



Public Health
England

Social and economic inequalities in diet and physical activity

About Public Health England

Public Health England's mission is to protect and improve the nation's health and to address inequalities through working with national and local government, the NHS, industry and the voluntary and community sector. PHE is an operationally autonomous executive agency of the Department of Health.

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1. Introduction

Health is not distributed equally across society. There is clear evidence of social and economic inequalities in many aspects of health.¹ Inequalities can be measured using a number of social and economic variables such as income, occupational status or education. These are often used as proxy measures to categorise groups of the population by their “socioeconomic position”. The lower a group’s socioeconomic position, the worse their health tends to be.¹

The Health and Social Care Act 2012 places legal duties on PHE, local authorities and the NHS to demonstrate that they have taken into account the need to reduce health inequalities in all their work. The Equality Act 2010 includes a public sector equality duty and defines certain characteristics as being at higher risk of inequality. These characteristics are “protected” and are: age, disability, gender reassignment, pregnancy and maternity, race, religion or belief, sex, sexual orientation, marriage and civil partnership.²

This briefing paper describes social and economic inequalities associated with two of the main determinants of obesity – diet and physical activity – and provides possible explanations for these inequalities. The PHE Obesity Knowledge and Intelligence team has also produced factsheets that describe the relationship between obesity and various measures of socioeconomic position for both **adults** and **children**.

2. Measuring inequalities

Selecting appropriate measures and groups

In the context of health status, risk or outcomes, “inequality” refers to differences in health between groups of individuals.³ Other terms used include “disparities” or “variations” in health.

In measuring health inequality it is important to focus on the most appropriate indicators of health status, and also to use the most appropriate categories of population group for comparison. A number of categorisations or proxy measures may be used, many of which are interrelated:

- demographic variables (age, sex)
- sociodemographic categories (area of residence, ethnicity, disability)
- measures of economic status (car ownership, employment, income)
- measures of social position (education, employment, occupational social class, socioeconomic groupings, housing, tenure status)
- social environment (housing conditions, rural versus urban)
- social capital (social networks, social support)

For some health outcomes similar patterns of inequality may be observed whichever measure or indicator is used. However, this is not always the case. For example, patterns of inequality in obesity prevalence using education as a measure of socioeconomic position differ from patterns using income as a measure.⁴ Patterns of health inequality should therefore be interpreted carefully and with reference to the measurement methods used. Proxy variables are commonly used. These utilise available data to describe more complex social factors. For example socioeconomic position could be described using data on household or individual income, car ownership or housing tenure. However, caution should be applied when interpreting data using proxy measures. Car ownership and housing tenure, for example, have become less sensitive indicators of income in the last 20 years.⁵

Indices of deprivation

Measurement of inequality can also be based on an “index of deprivation” which is an attempt to quantify the complex issue of “deprivation” into one measure or rank. An index frequently used to describe health inequalities in England is the “Index of Multiple Deprivation”.⁶ Deprivation indices typically use a range of indicators covering measures of inequality such as income,

health and housing. Statistical methods are used to combine and weight indicators to provide an overall score for a geographical area.³ While useful, such indices should be applied and interpreted with caution as each index will have its own set of assumptions and potential biases according to the measure used.

Sociodemographic variables

Sociodemographic variables such as ethnicity and disability are often associated with inequalities in health. This is in part due to the social and economic factors that combine to have an impact on those groups. For example, minority ethnic groups tend to have higher levels of unemployment, have lower incomes than non-minority groups in the UK⁷ and tend to be spatially concentrated in deprived urban areas.⁸ Disabled people are far less likely to be employed than non-disabled people and around twice as likely to have no qualifications.⁹ PHE Obesity Knowledge and Intelligence has published a number of resources relating to demographic and sociodemographic patterns in obesity that are available on www.noo.org.uk.

Focus of this paper

The focus of this paper is to describe and explain inequalities in diet and physical activity that are related to social and economic measures. This paper will not focus on demographic and sociodemographic variables such as age, sex, area of residence, ethnicity or disability. While age and sex can be useful indicators of health status, risk and outcomes, they cannot be used as measures of inequality without additional categories that provide a proxy for socioeconomic position.³

3. Socioeconomic inequalities in health outcomes

The Marmot Review *Fairer Society, Healthy Lives* (published in 2010) highlighted that people from different socioeconomic groups experience avoidable differences in health, wellbeing and length of life, but that the relationship is graded: the higher a person's socioeconomic position, the better his or her health.

