Chapter 4

How Does Obesity Spread?

The obesity epidemic is the result of multiple, complex and interacting dynamics, which have progressively converged to produce lasting changes in people's lifestyles. Remarkable changes in the supply, availability and prices of food in the second half of the 20th century, in line with major changes in food production technologies and marketing approaches, decreased physical activity at work, and changes in labour markets and conditions heavily influenced lifestyles and contributed to the obesity epidemic. This chapter explores some of the key determinants of health and their role in the obesity epidemic. The question is addressed of whether the changes that fuelled obesity and chronic diseases are simply the outcome of efficient market dynamics, or the effect of market and rationality failures preventing individuals from achieving more desirable outcomes. Social multiplier effects (the clustering and spread of overweight and obesity within households and social networks) are shown to be especially relevant to the formulation of effective policies to tackle obesity.

The determinants of health and disease

It is not uncommon for lifestyles to be viewed as independent from other determinants of health, and purely the result of free choice, in line with a traditional (personal) health care approach to disease prevention. This view tends to reinforce a culture of "victim-blaming" (Evans and Stoddart, 1994) that stigmatises those who take up unhealthy behaviours. The policy response that naturally follows calls for individuals to take responsibility for their own health and ensures the provision of suitable health care to those who reach high levels of risk or develop chronic diseases. If, on the other hand, lifestyles are viewed as individual responses to environmental influences, the focus of policy will shifts towards the environmental factors that determine individual behaviours.

A number of attempts have been made in recent years to conceptualise the roles and reciprocal influences of different groups of health determinants. As discussed in Chapter 2, dramatic improvements have been recorded over the past few centuries in health status and longevity (Fogel, 1994). Research has highlighted some of the factors that have contributed to such improvements, like increasing standards of living, education, access to clean water and sanitation, access to health care (Frank and Mustard, 1995). A large part of the work on health determinants originated from efforts to understand and tackle persisting health disparities (Mackenbach, 2006), particularly among socio-economic groups, as the focus of such research has often been on the determinants of differences in health among population groups.

Biology, environments and choices

The "Lalonde report" (Government of Canada, 1974) is often cited as an early attempt to frame the determinants of population health in a broader policy perspective than that associated with a medically-dominated paradigm. The report, inspired by Thomas McKeown's work published in the 1970s, characterises the "health field" as encompassing environmental and lifestyle factors, as well as human biology.

Dahlgren and Whitehead (1991) developed a model of the determinants of health inequalities centred on the individual and on his/her biological characteristics, with various "layers of influence", or groups of factors influencing health. The layers include: individual lifestyle factors; social and community influences; living and working conditions; general socio-economic, cultural and environmental conditions. Each of these layers has a

direct influence on individual health, but interactions between layers contribute significantly to shaping the impact of each group of determinants. The existence of a socio-economic gradient in all layers of determinants supports the view that the layers are closely interconnected. Understanding the relationships between layers of influence is as important as understanding the direct impact of each layer on individual health.

Wilkinson and Marmot (2003) identified ten areas in which solid evidence exists of the role of aspects of the social environment on health, elsewhere developed into a more extensive inventory of social determinants of health and evidence of their impact (Marmot and Wilkinson, 2006). The World Health Organisation established a Commission on the Social Determinants of Health in 2005 to emphasise the role of socio-economic influences in shaping recent dramatic changes in population health patterns and trends at the global level. The conceptual framework developed for the work of the Commission is built upon a model of the influences of two main groups of determinants: structural determinants, such as socio-economic and the political contexts, social structures and socio-economic position; and intermediary determinants, which mediate the effect of the former, including biological and behavioural factors, living and working conditions, psychosocial factors and health system determinants (Solar and Irwin, 2007).

In a policy perspective, it is important to know whether links between specific determinants and health are of a causal nature, in order to be able to design effective interventions. Good evidence of a causal link exists for education as a determinant of health status (Arendt, 2005), longevity (Lleras-Muney, 2005), and health-related behaviours such as smoking and obesity (Kenkel *et al.*, 2006; Gilman *et al.*, 2008). In turn, lifestyles were shown to be causally related to chronic diseases. For instance, both active and passive smoking, as well as environmental factors, were shown to cause lung cancer (Alberg *et al.*, 2005; Taylor *et al.*, 2007). Aspects of diet and drinking patterns were found to cause various types of cancers (Key *et al.*, 2004) and to be causally associated with risk factors such as hypertension (John *et al.*, 2002). However, other associations between lifestyles and chronic diseases have not yet been proven to be causal. For instance, the association of smoking with diabetes (Willi *et al.*, 2007), or the negative association of fruit and vegetable intake with coronary heart disease (Dauchet *et al.*, 2006). Environmental factors such as food production technologies, restaurant density, the price of restaurant meals, and the density of urban developments have a causal influence on obesity (Cutler *et al.*, 2003; Plantinga and Bernell, 2005; Rashad, 2006).

The importance of interactions between determinants

A large part of the research undertaken in recent years on the determinants of health focused on gathering evidence of the role of individual determinants

and groups of determinants (Lurie *et al.*, 2003). However, an increasing number of contributions emphasise the importance of the relationships among groups of determinants, and the fact that certain determinants mediate or modulate the influence of other determinants. Extensive interactions between determinants are also recognised in the work of the WHO Commission on the Social Determinants of Health, particularly between structural and intermediary determinants. Using different terminologies but the same basic idea, other models identify primary health determinants, including socio-economic and demographic factors, and secondary determinants, including a range of biological and psychosocial mediators of the effect of primary determinants (*e.g.* Kosteniuk and Dickinson, 2003).

