


view to developing understanding of it. While measurement issues are not confined to studies of health behaviour, they are particularly pertinent in this domain (see Issues below).

## Unhealthy diet

What and how we eat plays an important role in our long-term health. Heart disease and some forms of cancer have been directly associated with diet. Our dietary intake and behaviour (e.g. snacking, bingeing) may also confer an indirect risk of disease through its effect on weight and obesity – something we turn to later in the chapter. The degree of risk for cancer conferred by diet may be surprising. While many cancer deaths (approximately 30 per cent) are attributed to smoking cigarettes, it is perhaps a lesser-known and discussed fact that 35 per cent of cancer deaths are attributable, in part, to poor diet. A diet involving significant intake of high-fat foods, high levels of salt and low levels of fibre appears to be particularly implicated (American Cancer Society 2012). The World Health Report 2002 attributes over 7 per cent of the global disease burden to raised body mass index and about a third of heart disease and stroke and over 60 per cent of hypertension to people being overweight. Abdominal obesity, that is a high waist to hip ratio ('apple shape') is particularly implicated in heart attack, more so than BMI. Problems of overweight and obesity have been rising significantly amongst children as well as adults, with about a quarter of adults in many Western European countries, and the USA, being obese, and up to 60 per cent being overweight. Behaviours of poor or overeating and not exercising are central to this 'epidemic'.

### Fat intake and cholesterol

Excessive fat intake has been found to be implicated in coronary heart disease and heart attacks (Yusuf et al. 2004) and to a lesser extent cancer, particularly colorectal, testicular and breast cancer (Freedman et al. 2008). (Chapter 8 discusses the relevant biological and chemical processes ). Cholesterol is a lipid (fat) which is present in our own bodily cells. Normal circulating cholesterol (serum cholesterol) has a purpose in that it is synthesised to produce steroid hormones and is involved in the production of bile necessary for digestion.

Serum cholesterol levels can be increased by a fatty diet (and by other factors such as age). While there is not a perfect correlation between dietary cholesterol and serum cholesterol, they are related, which is why cholesterol is of interest to health psychologists concerned with behaviour change!

Fatty foods, particularly foods high in saturated fats (such as animal products and some vegetable oils), contain cholesterol, a fat-like substance which contains lipoproteins which vary in density. Those known as low-density lipoproteins (LDLs), when circulating in the bloodstream can lead to the formation of plaques in the arteries, and as a result cholesterol carried by LDLs is often called 'bad cholesterol'. LDL appears to be implicated in atherosclerosis (see below), whereas cholesterol carried by high density lipoproteins (HDLs) is called 'good cholesterol', as it appears to increase the processing and removal of LDLs by the liver. Some foods, such as polyunsaturated fats which can be more easily metabolised in the body, or foods such as oily fish which contain Omega-3 fatty acids and which have been found to raise HDL levels, are beneficial to one's health. What seems important to health is having a low ratio of total cholesterol (HDL + LDL + 20 per cent of even lower density triglycerides) to HDL, where the desirable ratio is less than 4.5:1. At that level people are thought to have a reduced risk of heart disease. However, it is still thought important to keep the actual LDL levels as low as possible, particularly in those with other risk factors for heart disease such as hypertension, family history, or smoking.

If fat molecules, a good store of energy in our bodies, are not metabolised during exercise or activity, then their circulating levels become high, and plaques (fatty layers) are laid down on the artery walls (**atherosclerosis**), causing them to thicken and restrict blood flow to the heart. An often related condition, **arteriosclerosis**, exists when increased blood pressure causes artery walls to lose elasticity and harden, with resulting effects on the ability of the cardiovascular system to adapt to increased blood flow (such as during exercise). These arterial diseases are together referred to as CAD (coronary artery

#### atherosclerosis

formation of fatty plaque in the arteries.

#### arteriosclerosis

loss of elasticity and hardening of the arteries.

disease) and form a major risk factor for angina pectoris (a painful sign of arterial obstruction restricting oxygen flow) and coronary heart disease (CHD).

Reduced fat intake is a target of health interventions, not solely because of its effects on body weight and, potentially, obesity (see later), but because of the links with CHD. Evidence for this link has come from many studies, including three large prospective studies (MRFIT study of 69,205 men followed over 16 years; CHA study of 11,017 men over 25 years; PG study of 1,266 men over 34 years) where a significant linear relationship between baseline cholesterol level and death from heart disease, stroke, or in fact mortality overall, was reported (Stamler et al. 2000). It has been shown that a 10 per cent reduction in serum (blood) cholesterol is associated at five-year follow-up with a 54 per cent reduction in the incidence of coronary heart disease at age 40, a 27 per cent reduction at age 60 and a 19 per cent reduction at age 80 (Law et al. 1994). This reduced association in older adults is a relatively consistent finding, suggesting that those over 65 need perhaps to worry less on their total cholesterol levels (Navas-Nacher et al. 2001). While there is some correlational evidence of higher breast cancer death rates in countries where high fat intake is common (e.g. the UK, the Netherlands, the USA) than in countries where dietary fat intake is lower (e.g. Japan, the Philippines), firm causal data is limited, both in terms of breast cancer (e.g. Löf et al. 2007) and prostate cancer risk (Crowe et al. 2008).