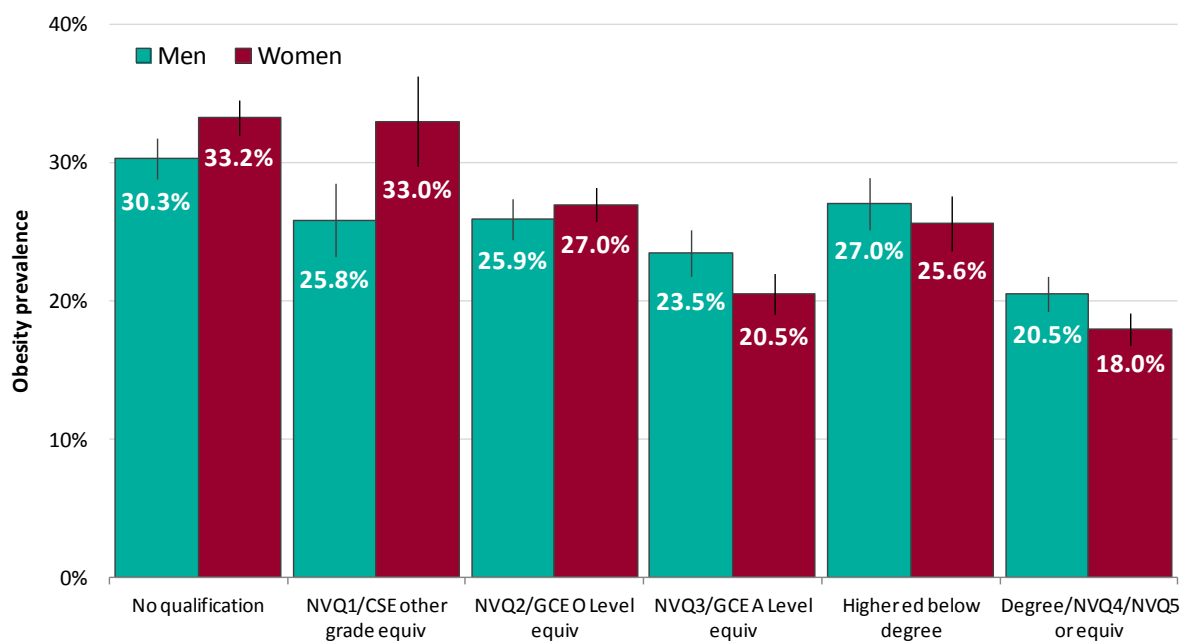
The review stated that “creating a fairer society is fundamental to improving the health of the whole population and ensuring a fairer distribution of good health”.¹ Prevalence of a number of diseases such as cardiovascular disease,¹⁰ and cancer is higher among people from lower socioeconomic groups.¹ Other health indicators such as overall mortality, life expectancy, infant mortality and self-reported health follow similar patterns.¹

Some health-related behaviours such as smoking and drug use also show socioeconomic gradients.^{11,12} In England people living in the poorest neighbourhoods will on average die seven years earlier than people living in the wealthiest neighbourhoods.¹

4. Socioeconomic inequalities in obesity prevalence

Obesity prevalence in England is associated with measures of socioeconomic position – with higher levels of obesity found among more deprived groups.¹ This association is stronger for women than for men,⁵ a pattern that has been observed in many other developed countries.¹³ Data from the Health Survey for England indicate that for women, obesity prevalence increases with decreasing socioeconomic position, regardless of the measure used.⁴ For men however, only occupation-based and qualification-based measures show a consistent inverse correlation. Figure 1 shows the relationship between obesity and highest level of educational qualification.

Figure 1: Prevalence of obesity among adults (aged 16+ years) by highest level of educational qualification 2007-2011, with 95% confidence limits (Health Survey for England)



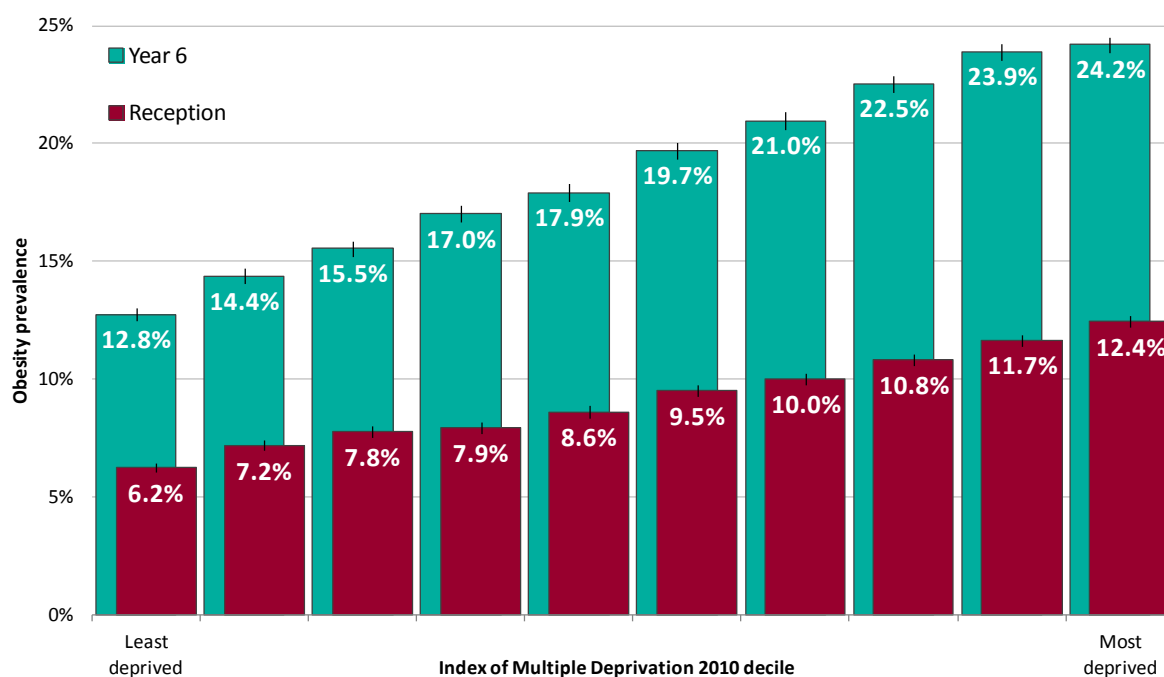
Adults are classified as obese where BMI is $\geq 30\text{kg/m}^2$

Among adults there may also be differences in the associations between obesity and socioeconomic position across ethnic groups.