Understanding interactions between individual health-related behaviours and the range of determinants that contribute to shaping such behaviours is a fundamental step in the design of effective interventions. Cutler and Glaeser (2005) observe that individual characteristics alone are unlikely to explain the uptake of health-related behaviours. If the opposite were true, individuals with certain characteristics, *e.g.* poor self-control, would tend to engage in different risky behaviours at the same time. On the contrary, the correlation of risky behaviours in individuals appears to be very low: smokers are unlikely to be also heavy drinkers (correlation 12.9%); obesity has virtually no correlation with smoking or heavy drinking; the uptake of medical preventive services like flu shots or screening is negatively, but very weakly, correlated with risky behaviours such as smoking, drinking, or having a high BMI. Cutler and Glaeser find empirical support for the hypothesis that certain "situational influences" are likely to trigger specific lifestyle choices in those who are exposed to such influences, with an intensity of response that may be modulated by individual characteristics. One such situational influence that the same authors explore in some depth is changes in food production technology, which are partly responsible for dietary changes and for the rise of obesity rates, particularly in individuals and families whose time available for meal preparation and cooking has become increasingly limited (Cutler *et al.*, 2003). This work lends support to the hypothesis that health-related behaviours are primarily determined by interactions between individual characteristics and specific environmental influences, rather than by the former alone.

If lifestyle choices are the result of environmental influences interacting with individual characteristics, then the socio-economic gradient in lifestyles and related health outcomes is likely to reflect differences between individuals in the degree of control they have over their own environment. Research conducted in the United Kingdom since the 1970s on the relationship between socio-economic position and health (Marmot, 2004) underscores the importance of the ability of individuals to gain control over their own environment as a crucial determinant of the same individuals'

health and health-related behaviours. Evidence is becoming available of the role of work-related stress in the relationship between socio-economic position and health. Stress was shown to be causally associated, for instance, with unhealthy lifestyles, the metabolic syndrome and coronary heart disease (Chandola *et al.*, 2008). However, the direction of the causal relationship remains uncertain. Are individuals predisposed (genetically or by other means) to achieving a better control over their own environment also able to reach more privileged socio-economic positions as well as a better health status through healthier lifestyle choices, or does a privileged socio-economic position confer better control and healthier lifestyles?

A certain degree of inertia in the relationship between socio-economic condition and health has been observed, as changes in the former do not always appear to translate swiftly into corresponding changes in the latter. The health effects of social mobility, discussed below, provide an example of such inertia. However, a larger scale phenomenon can be observed in cross-national comparisons showing very strong correlations between income and health in cross-sectional analyses, which become substantially weaker, or even disappear, when changes over time are considered. This may lead to the conclusion that factors such as technology transfer and health systems may determine the speed at which changes in wealth translate into changes in health at the national level (Deaton, 2004). A knowledge-based phenomenon similar to technology transfer might also act at the individual level, possibly based on education and ability to use information effectively, determining the speed at which changes in socio-economic position translate into changes in health. These observations further emphasise the importance of interactions between socio-economic condition and other determinants of health.

Determinants of health over the life course and across generations

The importance of adopting a life-course approach in assessing the determinants of health and disease has been widely acknowledged (Kuh and Ben Shlomo, 2004) based on a large body of evidence indicating that many key determinants of health produce their effects over the course of many years, across different life stages and sometimes even across generations. Health is the result of the accumulation of influences to which an individual is exposed since conception, and of the interactions of such exposures with individual biological characteristics.

The clustering of exposures to factors potentially leading to chronic diseases that is observed in cross-sectional studies in certain population groups (*e.g.* association of many aspects of disadvantage, from occupational hazards to inadequate housing, from poor education to low income, in the same individuals) can also be observed in a life-course perspective (Blane, 2006). Exposures to the same factors in earlier stages of life tend to correlate

highly with similar exposures in later stages. Social mobility may mitigate the health effects of such exposures over time. Perhaps the most accredited model of life-course effects is the "accumulation model", which essentially views the accumulation of exposures, and the interactions between such exposures, as responsible for the long-term health of individuals. This model has found some empirical support in relation to obesity. Research as part of the British Whitehall II study (Heraclides and Brunner, 2009) shows that the likelihood of obesity among adults increases with the accumulation of social disadvantage. Alternative models have also found empirical support. Some of the latter view exposures at critical stages of life as primary health determinants, others focus on the correlation of exposures at different stages in the life course, while viewing current exposures as primarily responsible for current health status (Blane, 2006; Hallqvist, 2004). The impact of social mobility has also been studied using different models. The evidence appears to indicate that social mobility tends to produce a convergence of health status towards the mean, *i.e.* socially mobile individuals depart from the typical health status of the group they leave but do not fully achieve the levels characteristic of the group they join. A resultant, immediately observable, effect is a reduction in health inequalities (Blane *et al.*, 1999b). A similar pattern has been observed in health-related behaviours (Karvonen *et al.*, 1999). Evidence from the Whitehall II study shows that downward social mobility is associated with a higher likelihood of obesity, but upward mobility does not appear to decrease the chances of becoming obese (Heraclides and Brunner, 2009). The relationship between social mobility and obesity has also been studied in young men in Sweden from the opposite perspective (whether obesity affects social mobility). Obesity was found to be a significant obstacle to upward social mobility, while it was often associated with downward mobility (Karnehed *et al.*, 2008).

However, health-related behaviours do not appear to be subject to life-course influences to the same degree as health status. Behaviours such as diet, physical activity and smoking correlate more strongly with current exposures to known determinants of those behaviours than with earlier exposures, with few exceptions, mainly in relation to diet (Blane *et al.*, 1996).

