Understanding the role of nutrition in preventing non-communicable diseases and supporting planetary health

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Why you should read this article

● To recognise the link between obesity and the risk of developing non-communicable diseases

● To understand the effects of diet on metabolism in individuals and the benefits of a personalised approach to nutrition

● To learn how to promote foods to patients that reduce the risk of non-communicable diseases and sustain planetary health

ABSTRACT

Obesity is a multifaceted, long-term condition associated with a range of serious consequences, including an increased risk of non-communicable diseases such as type 2 diabetes, cardiovascular disease and certain cancers. This article discusses the multiple factors that can influence an individual's dietary choices. It describes the different effects of diet on metabolism and the gut microbiome between individuals, and explains the benefits of a personalised approach to nutrition. The article also identifies foods that nurses and other healthcare professionals can promote to patients and service users that reduce the risk of non-communicable diseases and can support planetary health.

KEYWORDS

clinical, diabetes, diet, health promotion, nutrition, nutritional intake, nutritional requirements, obesity

KEY POINTS

● Weight reduction among those who are obese will reduce the burden of non-communicable diseases

● Maintaining weight loss can be highly challenging due to biological, environmental and psychological factors

● Nurses must encourage healthy lifestyle behaviours at an individual level by promoting physical activity and healthful, gut-friendly food

● Planetary health diet describes dietary targets that are healthy and environmentally sustainable

● Making dietary and lifestyle changes is better for the environment and supports a healthier, more sustainable future.

Nutrition is integral to health, and a healthy diet is required for growth, maintenance and repair of the body, while a suboptimal diet can increase the risk of short and/or longterm health issues. For example, suboptimal dietary habits can have negative effects on body weight, blood cholesterol, blood pressure, glucose-insulin homeostasis and inflammation, increasing the risk of non-communicable diseases (GBD 2019 Risk Factors Collaborators 2020). Nutrition, therefore, has an important role in the prevention, development and treatment of various long-term non-communicable diseases, including type 2 diabetes, cardiovascular disease and cancer. However, nurses and other healthcare professionals should be aware that an individual's reasons for choosing and consuming specific foods are complex and include physiological, psychological, social, economic and cultural factors that may be challenging to change to optimise health.

This article discusses the risk factors, foods and nutrients that can increase or decrease the risk of developing non-communicable diseases, with a particular focus on obesity. It also outlines recommendations for healthy and sustainable foods, which nurses and other healthcare professionals can use when providing dietary advice to patients.

CAUSES AND EFFECTS OF OBESITY

Overweight and obesity refer to excess body fat and are commonly measured using body mass index (BMI), whereby an individual's weight in kilograms is divided by the square of their height in metres. A BMI of 25 to 29.9 is classed as overweight, while a BMI of 30 or more is classed as obese (NHS Digital 2020).

The prevalence of obesity is increasing globally, and no country has yet reversed this trend (Swinburn et al 2019). In the UK, around 37% of the population is overweight and 27% is obese (Public Health Wales 2019, NHS Digital 2020, Department of Health (Northern Ireland) 2020, Scottish Government 2020).

The most common cause of obesity in adults is a combination of physical inactivity and suboptimal diet, but there is no consensus on the primary reasons for these behaviours (Ross et al 2016). It is recognised that obesity is a complex interaction between genetic susceptibility, human behaviour and environmental factors, such as work environment, working and sleeping patterns, local surroundings and social networks (Omer 2020). Therefore, it is important for healthcare professionals, including nurses, to recognise the multiple factors that can lead to weight gain.

Excess body fat is linked to an increased risk of non-communicable diseases such as type 2 diabetes, cardiovascular diseases and 13 cancers, including breast and bowel (Stefan et al 2021). In the UK, increase in life expectancy has slowed in recent years, to 79.0 years for men and 82.9 years for women

in 2018-20 (Office for National Statistics 2021a), while in 2017-19 healthy life expectancy reduced to 62.9 years for men and 63.3 years for women (Office for National Statistics 2021b). This means that men can expect to live with ill-health for around 16.1 years, and for women 19.6 years. However, there are significant differences in healthy life and life expectancies across the UK, with those living in the most deprived areas having higher levels of obesity (NHS Digital 2020), type 2 diabetes (Public Health England (PHE) 2018a), lung cancer, and heart and respiratory diseases, compared with those living in affluent areas (Raleigh 2021).