Among children there are stark social gradients in obesity prevalence. The National Child Measurement Programme data from 2006/07 to 2011/12

indicate that prevalence of obesity among both Reception year (aged 4–5 years) and Year 6 (aged 10-11 years) children in England in the most deprived 10% is approximately double that of the least deprived 10% (Figure 2).

Figure 2: Prevalence of obesity among children by Index of Multiple Deprivation 2010 decile and school year 2011/12, with 95% confidence limits (National Child Measurement Programme – England)



Children are classified as obese where BMI is $\geq 95^{\text{th}}$ centile of the UK90 growth reference

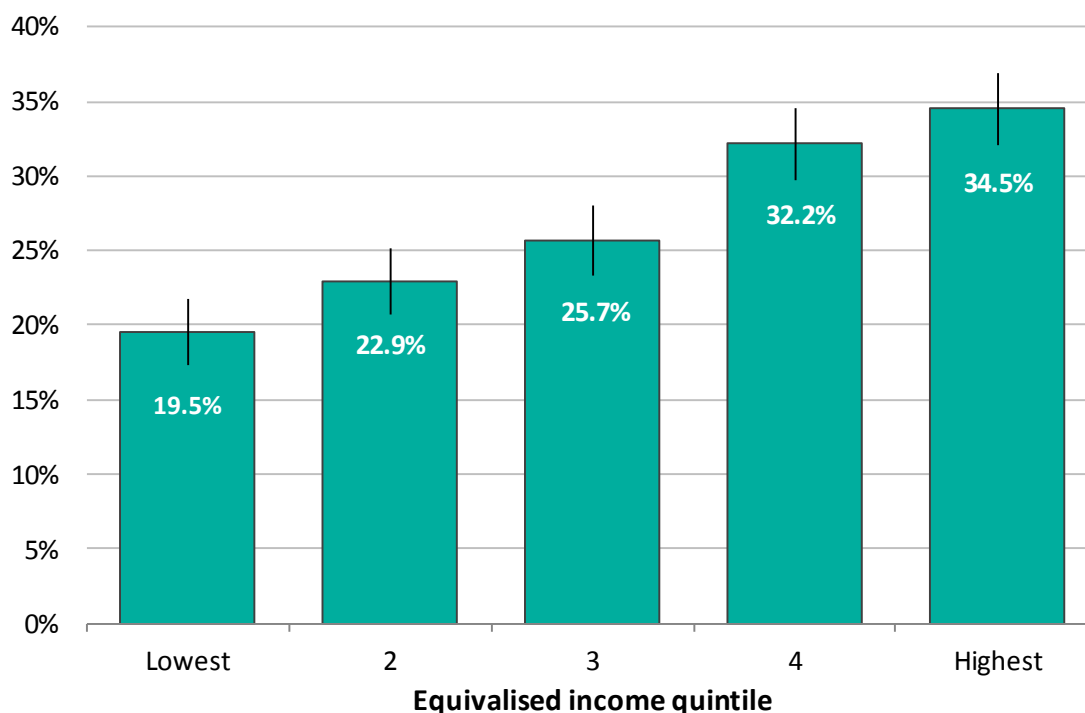
The relationship between obesity and various measures of socioeconomic position is described in more detail in the PHE factsheets on obesity and socioeconomic position in adults and children.

5. Inequalities and diet: descriptive data

Dietary intake and eating behaviours in England are related to socioeconomic position. People from lower socioeconomic groups (as measured by equivalised income and material deprivation)^a tend to have diets that are less healthy than people from higher socioeconomic groups.

Data from the Health Survey for England 2011 indicate that fruit and vegetable consumption varies significantly by equivalised household income. Adults in the higher income quintiles were more likely than those in lower income quintiles to report eating the recommended five or more portions per day. Figure 3 shows the proportion of men and women eating five or more portions of fruit and vegetables per day by equivalised household income: 34.6% in the highest quintile did so, compared with 19.7% in the lowest quintile.

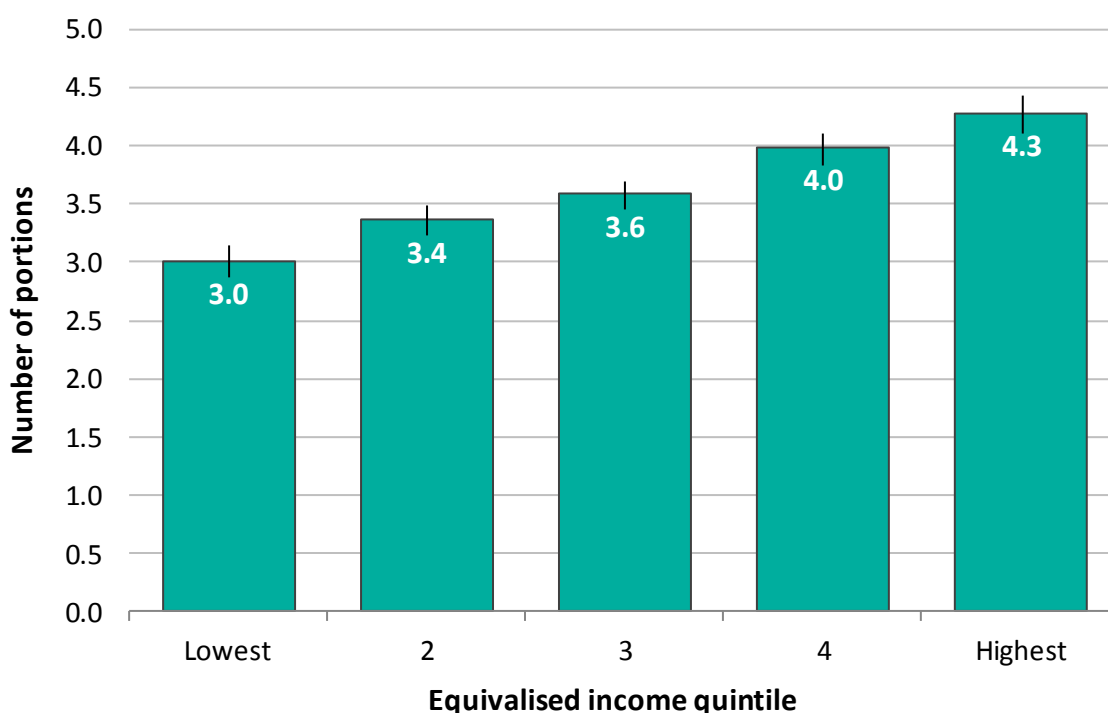
Figure 3: Proportion of adults (aged 16+ years) eating five or more portions of fruit and vegetables per day by equivalised income quintile, with 95% confidence limits (Health Survey for England 2011)