Education plays a particularly significant role in determining intergenerational health effects as well as intergenerational social mobility (Blane *et al.*, 1999a). Individuals belonging to disadvantaged socio-economic groups may be locked over time into pathways of disadvantage (their parents' educational attainment determines their own, and their own in turn determines their offspring's). This suggests that policies aimed at improving health and social outcomes by increasing educational opportunities for individuals with a background of disadvantage and lesser parental education have a potential for contributing to a prevention strategy.

The main driving forces behind the epidemic

A vast literature exists on the individual and environmental factors that have contributed to the obesity epidemic. A wealth of empirical analyses have been produced, many of which have shown important and statistically significant influences on individual behaviours and BMI. This literature is reviewed elsewhere (*e.g.* Branca *et al.*, 2007) pointing to a wide range of interconnected factors over the life course of individuals, from genetic background to early nutrition, to education, to exposure to obesogenic environments affecting many aspects of the lives of individuals. The knowledge that can be distilled from this literature leads to identifying three main groups of factors that have contributed to fuelling obesity in the last part of the 20th century and beyond: factors related with the supply of lifestyle commodities, particularly food; government policies in various sectors which have not always taken into consideration potential unwanted effects on individual lifestyles and health; and changes in labour markets and working conditions.

The mass production of food has changed both the quality and availability of food over time, with major effects on food prices and convenience of consumption from technological innovation (*e.g.* Cutler *et al.*, 2003). Falling relative prices of food contributed to up to 40% of the increase in BMI over the period 1976 to 1994 in the United States, according to some estimates (Lakdawalla and Philipson, 2002). Convenience also played a major role, in combination with falling prices, with the spread and concentration of fast food restaurants, for instance, being blamed in several studies as one of the factors contributing to obesity (Chou *et al.*, 2004; Rashad, 2006). The use of increasingly sophisticated marketing techniques is naturally associated with an increased supply of food, and is likely to have further contributed to the obesity epidemic (*e.g.* Nestle, 2006). These effects are consistent with the patterns observed in the distribution of obesity among population groups, with more vulnerable individuals and families, and those whose time available for meal preparation and cooking has become increasingly limited, being more exposed to the influences of supply-side changes.

A number of government policies are likely to have had unintended adverse effects on obesity and health in OECD countries by providing incentives to individuals, or even forcing them, to make certain lifestyle choices. For instance, agricultural policies adopted in many OECD countries, mostly based on fiscal measures such as subsidies to producers, may have raised the relative prices of healthy foods, such as fruit and vegetables, and lowered the relative price of less healthy foods, such as fats and sugar (*e.g.* Schäfer Elinder, 2005). International trade policies may have played a similar role in certain cases (*e.g.* Labonte and Sanger, 2006). Town planning, the design of the built environment and traffic regulation may discourage

active transport (such as walking and cycling) in favour of inactive (vehicular) transport. Recent research has been focusing, in particular on the contribution of urban sprawl on the spread of obesity (*e.g.* Plantinga and Bernell, 2005).

Changes in production technologies are among the most important contributors to reduced physical activity over recent decades, leading to a massive decrease in the number of those working in agriculture and, in certain manufacturing sectors, and a corresponding increase in sedentary jobs, particularly in the service sector (Lakdawalla and Philipson, 2002). Increased participation of women in the labour force, increasing levels of stress and job insecurity, longer working hours for some jobs have also been found to be associated with increasing levels of obesity.

Market failures in lifestyle choices

An economic approach to prevention involves interpreting individual lifestyles as the result of choices regarding the consumption of commodities such as food and physical activity or leisure time. These choices are subject to many external influences and constraints, and are driven by opportunity costs and other incentives. The dynamics through which lifestyles are shaped are broadly interpreted in economics as market mechanisms, whether or not monetary exchanges are involved. The health determinants that influence lifestyles, discussed earlier in this chapter, are in turn the result of similar dynamics.

Sometimes markers fail to operate efficiently. If those failures could be avoided, social welfare would be increased. Information failures may contribute to the adoption of unhealthy behaviours and lifestyles through an inadequate knowledge or understanding of the long-term consequences of such behaviours. Externalities may lead to the social costs and benefits of certain forms of consumption not being fully reflected in their private costs and benefits to individual consumers. A biased perception of the importance of future risks may prevent individuals from making choices in their own best interest now.

Several economists have reviewed potential market failures in relation to chronic diseases and prevention (*e.g.* Kenkel, 2000; and Suhrcke *et al.*, 2006), and some have focused specifically on diet, physical activity and obesity (*e.g.* Cawley, 2004; Brunello *et al.*, 2008). Where market failures exist and have a significant impact, the benefits potentially deriving from tackling the inefficiencies they cause may sometimes justify some form of corrective action, either by governments or other actors, provided such actions are viable and effective.

Externalities: Health expenditure and productivity

Passive smoking is a typical externality, as it has been shown to cause negative health effects on individuals other than the smoker. Such effects would not be reflected in the price of cigarettes if this were negotiated in a free

market between smokers and tobacco manufacturers. Negative externalities, such as passive smoking, lead to a consumption that is greater than socially desirable, because consumers do not pay the full price that would cover external effects. Conversely, positive externalities lead to underconsumption. In many cases, external effects can be "internalised", so that production and consumption may be brought back in line with social costs and benefits. Internalising externalities requires measures like transfers, taxes or subsidies, which may be imposed on, or offered to, consumers or suppliers of the commodity that generates the externality.