Weight reduction among people who are obese will reduce the burden of non-communicable diseases on individuals, society and the NHS. The National Institute for Health and Care Excellence (NICE) (2014) guidelines on the identification, assessment and management of obesity include lifestyle interventions and dietary advice. The dietary advice recommends an individual approach to reducing energy (calorie) intake by improving diet but maintaining an energy deficit of around 600kcals per day (NICE 2014). Evidence also suggests that ongoing support is important for successful long-term weight loss (Hall and Kahan 2018). The NHS (2022a) Better Health weight loss plan provides information on healthy eating, recipe ideas and links to healthy lifestyle services.

OBESITY, DIET AND NON-COMMUNICABLE DISEASES

Table 1 summarises the risk factors, foods and nutrients that can increase or decrease the risk of obesity and developing non-communicable diseases.

Type 2 diabetes

Globally, the number of people with type 2 diabetes is rising significantly (International Diabetes Federation 2019). Although there is a genetic predisposition for type 2 diabetes (Ingelsson and McCarthy 2018), obesity and physical inactivity are linked to this increase (Chatterjee et al 2017). The risk of developing type 2 diabetes is three times higher in people who are overweight and seven times higher in those who are obese (PHE 2018a).

In 2018-19, around 6% (3.92 million people) of the UK population was diagnosed with diabetes mellitus (Diabetes UK 2020a), of whom 90% had type 2 diabetes (Diabetes UK 2020b). It is estimated that there are a further one million people with type 2 diabetes not yet diagnosed (Diabetes UK 2020a).
Type 2 diabetes is largely preventable through lifestyle modifications such as dietary change and increased physical activity. The NHS (2022b) Diabetes Prevention Programme is a nine-month supported lifestyle intervention targeted at people with a high risk of developing type 2 diabetes. It aims to support people to achieve a healthy weight, improve their nutrition and increase their physical activity levels. Initial evaluations are encouraging, with a mean weight loss of 3.3kg (mean percentage weight change -

4%) for all those who complete the programme (Valabhji et al 2020). By following a healthy diet and reducing weight, the risk of developing type 2 diabetes is decreased.

Cardiovascular disease

Cardiovascular disease is the leading cause of mortality globally (World Health Organization 2021). In the UK, around 7.6 million people have heart and circulatory diseases, which account for around 25% of all deaths (British Heart Foundation 2021).

PHE (2019) has published best practice guidance, which includes clinical risk management, and advice on lifestyle and behavioural factors, with the aim of reducing the risk of cardiovascular disease. Most cases of cardiovascular disease could be avoided with changes to tobacco use, unhealthy diet, high BMI, physical inactivity and excess alcohol consumption (PHE 2019). The Scientific Advisory Committee on Nutrition (2019) recommends that, for the general population, saturated fats should be no more than 10% of total dietary energy and should be substituted with unsaturated fats, preferably polyunsaturated fats, to reduce low-density lipoprotein (LDL) cholesterol and the risk of cardiovascular disease.
For people at high risk of, or with, cardiovascular disease, NICE (2016) guidelines suggest a cardioprotective diet that is low in total fat (≤30% energy intake), low in saturated fats (≤7% energy intake) and high in wholegrain foods, fruit, vegetables, nuts, seeds and legumes.

Cancer

There are around three million people living with cancer in the UK (Macmillan Cancer Support 2021), with 375,400 new cases in 2016-18 and 166,533 deaths from cancer per year during that period (Cancer Research UK 2022).

Thirteen cancers are linked to being overweight or obese, including breast and bowel, which are two of the most common cancer types (Cancer Research UK 2022). It is thought that many of these cancers could be prevented by achieving a healthy weight, increasing physical activity and following a healthy diet (World Cancer Research Fund and American Institute for Cancer Research 2018).

PERSONALISED NUTRITION

Personalised nutrition has been defined as ‘an approach that uses information on individual characteristics to develop targeted nutritional advice, products, or services’ (Ordovas et al 2018). These individual characteristics can be biological, genetic and/or behavioural. One or more of these factors can be identified and used to provide personalised dietary advice, usually with the aim of reducing weight or lowering the risk of a particular disease.

Personalised nutrition is a growing area of healthcare and there are some indications of its effectiveness (Mathers 2019). As with all dietary interventions, personalised nutrition must consider the

psychological, social, economic and cultural factors that influence behaviour. Many commercial diet programmes take an individualised approach to weight loss, aiming to identify the psychological or underlying causes that lead to unhealthy food choices, then applying strategies to overcome these. Since nurses are expected to promote healthy lifestyle choices to their patients and service users (Xu et al 2017), it may be beneficial for them to use a personalised nutrition approach.