^a Equivalised income is adjusted household income to account for size and composition so that the incomes of all households are comparable

Figure 4 shows that the mean number of portions of fruit and vegetables consumed by adults aged 16 and over per day also increased from the lowest to highest income quintiles, with a mean of 3 in the lowest quintile and 4.3 in the highest. The differences between quintiles are statistically significant.

Figure 4: Average portions of fruit and vegetables consumed by adults (aged 16+ years) per day by equivalised income quintile, with 95% confidence limits (Health Survey for England 2011)



Recent data from the Living Costs and Food Survey 2011 (LCFS) also reflect these patterns. This survey combines data from questionnaires and a 14 day expenditure diary recording all purchases made in the period. Data analyses investigating household expenditure on different categories of food by equivalised income demonstrate socioeconomic inequalities in expenditure on food. Expenditure on different types of food is expressed as a percentage of all money spent on food and non-alcoholic beverages using weekly averages. These data represent the total household expenditure including adults and children.

Figure 5 shows household spending on fruit and vegetables as a proportion of all food and non-alcoholic drink expenditure from the LCFS. These data include all types of fruit and vegetables with the exception of dried fruit and

fruit juice. The data show that the proportion of food spent on fruit and vegetables increases as equivalised income increases. The proportion of spend on fruit and vegetables in decile one was statistically significantly lower than all the other deciles with the exception of decile two.

Figure 5: Household spending on fruit and vegetables by equivalised income decile, with 95% confidence limits (Living Costs and Food Survey 2011)