It is difficult to identify externalities immediately associated with diet, physical activity and obesity, similar to passive smoking, violent and disorderly behaviour associated with alcohol abuse, or traffic accidents resulting from reckless driving. But externalities may also be deferred, as the link between lifestyle choices and chronic diseases typically operates in the long term. Once chronic diseases emerge, and in some cases even before they emerge (*e.g.* when important risk factors emerge such as hypertension), the individuals affected will become less productive, possibly entirely unproductive, they will make a more intensive use of medical and social services, which may be collectively funded (through fiscal revenues or insurance), they may require care by members of the family and friends. Conversely, a reduced life expectancy may mean a less prolonged use of publicly funded medical and social services at the end of life, as well as reduced pension payments, which are not themselves externalities, but would translate into a less onerous fiscal burden and therefore less distortional effects on the overall economy. All of these phenomena involve externalities (negative and positive) on society at large, family and friends, ultimately associated with the lifestyle choices originally made by the individual.

But, do the externalities described here apply to obesity? Two externalities, in particular, deserve consideration: the fiscal, or insurance, externality, particularly in relation to the demand for collectively funded health care by the obese; and labour market externalities.

The discussion of health care costs associated with obesity in Chapter 1 suggests that costs increase steeply with BMI. This has provided some support to the widespread claim that obesity is associated with insurance externalities (individuals sharing the same risk pool will bear higher costs). However, as Brunello *et al.* (2008) emphasise: "A necessary condition for the externality to occur is that the obese incur higher lifetime costs than the non-obese." There is no conclusive evidence that lifetime health care costs are indeed higher for the obese. The evidence presented in Chapter 1 shows conflicting results from different studies. Even though Brunello and his co-authors reach the conclusion that lifetime costs are higher for the obese, both in the United Stated (8% higher than for the non-obese) and in Europe (12% higher),

considering the likely degree of moral hazard associated with those differences their analysis leads to the conclusion that the size of the insurance externality associated with obesity is too small to warrant attention by policy makers. This is in line with empirical evidence produced by Bhattacharya and Sood (2005), who estimated an externality in the order of USD 150 per capita, and with the arguments put forward by Philipson and Posner (2008).

Externalities may also be associated with the labour market outcomes of obesity, discussed extensively in Chapter 3. In particular, differences in productivity between the obese and people of normal weight, often associated with a larger recourse to disability benefits, represent an important source of negative externalities, although the size of these externalities depends on the characteristics of the relevant labour markets and has not been quantified in existing research. Further productive inefficiencies associated with obesity are those related to disadvantage in wages and employment opportunities suffered by the obese, especially women, of which ample evidence has been presented in Chapter 3.

Suhrcke (2006) emphasises the distinction between externalities that occur within the household (but some externalities within an individual's broader social network could be viewed in the same way) and externalities imposed on other subjects or society at large. The former, defined as "quasi-externalities", may be assimilated to either private or fully external effects. This is mostly a value judgement, and it is not for the economist to determine among what effects quasi-externalities should be accounted for, as long as they are not ignored. In the final section of this chapter we shall discuss some of the effects of obesity within households and social networks, that we shall call social multiplier effects, which may be regarded as externalities.

The classical tools to address externalities are taxes and subsidies. These may improve the efficiency of market exchanges, but will also produce distributional changes. For instance, if a government imposes a tax on a form of consumption that generates negative externalities, it may or may not be possible, or desirable, for the same government to redistribute the tax revenues raised to those who suffer the consequences of the negative externality (which will be diminished by the tax, but not eliminated altogether). Similarly, if a commodity that produces positive externalities is subsidised, it may not be possible to fund the subsidy by charging those who enjoy the positive external effects. From a mere efficiency standpoint, what matters is just that welfare gains exceed any losses, but societies are not indifferent to the distribution of those gains and losses, therefore governments will have to take this into account in assessing the desirability of a policy to address externalities.

Information failures

Information is a critical factor for markets to operate efficiently. In order to make rational and efficient choices, consumers have to be fully informed about the characteristics and quality of the goods they consume, about the benefits (and harms) they will derive from consumption, and about the opportunity costs they will incur. In the case of health-related behaviours, information on the nature and the size of the associated health risks may be lacking or difficult to use. It may be lacking because it does not exist (*e.g.* information on the long-term health effects of the consumption of genetically modified crops); because it is concealed or communicated in a misleading form by parties that have a vested interest (*e.g.* information on the health effects of smoking withheld by the tobacco industry in the recent past); or because it is complex and not easily accessible to the lay person (*e.g.* information on the health risks involved in the consumption of different types of fats).

The importance of information in forming health-related beliefs, a first step towards influencing lifestyle choices, is shown, for instance, by Cutler and Glaeser (2006) in their analysis of the determinants of higher smoking rates in Europe compared to the United States. The authors reach the conclusion that beliefs were changed in the United States when "substantial information about the harms of smoking" was made available to the public, while the same information appears to have been communicated less effectively in Europe.

Information clearly plays an important role in dietary choices and choices about physical activity, as discussed in Donald Kenkel's special focus contribution which follows this chapter, although many would argue that most individuals today possess the basic knowledge required for them to broadly discriminate between more and less healthy options. However, there is evidence that interventions based on the provision of information in various forms, from nutritional labelling to health education campaigns, from health claims in advertising to the dissemination of nutritional guidelines, has at least some impact on individual dietary choices (see, for instance, the evidence discussed in Chapter 6), suggesting that there is still scope for improving the information-base upon which individuals make their dietary choices.

In a policy perspective, the question is whether information failures may warrant some form of corrective action. Brunello *et al.* (2008), as well as Philipson and Posner (2008), do not find that existing evidence of information failures in relation to obesity would justify, *per se*, government action. Cawley (2004) insists on the "public good" nature of information, which suggests that information would be underprovided in a market setting and justifies governments' involvement in its provision. However, in relation to the issue of information on calories he concludes that "lack of information […] may not be

resolved by simply providing more information, but may require finding ways to present information so that consumers may process it more quickly and easily", which suggests that possible failures may concern individual ability to process information, rather than information itself (Cawley, 2004).