As a result of these and other data, governmental policy documents have been produced in many countries that provide guidelines for healthy eating and dietary targets. In the UK, for example, *The Health of the Nation* report (1992) recommended that a maximum of 35 per cent of food energy (calories) should be derived from fat intake, of which a maximum of only 11 per cent should come from saturated fats. Subsequently, the recommended percentage fat intake has decreased to 30 per cent (World Health Organization 1999; US Department of Health and Human Services 2000); however, there is evidence that, at least in Europe, average consumption figures remain around 40 per cent. In terms of grams per day, these recommendations convert to a maximum of 30g of saturated fat intake per day for males, 20g for females.

Ethnicity has been shown to have an effect on fat intake: for example, a study of ethnic minority males living in the UK found higher levels of fat intake among

Bangladeshi males than among most other ethnic groups (2012 CHD Statistics; Bhopal et al. 1999). It is worth noting, however, that a systematic review (Cochrane Review) of evidence derived from four randomised controlled trials concluded that fat-restricted diets were no more effective than calorie-restricted diets in terms of long-term weight loss among overweight or obese individuals (Pirozzo et al. 2003), suggesting that dietary change should not focus solely on fat intake but on total intake. In relation to older populations, however, there is evidence that low rather than high levels of calorific intake are detrimental to health status and cognitive function, and older men living alone seem particularly vulnerable here (Hughes et al. 2004).

## Salt

Salt intake is also a target of preventive health measures, with high salt (sodium chloride) intake, much of it coming from an increasing overreliance on processed foods, being implicated in those with persistent high blood pressure, i.e. hypertension. The detrimental effects of high salt intake on blood pressure appear to persist even when levels of physical activity, obesity and other health behaviour are controlled and thus educational interventions have attempted to modify intake.

A systematic review and meta-analysis of intervention trials assessed the impact of lowering salt intake in adults who were either normotensive (i.e. 'normal' blood pressure), who had high blood pressure that was not being treated, or who were hypertensive (i.e. had high blood pressure) and being treated using drug therapy (Hooper et al. 2002). Overall, the review is not conclusive in that salt reduction resulted in reduced **systolic** and **diastolic blood pressure**; however, the degree of reduction in blood pressure was not related to

### systolic blood pressure

the maximum pressure of blood on the artery walls, which occurs at the end of the left ventricle output/contraction (measured in relation to *diastolic blood pressure*).

### diastolic blood pressure

the minimum pressure of the blood on the walls of the arteries between heartbeats (measured in relation to *systolic blood pressure*).

the amount of salt reduction. In addition, the trials had no impact on the number of heart disease-related deaths seen in follow-ups ranging from seven months to seven years, with deaths equally distributed across the intervention and control groups. It seems therefore that

interventions targeting salt intake provide only limited health benefits.

In spite of mixed findings, guidelines still exist as to recommended levels of salt intake. High salt intake is considered to be in excess of 6 g per day for adults, and

## ISSUES

### The changing messages

It is sometimes hard to keep up with health recommendations as new evidence or syntheses of evidence lead to new health messages, typically picked up by the media and summarised in a non-critical manner. There are two recent examples of this.

#### Saturated fats may not be as bad as we thought?

In March 2014 the *Daily Mail* picked up on the findings of a paper published in the *Annals of Internal Medicine*, a highly respected journal (Chowdury et al. 2014). In this the authors present findings from a meta-analysis of data pooled from 72 studies of fat intake and report that their findings do not fully support the risks attached to saturated fats in terms of heart disease risks. They point to a specific sub-component of saturated fats, trans-fatty acids, which do seem to confer the increased risk. So perhaps reducing all saturated fat is not the answer, but focusing on TFAs contained in processed oil-based products may be.

Coverage gives the suggestion that scientists do not really know what is best for us, but taken in the larger context of other published evidence, as responsibly reported in the *Guardian* (24.03.14), this new data is not that inconsistent with other evidence that concludes that focusing on reducing saturated fat is not the answer to reducing heart disease. Replacing fatty foods with more carbohydrates can increase obesity, eating the wrong polyunsaturated fats (from vegetable oils instead of, for example, from fish) can also carry risk. A balanced and more

Mediterranean-style diet with a high amount of fruit and vegetables, nuts, beans and seeds, with a smattering of fish, meat and egg protein and dairy, is advocated. However, how many fruit and vegetables do we need to reap health gains . . . ?

#### Fruit and Veg: 5, 7 or 10 a day?

Report from April 1st media coverage and paper from UCL BHF 2012 show that in Great Britain the average total grams of fresh fruit intake per week in 1942 was 197g; by 2010 this was 755g; for fresh vegetables (excluding potatoes) things were more stable (88g per week in 1942 to 757g in 2010), and potato consumption has also significantly decreased 1877g per week to 501g. Given that your average apple weighs about 100g, you can see how these weekly figures don't add up to average intake of 'five a day'.

Recent reports suggest, however, that 5 a day is not enough to obtain long-term health gains and that we should instead seek to consume a regular intake of 7 portions of fruit or veg a day. Add to that the debate over whether cooking destroys some of the potential beneficial ingredients and enzymes found in raw foods, or helps in their release (e.g. cooking may maximise the release of lycopene from tomatoes which has been associated with reduced risk of some cancers and heart disease), then it is understandable that people say they are confused. However, none are saying that fruit or vegetables are not good for you, and so whilst research progresses it would be advisable to just eat as many as you can, within a balanced diet and without putting your daily calorie intake above acceptable levels.