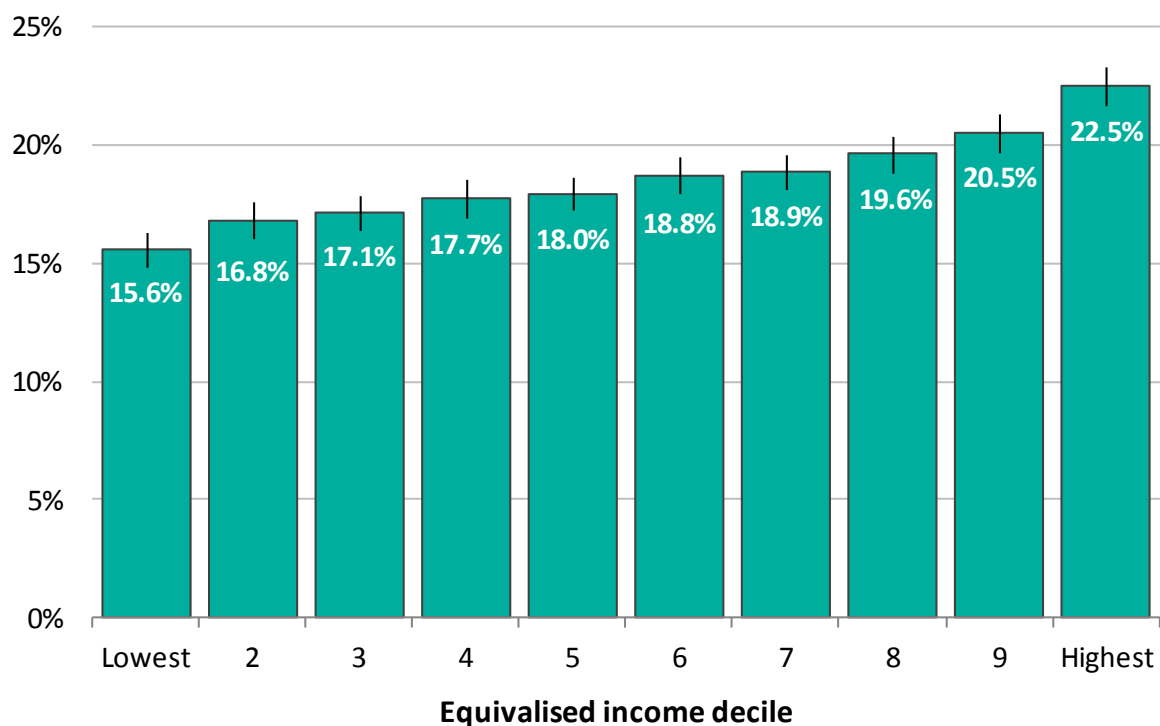
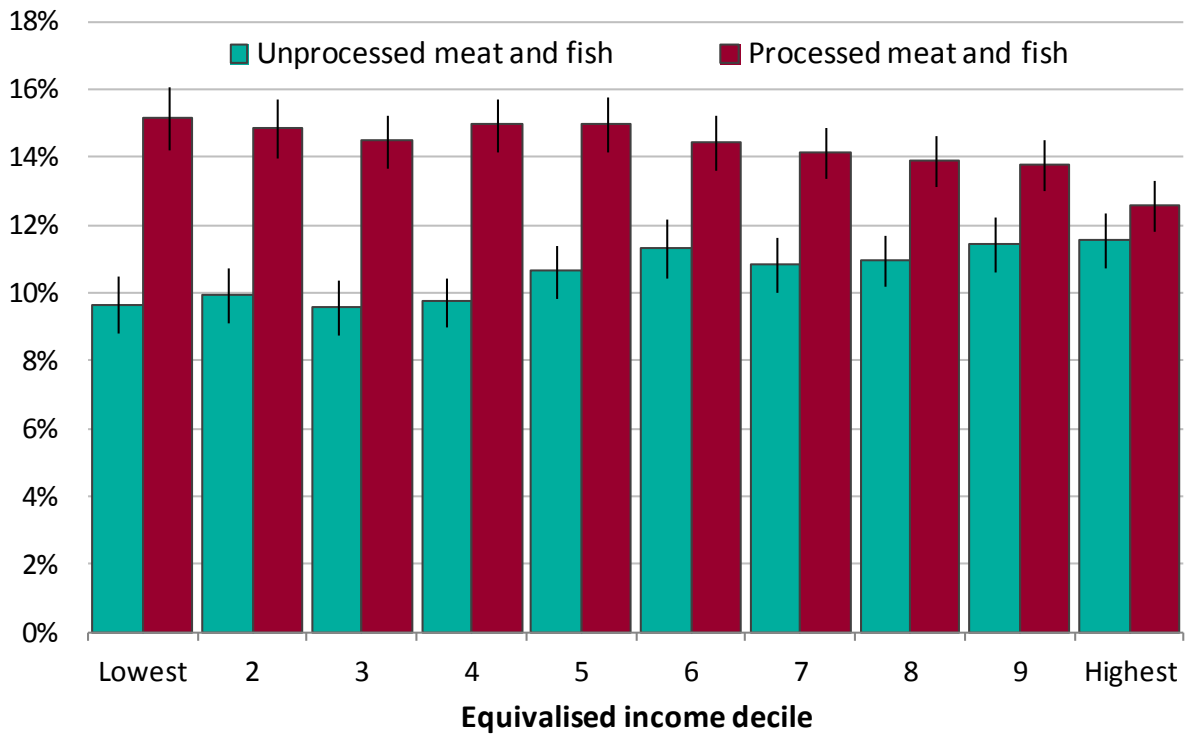


Figure 6 shows the proportion of food expenditure spent on processed and unprocessed meat and fish. Across all deciles spending on processed meat and fish is higher than spending on unprocessed meat and fish; however, the gap is more pronounced in more deprived households. Those in the most affluent 10% of households were found to spend less on processed meat, and more on unprocessed fish and meat than the least affluent 10%. These differences are statistically significant.

Figure 6: Household spending on processed and unprocessed meat and fish by equivalised income, with 95% confidence limits (Living Costs and Food Survey 2011)



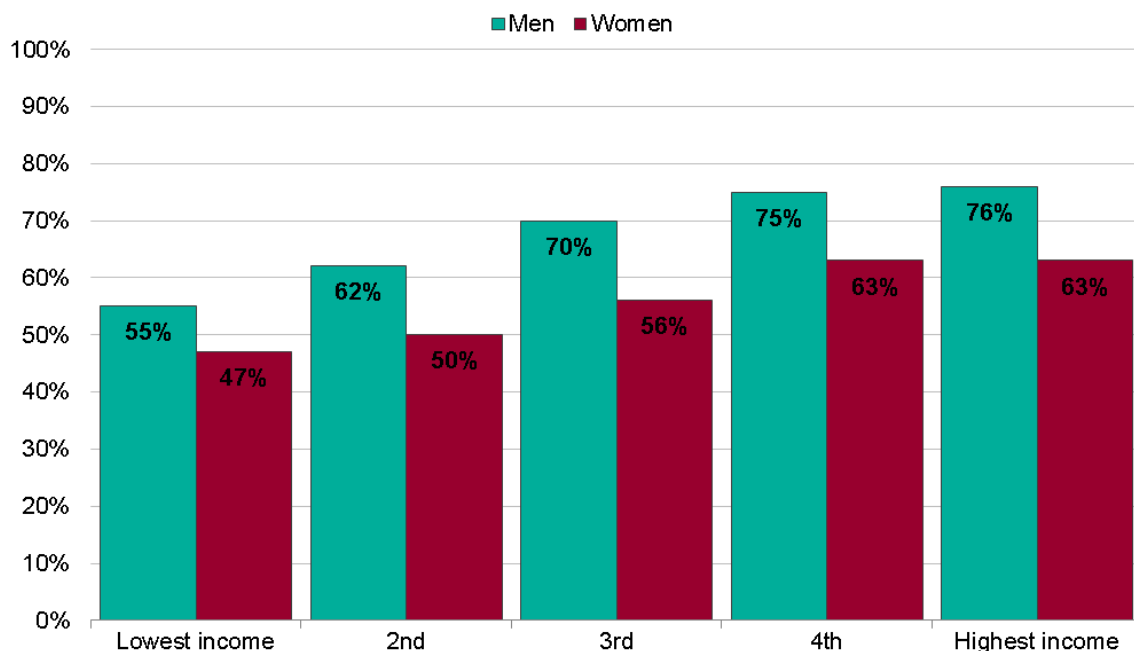
6. Inequalities and physical activity: descriptive data

There is a complicated relationship between socioeconomic position and physical activity which varies according to the measures used and the types of activity included.