The direct provision of information by governments (*e.g.* health education campaigns to improve diets or increase physical activity) or the regulation of information (*e.g.* limits on advertising, guidelines on food labelling) are usually justified by limited or imperfect information on the part of the consumer. However, Glaeser (2006) and others do not appear to support the provision of information by governments (classified as "soft paternalism") in the generality of cases. One of the main reasons for this conclusion is that governments are not always equipped for delivering complex communication strategies, and in some cases their action may be influenced by the very interests it attempts to counter. When information failures cannot be fixed, for instance because communication of information is difficult, governments may still attempt to compensate for the effects of imperfect information by influencing behaviours through appropriate incentives (*e.g.* fiscal incentives like taxes and subsidies).

Additional insights from behavioural economics

A relatively recent stream of economic research supported by a growing body of empirical evidence, which goes under the name of behavioural economics, sheds light on additional potential failures affecting lifestyle choices. Behavioural research shows that the assumption of perfect rationality of the individuals and organisations involved in market transactions does not always reflect the behaviours of those agents. Failures of rationality may affect the way choices are made, the information upon which choices are based or the preferences that guide those choices. The first aspect includes, for instance, the use of heuristics, or rules of thumb, in decision making. The second includes a biased perception of the information available, because the way information is presented (framing) influences choices and because of cognitive errors in the interpretation of information. The third aspect includes inconsistent preferences for outcomes expected at different points in time, or for gains and losses.

Time preferences and self-control

Understanding the way in which people discount future costs and benefits in making their lifestyle choices is critical to the design of effective policies to counter the possible long-term ill-health effects of particular behaviours. A large body of empirical literature about time preferences in relation to a variety of outcomes, including health (reviewed by Lipscomb *et al.*, 1996), suggests that there are no particular reasons for the future health risks associated with certain lifestyle choices to be discounted at particularly high, or particularly low rates. Some characteristics of those choices, such as

the relatively small size of the perceived health risks involved, will make people discount future risks more heavily. But other characteristics of the same choices will have the opposite effect.

However, empirical evidence from behavioural economics research suggests that health-related behaviours often reflect a wholly different approach to discounting future health risks, termed hyperbolic discounting. This refers to an accelerated form of discounting, which heavily penalises future outcomes in present judgements, in a way that makes time preferences inconsistent. In lay terms, this may be identified as a self-control problem. Take, for instance, an obese person who is perfectly aware of the long term health risks associated with her condition. She may decide that such risks are offset by the pleasure she derives from her dietary habits and sedentary lifestyle at present, therefore she will choose to postpone quitting her habits. Procrastination, as discussed in Chapter 1, is a key feature of hyperbolic discounting. She perceives this as a postponement because she feels that after some time (say, in one year) she will no longer value pleasure from her current lifestyle more highly than the long term health risks associated with it. She is convinced that a year later she will be prepared to change some of her dietary and activity behaviours. However, after one year she will find herself discounting future health risks more heavily than she previously thought she would do, and she will still feel that the pleasures of her lifestyle offsets future health risks. Inconsistency in time preferences is reflected by the discrepancy between the way the individual originally thought she would discount future outcomes and they way she actually discounted them one year later. The result is a likely indefinite postponement of the decision to quit current habits. At least some evidence of hyperbolic discounting has been found in relation to obesity: "Time inconsistent preferences regarding weight is a very common problem among teenagers, since the majority of them end up failing to reduce their BMI after having declared to be trying to lose weight" (Brunello *et al.*, 2008).

Possible solutions to present-biased preferences have been discussed in a broad literature. For instance, Glaeser (2006) argues that there is limited scope for paternalistic government intervention to counter self-control problems, as this would require "tricky social welfare decisions", or a judgement of whether individuals' future self, or long term preferences, should be given priority over their present self, or short term preferences. Such problems, in Glaeser's view, are best addressed by increasing the availability of "technologies or contracts that facilitate private self-control". An example could be the fiscal deductibility of private expenditures on devices that may facilitate self-control (*e.g.* nutrition advice, organised physical activities, etc.).

Addictive and habitual behaviours

Certain behaviours reflect sequences of repeated acts of consumption which are not independent of each other. This may happen because the commodity consumed generates a form of chemical dependence that makes it difficult for individuals to quit consuming it, as is the case with heroin, or because of psychological mechanisms that encourage the reiteration of consumption. The term "habit" is generally used in relation to the latter mechanisms, while the term "addiction" is applied more widely, both in relation to drugs or tobacco smoking (which involves a certain degree of dependence on nicotine) and in relation to consumption that does not involve chemical dependence (*e.g.* gambling addiction). However, it is the non-independence of acts of consumption that may cause concern about individuals' ability to maximise their welfare, rather than the nature of the underlying mechanisms, which often co-exist to varying degrees. The presence of a chemical dependence may strengthen the justification for intervention, but some forms of psychological addiction may also be extremely powerful and potentially damaging.

Once an individual has first engaged in a certain form of addictive consumption, overcoming the disincentives involved in that original choice (*e.g.* the opportunity cost, or price, of the commodity consumed), they will tend to continue that consumption and they will need much greater disincentives to be able to quit than those they faced when they started. Lack of self-control and inconsistent time preferences may be seen to produce similar effects. Individuals perceive consumption as desirable at the present time, while thinking that sometime in the future they may find it no longer desirable and they will quit. However, their current and future preferences change as time passes and those individuals tend to continue their consumption and further procrastinate quitting.

