	0.59-1.00	0.57-1.05	0.44-0.84	0.70 - 1.38	0.65 - 1.34
	Lowest income group	0.81	**0.61****	**0.53*****	**0.38*****	1.04	0.82	0.92	0.74	1.10	0.97
		0.63 - 1.04	0.47 - 0.79	0.39-0.72	0.27-0.54	0.81-1.34	0.62-1.09	0.68-1.24	0.53-1.04	0.79 - 1.53	0.67 - 1.40

Bold text shows statistical significance while asterisks show level of significance (***$p<0.001$, **$p<0.01$, *$p<0.05$;)

Reference categories: Degree level or above; Non-manual occupation; Highest income group

Model 1 was fitted with single SEP indicators (adjusting for age); Model 2 was fitted with all three SEP indicators (adjusting for age)

Table A10.4: Relationship (risk ratios and 95% confidence intervals) between estimated heavy drinking and SEP indicators, plus age (grouped) obtained from log binomial regression models for women for selected survey years (Chapter 6)

SEP indicator		1978 Model 1	1978 Model 2	1984 Model 1	1984 Model 2	1992 Model 1	1992 Model 2	2002 Model 1	2002 Model 2	2011 Model 1	2011 Model 2
Education	Below degree level	**0.77***	0.88	0.96	1.21	0.84	1.04	**1.33**	**1.43**	0.98	1.18
		0.62 - 0.95	0.71 - 1.08	0.77-1.18	0.92-1.58	0.69-1.03	0.83-1.29	1.09-1.62	1.13-1.81	0.81 - 1.19	0.95 - 1.47
	No qualifications	**0.67***	0.90	**0.64***	1.01	**0.62***	0.87	1.04	**1.45***	**0.71***	0.94
		0.55 - 0.83	0.72 - 1.13	0.51-0.80	0.74-1.39	0.49-0.79	0.66-1.17	0.78-1.39	1.03-2.03	0.51 - 0.99	0.63 - 1.40
Occupation	Manual	**0.69***	**0.79**	**0.71***	1.00	**0.77**	0.91	1.02	1.04	**0.76**	0.87
		0.61 - 0.79	0.69 - 0.92	0.61-0.82	0.82-1.22	0.65-0.90	0.76-1.10	0.86-1.22	0.85-1.27	0.63 - 0.93	0.69 - 1.09
Income	Second highest income group	**0.62***	**0.66***	**0.63***	**0.64***	**0.74**	**0.78***	**0.74***	**0.69**	0.77	0.77
		0.51 - 0.76	0.54 - 0.81	0.49-0.80	0.50-0.82	0.59-0.92	0.62-0.99	0.57-0.96	0.53-0.91	0.59 - 1.00	0.59 - 1.01
	Third income group	**0.61***	**0.65***	**0.47***	**0.47***	**0.63***	**0.68**	0.79	**0.70***	**0.63**	**0.63**
		0.50 - 0.75	0.53 - 0.78	0.36-0.61	0.35-0.62	0.50-0.79	0.53-0.88	0.61-1.03	0.53-0.92	0.47 - 0.85	0.47 - 0.85
	Fourth lowest income group	**0.52***	**0.58***	**0.39***	**0.42***	**0.56***	**0.63**	**0.76***	**0.60***	**0.58***	**0.61**
		0.43 - 0.64	0.47 - 0.72	0.30-0.52	0.31-0.56	0.44-0.71	0.49-0.83	0.59-0.98	0.54-0.80	0.44 - 0.78	0.45 - 0.84
	Lowest income group	**0.55***	**0.59***	**0.39***	**0.39***	**0.49***	**0.54***	**0.66**	**0.54***	**0.54***	**0.64***
		0.45 - 0.67	0.48 - 0.73	0.30-0.51	0.29-0.53	0.38-0.63	0.41-0.72	0.51-0.86	0.40-0.73	0.40 - 0.72	0.47 - 0.89

Bold text shows statistical significance while asterisks show level of significance (***$p<0.001$, **$p<0.01$, *$p<0.05$;)

Reference categories: Degree level or above; Non-manual occupation; Highest income group

Model 1 was fitted with single SEP indicators (adjusting for age); Model 2 was fitted with all three SEP indicators (adjusting for age)