The Health Survey for England is an annual health and lifestyle survey of a representative sample of adults and children in England. In 2012 the survey included questions asking about participation in all types of physical activity at work, and during leisure time. The 2012 survey¹⁴ showed that there is some evidence of a social gradient in participation in total physical activity.

Figure 7 shows that the proportion of participants meeting the physical activity recommendations (150 minutes of moderate intensity physical activity per week, or 75 minutes of vigorous activity, or an equivalent combination) varied by equivalised household income. For both men and women, those in the lowest income quintile were least likely to meet the recommended levels of physical activity.

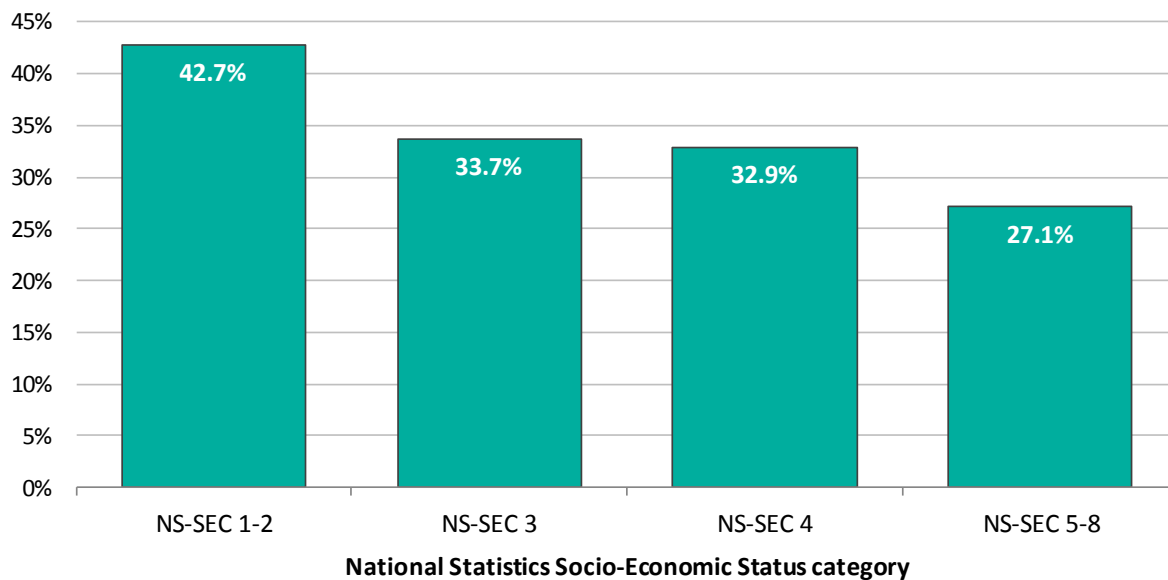
Figure 7: Proportion of participants meeting the recommended amount of physical activity by equivalised household income and sex 2012 (Health Survey for England)



This measure of total physical activity includes activities carried out through work, including manual occupations. The relationship may also be influenced by patterns of active transport (walking and cycling), as people on lower incomes may walk or cycle more due to lack of access to a car or public transport.^{15,16}

Participation in sport and active leisure pursuits is also socially patterned.¹⁵ The Active People Survey (APS) is an annual survey of sport and physical activity participation among a sample of 500 adults per local authority in England. The APS reports a socioeconomic gradient in sport participation. Using the National Statistics Socio-Economic Classifications (NS-SEC)¹⁷ the survey shows that 43% of adults in groups 1 and 2 (managerial/professional) take part in sport for at least 30 minutes once a week or more, compared to 27% of adults in groups 5-8 (lower supervisory/technical/routine occupations and unemployed/students).

Figure 8: Participation in sport among adults (aged 16+ years) by socioeconomic position: percentage doing one or more session per week of sport for 30+ minutes 2011/12 (Active People Survey)^b



^b NS-SEC 1 = Higher managerial, administrative and professional occupations; NS-SEC 2 = Lower managerial, administrative and professional occupations; NS-SEC 3 = Intermediate occupations; NS-SEC 4 = Small employers and own account workers; NS-SEC 5 = Lower supervisory and technical occupations; NS-SEC 6 = Semi-routine occupations; NS-SEC 7 = Routine occupations; NS-SEC 8 = Never worked and long-term unemployed.

7. What might explain socioeconomic variations in physical activity and dietary behaviour?

There is no simple explanation for the social and economic inequalities presented in sections 5 and 6. The Foresight report *Tackling Obesities* was one of the most comprehensive investigations into obesity and its determinants in the UK. It described the complex relations between the social, economic and physical environments and individual factors that underlie the development of obesity.¹⁸ The following section describes some of the evidence to help explain how these factors may be interrelated and how they may influence behaviour.