Habit forming behaviour is consolidated behaviour in which individuals engage over a prolonged period of time and from which they find it difficult to wean themselves. A recent report on obesity published by a United Kingdom government agency emphasises two psychological mechanisms characterising habitual behaviour that represent obstacles to behaviour change (Maio *et al.*, 2007). The first is defined as "tunnel vision" and refers to a reduced motivation to seek and use information that may lead to a better understanding of the consequences of the behaviour in question, and to a tendency to discount the value of new information that is received, particularly when it highlights risks associated with the habitual behaviour. The second aspect is that people who engage in habitual behaviour act on the implicit assumption that if they found the behaviour desirable when they first adopted it, it must also be desirable for them to continue to engage in the

same behaviour. Factors like those described here are likely to prevent markets from working efficiently and may lead to sub-optimal outcomes for consumers. Of course consumers take up habits because they find it convenient to do so. In a short-term perspective, it may be efficient to avoid re-examining the desirability of a certain form of consumption every time consumption is repeated, but in doing so consumers may overlook longer term consequences of that consumption which may well offset any short-term efficiency gains. Economic models of "rational addiction", originally proposed by Becker and Murphy (1988), find support in empirical evidence (*e.g.* as discussed by Chaloupka and Warner, 2000, in relation to smoking). These models assume that consumers engaging in addictive, or habitual, behaviours are rationally aware of the short term as well as the long term consequences of those behaviours and make judgements on their desirability based on both the short term and the long term opportunity costs involved.

The issue of whether specific foods, or ingredients, may have addictive effects is still contentious (for instance, see Avena *et al.*, 2008, and Benton, 2010, on the controversy concerning the addictive properties of sugar). While the role of habitual behaviours, combined with strong environmental pressures, in the maintenance of unhealthy eating habits is a potentially important determinant of the obesity epidemic, the existing evidence-base is far too small to conceive any actions specifically aimed at tackling this effect or to justify broader interventions.

The social multiplier effect: Clustering of obesity within households, peer groups and social networks

When acts of consumption made by an individual over time are not independent of each other we may have addictive or habitual behaviour, as discussed in the previous section. When acts of consumption made by different individuals are not independent of each other, as in the presence of social influences and peer pressures, we likely have externalities (positive or negative). When an individual's decision to adopt a certain behaviour affects the likelihood that other individuals related to the first will adopt the same behaviour, it is possible that the behaviour in question will spread to a larger extent than is desirable (in the case of negative externalities) or to a smaller extent (in the case of positive externalities). For instance, if adults' eating behaviour influences that of their children, and if we assume that adults will make their food choices freely, on the basis of their own preferences alone, and they are fully aware of the health consequences of those choices, an inefficiently large number of adults will adopt less healthy eating behaviours (which cause negative externalities on their children), and an inefficiently small number will adopt healthier behaviours (causing positive externalities).

Individual behaviours are subject to powerful social influences that contribute to shaping individual preferences. Social influences interact with market behaviours to create what Becker and Murphy (2000) defined as "social markets". A recent important study, based on a unique dataset, provided an empirical demonstration of the impact that social networks of family and friends may have on an individual's chances of becoming obese (Christakis and Fowler, 2007). Individuals whose friends (including those living in remote locations) or relatives had been gaining weight were substantially more likely to become themselves obese.* Social influences and peer pressures are not necessarily market failures, but they can contribute to spreading unhealthy lifestyles in certain population groups and in certain communities. Whether or not social influences are to be considered deviations from perfectly rational choice, they are likely to pose an externality problem. The presence of social influences raises issues not only about the design of efficient ways to tackle unhealthy lifestyles, but also about the impact of any interventions on the distribution of health.

Much of the existing research on the clustering of obesity, particularly within families, has been conducted within a "nature *vs*. nurture" framework trying to distinguish the role of common genetic backgrounds from the role of shared environmental exposures and behavioural responses. Studies of twins and adopted children have offered the best chances to shed light on this conundrum of interacting effects. The former have tried to compare body weight and BMI in monozygotic and dizygotic twins, while the latter have compared correlations between children and natural parents with those between children and adoptive parents. The most recent review of these types of studies (Silventoinen *et al*., 2010) reaches the conclusion that both genetic factors and shared exposures contribute to obesity. For instance, correlations in BMI between children and adoptive parents of between 0.10 and 0.16 are observed, some of which are statistically significant. Although these correlations are weaker than those observed between children and their natural parents, they are sufficient to show that shared exposures and behavioural responses do play a part in the spread of obesity. In addition, many of the existing studies are fairly old, dating as far back as the 1960s and 1970s, when the obesity epidemic was yet to materialise. It is plausible that increasing environmental pressures and rapid changes in behaviours in more recent years have augmented the effects observed in earlier studies.

* After the publication of Christakis and Fowler's study, a note by Cohen-Cole and Fletcher (2008) in the *Journal of Health Economics* disputed the conclusions of the former study on the grounds that it did not properly account for shared contextual (environmental) effects. In their rejoinder, however, Fowler and Christakis (2008) dismissed the criticism received.