The physical environment

The Foresight report had a strong focus on the concept of an “obesogenic environment”, defined as the “sum of the influences that the surroundings, opportunities or conditions of life have on promoting obesity in individuals and populations”.¹⁹ A key aspect of this is the physical environment, which can have an important influence on access to healthy and unhealthy food and opportunities to be physically active or sedentary.

Research looking at environmental influences on diet has been primarily concerned with physical access to, and availability of food and drink. This relates to the physical location of food outlets, including their relative accessibility by public transport or on foot. It also relates to whether outlets that are physically accessible provide a range of healthy and affordable foods. Recent evidence relating to this is limited, particularly in the UK. While studies from the US, Australia and New Zealand have shown that in many poorer neighbourhoods healthy food is either not available, unacceptable, inaccessible or unaffordable, this has not been conclusively shown in the UK.^{20,21} In relation to accessibility two “natural experiments” evaluating the impact of new large food retail stores in low-income communities have had differing results. One study found positive changes in fruit and vegetable consumption and the other not.^{22,23} Two further studies conducted in major urban centres in the UK found no independent association between the food environment (in terms of availability), individual diet and fruit and vegetable consumption.^{24,25}

Evidence supporting a relationship between area deprivation and diet is also mixed. For example, one large-scale, cross-sectional, population-based study has shown that residential area deprivation predicts fruit and vegetable consumption independently of individual educational level and occupational social class.²⁶ However other evidence indicates a more complex picture. A recent qualitative study suggests that the relationship between area deprivation, food environment and dietary intake at individual level is inconsistent and is influenced by multiple interrelated social, economic and cultural factors.²⁷

The distinction between area-based and individual measures is clearly important to help understand what environmental factors influence dietary intake and what interventions may be effective. However, the associations between these measures and dietary intake appear to be complex.

The physical environment can have an extremely important influence on opportunities to be physically active. Guidance from the National Institute for Health and Clinical Excellence (NICE)²⁸ underlines the importance of both the built and natural environments in influencing how people are able to be physically active. Much of the recent evidence has focused on associations between features of the built environment (such as parks, paths, pavements and overall “walkability”) and measures of physical activity.²⁹ People from lower socioeconomic groups tend to have poorer access to environments that support physical activity such as parks, gardens or safe areas for play; are less likely to visit green space, and are more likely to live close to busy roads.¹ The local environment appears to be a more important influence on transport-related physical activity (walking and cycling) than recreational physical activity,³⁰ which may exacerbate social inequalities. People from lower socioeconomic groups are more likely to live in areas that do not support walking and cycling, but in turn are more likely to need to walk and cycle for transport and to access employment.¹ In addition, fear of traffic can be a strong disincentive to allowing children to play outside and to walking and cycling. Children in the 10% most deprived wards in the UK are more than three times as likely to be pedestrian casualties as children in the 10% least deprived wards.³¹

Economic environment (income and cost)

Income level and cost of food are important influences on food choice and dietary intake. As described in section 5, data from the Living Costs and Food Survey 2011 and the Health Survey for England 2011 show that consumption of, and expenditure on fruit and vegetables and other foods are patterned by equivalised income. There is some evidence from the US that foods high in fat and sugar are cheaper than diets primarily made up of lean meats, fish and fruit and vegetables,¹² but very few recent studies have looked at this in the UK.³² Analyses of the Living Costs and Food Survey data by the Department for Environment, Food and Rural Affairs (DEFRA) indicate that when food prices rose in real terms by 12% in 2007, low income households were disproportionately affected with a rise of 1.6% of their household spending going on food and drink, compared with a 0.3% rise in all households. Data also suggest that lower income households responded to rises in costs by choosing to buy cheaper alternatives.³³

Survey data collected by DEFRA from a panel of 3,000 UK residents found that the expense of food was the second most frequently cited barrier to eating healthily after food preferences.³³ Similar findings were obtained by the Low Income Diet and Nutrition Survey, which was undertaken between 2003 and 2005 in order to examine the diets of a sample of the 15% most materially deprived households in the UK. This showed that income and cost of food has an influence on food choice and dietary intake with 36% of respondents reporting that they couldn't afford to eat balanced meals. When given a list of 21 options from which to choose as many barriers to making positive changes to their diets as were relevant to them, "price of healthy foods" was the most frequently selected option with over 30% of respondents saying this was a factor.³⁴

Therefore, while health may partially influence food choice, the cost of food (including the perceived cost of buying more healthy food) may be a more important issue. In addition, in the face of budgetary pressures, individuals may be reluctant to risk experimentation with home cooking or different types of food.³⁵ For low income families outlay on food may be considered flexible relative to other household expenditure such as fuel, rent and water, with items such as fresh fruit and vegetables being replaced with cheaper alternatives.³⁶

For physical activity, affordability may be a barrier to taking part in many sports and activities, with costs for gym membership being out of the range of many people on low incomes. In the Health Survey for England (2007) lack of

money was cited as a barrier to exercise by 13% of men and 16% of women. Although it may appear to cost little to take part in activities such as walking, socioeconomic factors such as competing pressures on time for work or childcare may make this impractical for some people. The Health Survey for England showed 45% of men and 34% of women thought “work commitments” were a barrier to being active. This can mean that people from lower socioeconomic groups may have a lack of discretionary time to take part in physically active leisure pursuits – even if they are free. Conversely some people on low incomes may walk out of necessity, due to lack of access to a car or inability to pay for public transport.¹⁶