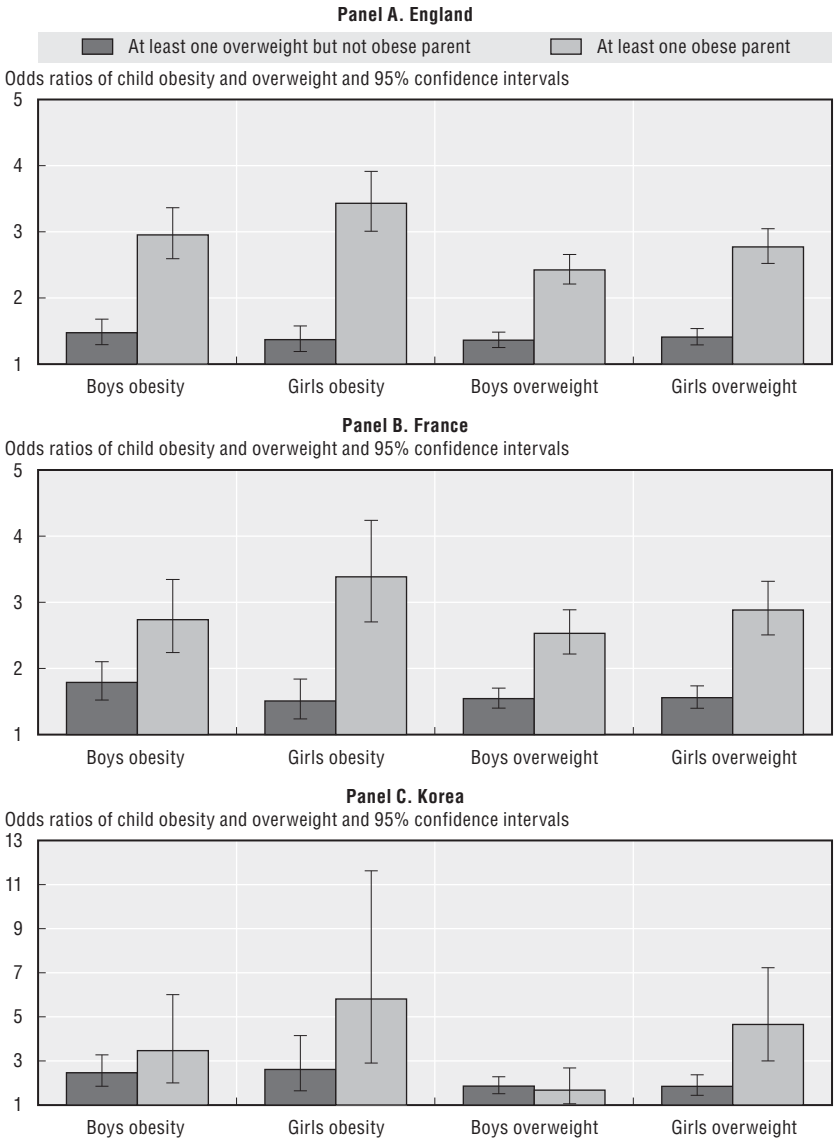
The OECD could conduct analyses of the spread of obesity within families in a select group of countries for which individual data were available at the household level. The relationship between parental and child (age 3-17) overweight and obesity was examined in England, France and Korea. The likelihood of being obese and overweight was assessed after adjusting for demographic and socio-economic characteristics such as age, gender, and socio-economic condition of the household. OECD findings highlighted a significantly higher likelihood for children to be overweight or obese if at least one of their parents, in turn, is overweight or obese. Figure 4.1 shows that the odds of a boy being obese when at least one of the parents is obese are almost three times higher in England compared to boys having both parents with normal BMI, and almost 3.5 times higher for girls. The strength of these correlations is even stronger in France and Korea.

In order to explore the potential role of behavioural influences in explaining the clustering of obesity, we compared correlations in BMI between spouses with those between mothers and their children, assuming the former would be purely driven by shared exposures and behavioural responses, while the latter would also be driven by shared genetic backgrounds. Figure 4.2 shows that the correlations between mothers and their children are stronger than those observed between spouses, but not by a large margin, in England, France and Italy. Korea is an exception in this analysis, because the correlation observed between spouses is very low. A recent study based on data from Germany (Clark and Etilé, 2010) suggests that the relatively strong correlation in BMI between spouses is mostly the result of partner selection, which may contribute to explaining the findings for Korea. It is also interesting to note that the correlations observed in this analysis are larger than those reported in older studies, which suggests that the clustering of obesity within families increased as the obesity epidemic progressed.

If the correlation in BMI were mainly the result of partner selection, concerns about its role in the spread of obesity would be somewhat attenuated. However, further OECD analyses of correlations in BMI between spousal couples of different ages, which shows that the strength of these correlations increases with couples' age (assumed to reflect the length of time spouses lived together) in three out of four countries examined (Figure 4.3), suggests that behavioural influences play a part in these correlations, as well as partner selection mechanisms. Of course, it is also possible that correlations increasing with age reflect the influence of period or cohort effects on such correlations, but it was not possible to ascertain this with the available data.

Further evidence of the importance of behavioural influences comes from studies of peer-group influences conducted among teenagers. In particular, two studies, both based on the US National Longitudinal Study of Adolescent Health, reach the conclusion that adolescents' weight is correlated with that

Figure 4.1. **Child obesity and overweight by parents' obesity status**

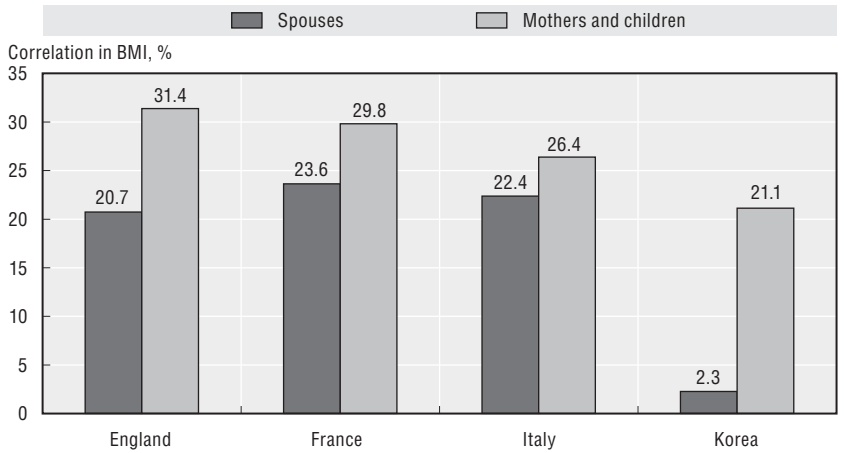


Note: Odds ratios are relative to children with normal-weight parents.

Source: OECD analyses of data from: Health Survey for England 1995-2007, French survey Santé et Protection Sociale 1992-2006 and Korean National Health and Nutrition Examination Survey 2001 and 2005.

StatLink http://dx.doi.org/10.1787/888932315982

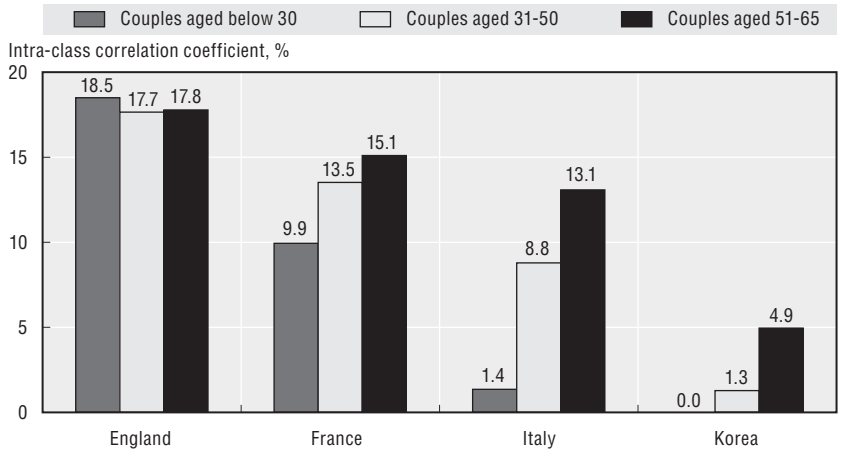
Figure 4.2. **BMI correlation between spouses and between mothers and children**



Source: OECD analyses of data from: Health Survey for England 1995-2007; French survey Enquête Santé et Protection Sociale 1995-2006; Italian survey Condizioni di Salute 1994-95, 2000 and 2005; Korean National Health and Nutrition Examination Survey 1998, 2001 and 2005.

StatLink http://dx.doi.org/10.1787/888932316001

Figure 4.3. **BMI Correlation in couples of different ages**



Source: OECD analyses of data from: Health Survey for England 1995-2007; French survey Enquête Santé et Protection Sociale 1995-2006; Italian survey Condizioni di Salute 1994-95, 2000 and 2005; Korean National Health and Nutrition Examination Survey 1998, 2001 and 2005.

StatLink http://dx.doi.org/10.1787/888932316020

of friends and other adolescents in their peer group (Renna *et al.*, 2008; Trogdon *et al.*, 2008).

The clustering of overweight and obesity within households, social networks, and possibly other levels of aggregation, provides important insights on the trends in obesity observed in recent years and on possible ways of tackling them. The findings of OECD analyses confirm the existence of what has been described elsewhere as a social multiplier effect, which is likely to have contributed to the rapid spread of overweight and obesity throughout the OECD area. In economic terms, this effect may be described as an externality, indicating that individual lifestyle choices are likely to have an influence on other individuals' lifestyles. The impact on other individuals' health may be less direct in this case than, for instance, in the case of passive smoking, but it is no less important. A strong indication emerges that actions targeting individuals within their social context are likely to be more effective (Bahr *et al.*, 2009). A number of countries are increasingly promoting interventions involving peer groups (*e.g.* school-based, or workplace interventions) or family members (*e.g.* children and parents). These interventions may better exploit the social multiplier effect, turning it into a positive externality generating favourable influences on health behaviours among members of families and social networks. In addition to providing better chances of interventions being effective in changing behaviours, exploiting the social multiplier effect in the way just described may produce faster reductions in overweight and obesity rates than interventions targeting individuals out of their social context.

Key messages

- Understanding the pathways through which chronic diseases are generated requires an assessment of individual determinants of those diseases as well as interactions among them.
- A central role is played by lifestyle choices, for their direct influence on health and because they mediate some of the effects of other health determinants. Lifestyles are closely associated with a significant portion of the morbidity and mortality from chronic diseases.
- An individual's health status is the result of recent as well as distant exposures to the action of risk factors and health determinants. A life-course approach is required to identify the mechanisms that should be acted upon in the prevention of chronic diseases.
- Market failures and imperfect rationality may prevent markets from ensuring efficient and equitable outcomes.
- Existing evidence suggests that externalities deriving from higher health care expenditures for the obese, collectively funded through insurance or

tax-funded systems are unlikely to be large enough to require specific government intervention.

- A more important source of externalities is associated with the spread of obesity within families and social networks, which reveals important social multiplier effects. The latter can be exploited in the design of policies to counter the obesity epidemic.
- Information failures are unlikely to play a major role in the current spread of obesity, but there is a clear role for governments in ensuring an adequate provision of information, especially to vulnerable groups, such children and those in disadvantaged socio-economic circumstances.
- Inconsistencies in time preferences, leading to poor self-control in health-related consumption, and a biased perception of risk make obesity more likely, but the scope for intervention to address these failures is unclear.
- The targeting of specific market failures in the design of prevention policies may be justified when these failures have a sufficiently large impact to warrant government intervention and when failures are amenable to correction through appropriate policies.

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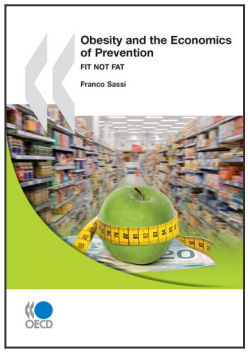

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