Social and cultural environment

The social and cultural environment embraces influences that come from immediate social surroundings, including friends, peers and wider society, and cultural or societal norms. Social and environmental factors can have an influence on an individual’s dietary intake and levels of physical activity. Qualitative studies have shown that the social environment, particularly partners, peers and family members have some influence on food choice.^{37,38} In a survey of a sample of materially deprived older people, social isolation was an influencing factor, with those who ate alone less likely to eat a nutritionally adequate diet.³⁹ It is likely that a complex and mutually reinforcing relationship exists between an individual and their physical and social environments which influences their diet.⁴⁰

There are considerable variations in dietary patterns across ethnic groups. A recent systematic review on the nutritional composition of children's diets found that compared with White Europeans, children from South Asian ethnic groups, and Bangladeshi children in particular, reported higher mean total energy intake. Black African and Black Caribbean children had lower fat intakes, and this was particularly marked among Black African children.⁴¹ These eating patterns are influenced by many cultural factors including food beliefs, dietary laws, religion, cultural patterns and customs.⁴² A qualitative study examining the food and eating practices of British Pakistanis and Indians with type 2 diabetes, found that many respondents attempted to balance the perceived risk of eating traditional South Asian foodstuffs against those of alienating themselves from their culture and community.⁴³ A further study focusing on women in the Somali community, found that the women were influenced by cultural factors such as the traditional Somali diet of rice, pasta and red meat and an association of fruit and vegetables with poverty.

The social environment also influences opportunities to be physically active, particularly when considered alongside aspects of the physical environment. For example, social trends in the last 20-30 years have tended to engineer physical activity out of daily living, through increased motorised transport, decreased manual labour, and increased use of labour-saving devices and technology.⁴⁴ Of particular note is the changing nature of leisure time, with people from higher socioeconomic groups having access to more discretionary time outside of employment to take part in physical activity. Access to leisure time can also be important for children's physical activity, and family support (such as taking children to sport or activity sessions) is also positively associated with levels of physical activity in adolescents.⁴⁵

Education

Level of education appears to be an important factor in the relationship between diet, physical activity and obesity. The Low Income Diet and Nutrition Survey showed that those with no educational qualifications were less likely to eat fruit and vegetables and more likely to eat high energy dense foods than those with educational qualifications.³⁴

There may be several mechanisms for this association, as a range of factors impact on education.¹ Education is often treated as a proxy for other measures such as income, occupation status or characteristics of the area of residence.⁴⁶ Higher levels of education may also be associated with a greater literacy and numeracy and therefore ability to access information about healthy lifestyle choices.⁴⁶ For example, some evidence shows that nutrition knowledge is associated with dietary intake, with those having poorer dietary knowledge, having less healthy diets.^{32,38}

Level of education has also been found to be inversely correlated with physical activity participation.⁴⁵ As with diet, it may be that education is a proxy for other factors such as income or characteristics of area of residence. For example, a DEFRA study identified a social gradient in the frequency of use of green spaces. People from the highest social group were much more likely than those from the lowest social group to visit green spaces frequently.⁴⁷ However, this relationship is likely to be due to a complex interaction of factors including differences in access to green space, leisure time, transport options, education, or culture. Low educational achievement is associated with behaviours such as smoking and being sedentary as well as diet and these associations remain even after adjustment for possible confounders such as low income and living in a deprived area.⁴⁸ Education may also be associated with an individual's confidence in their own abilities or

“self-efficacy”,⁴⁹ which is an important correlate of physical activity behaviour in adults.⁴⁵

Similarly, there is some evidence from a UK-based qualitative study, that compared with women of higher educational attainment, women of lower educational attainment had less perceived control over their families’ food choices; less support for attempts to eat more healthy food; fewer opportunities to observe and learn good food-related practices; more environmental barriers; and more ambiguous beliefs about longer term health outcomes associated with diet.⁵⁰

8. Discussion and conclusions

There is clear evidence of social inequalities in the prevalence of obesity. This paper has shown that there are also socioeconomic gradients in dietary intake and physical activity behaviour. People of lower socioeconomic position tend to eat less healthy diets and be less physically active than people of higher socioeconomic position. These inequalities in two of the main determinants of obesity are likely to contribute to the inequalities in the prevalence of obesity itself.

The nature of the relationships between socioeconomic position, diet and physical activity vary depending on the measure of socioeconomic position used. There is a complex and mutually reinforcing relationship between an individual and their physical and social environments which may influence their diet and physical activity behaviour.

The following interrelated social, economic, environmental, psychological and cultural factors may be important in explaining these associations:

- low income households may be less likely to have disposable income for non-essential costs such as leisure-time physical activity and are also likely to be disproportionately affected by any increases in food prices compared with higher income groups. This may influence their eating habits and physical activity levels
- areas of greater deprivation have reduced access to environments that support physical activity such as parks, gardens or safe areas for play, and are more likely to have transport environments less amenable to active travel. This is likely to influence the amount of physical activity that households living in these areas undertake
- education is associated with diet and physical activity behaviour, with lower educational attainment associated with poorer diet and lower physical activity levels. This may be because education acts as a proxy for other measures such as income and area of residence
- the evidence for a relationship between area deprivation and poor access to healthy food in the UK is inconclusive, and would benefit from further research

Understanding the nature of health inequalities is an extremely important challenge for people involved in tackling obesity. The complexities of the relationship between all these factors can only be unravelled with further research.

However, there is sufficient evidence available now to highlight the importance of targeted strategies to reduce inequalities in obesity and its determinants.

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