Many factors interact to affect an individual's risk of gaining weight and/or developing non-communicable diseases. For example, the timing and composition of a meal can influence fat and glucose metabolism after eating, and this varies between individuals (Berry et al 2020a). Those who are susceptible to postprandial (after a meal) glucose dips are more likely to have increased hunger and higher energy intake (Berry et al 2020b). It has also been found that circadian rhythm – the body's internal biological clock that regulates the sleep-wake cycle – affects lipid regulation, glucose tolerance and insulin sensitivity. Circadian misalignment due to insufficient daylight exposure or shifts in sleep phases may be linked to metabolic disturbances that can increase BMI and thus obesity (Poggiogalle et al 2018). Some studies have linked the gut environment and its microorganisms to the postprandial glycaemic response (Zeevi et al 2015) and postprandial lipid metabolism (Yu et al 2019, Berry et al 2020c).

The gastrointestinal tract contains trillions of microorganisms known as the gut microbiota. The gut microbiota has several beneficial physiological functions, including protecting against pathogens and harvesting energy (Thursby and Juge 2017). The composition of the gut microbiota is influenced by the external environment, including long-term, habitual, diet and lifestyle factors (Rothschild et al 2018). A diverse diet that is high in different types of plant foods containing fibre, such as vegetables, fruits and cereals, has been linked to greater gut microbial diversity and reduced risk of long-term conditions (Leeming et al 2019). The Western type of diet with low fibre is associated with low microbial diversity, obesity and metabolic diseases (Leeming et al 2019). A dysfunctional microbiome has been linked to obesity, cardiovascular disease, type 2 diabetes and atherosclerosis among other conditions, thus supporting the identification of the association between diet and disease (Singh et al 2017).

SUSTAINABLE DIET

Over the past few decades there has been increased awareness of the role of food systems on environmental sustainability as well as health. Food systems include all activities from farming to production and, ultimately, consumption.

In 2019, the EAT-Lancet Commission on healthy diets and sustainable food systems published global dietary targets that were healthy and environmentally sustainable, known as a universal healthy reference diet or planetary health diet (Willett et al 2019). For the UK, this diet favours increasing the consumption and variety of seasonal fruit and vegetables, plant proteins such as beans, wholegrain carbohydrate foods, nuts and seeds, while reducing portions of meat and moderating dairy (British Dietetic Association 2018), thus shifting towards a healthier and increasingly sustainable diet.

DIETARY ADVICE FOR PERSONAL AND PLANETARY HEALTH

Non-communicable diseases have a high health and economic burden. However, risks can be reduced by following a healthy diet and being physically active. In the UK, the Eatwell Guide (PHE 2018b) aims to inform the population about government recommendations for a well-balanced and healthy diet, and is available online at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/528193/Eatwell_guide_colour.pdf

Most public health advice on diet is based on energy (calories) and individual nutrients, specifically the reduction of sugars, saturated fats and salt. For example, calories and individual nutrients are listed on food labels, but there is limited evidence of their positive influence on people's grocery shopping habits (Crockett et al 2018). This is demonstrated by the fact that most of the UK population has diets that are low in nutritional quality, with the average fruit and vegetable consumption below the recommended five 80g portions per day, average intake of free sugars above the recommended 5% of total energy and average intake of fibre below the recommended 30g per day (PHE 2020).

It is evident that many non-communicable diseases are linked to the increasing weight of the population, and the primary solution is weight loss. Reducing energy alone is not particularly helpful because in the UK around 23% of adults are actively attempting to lose weight, primarily through calorie reduction (Euromonitor 2021). Without ongoing support, most people who follow a weight loss diet will regain most of the weight lost due to complex interactions between biological, environmental, behavioural and cognitive factors (Montesi et al 2016).

Following a diet that encourages consumption of wholegrains, fruits, vegetables, nuts, legumes, vegetable oils and fish, while reducing red and processed meat and added sugars, can reduce the risk of coronary heart disease, stroke, type 2 diabetes and some cancers (Schulze et al 2018). Findings from the Global Burden of Disease study (GBD 2017 Diet Collaborators 2019) indicated that globally a suboptimal diet high in sodium and low in wholegrains, vegetables, fruits, nuts, seeds and omega-3 fatty acids is

responsible for more deaths than any other risk factor, including tobacco use. These findings also suggested that policies focusing on promoting consumption of healthy foods might be more beneficial than targeting the reduction of unhealthy foods, such as sugar and fat (GBD 2017 Diet Collaborators 2019).

Table 2 details recommendations for healthy and sustainable foods and factors to consider when providing dietary advice.

CONCLUSION

The adult population in the UK has high levels of overweight and obesity, which increase the risk of non-communicable diseases. Chronic ill-health affects the life of the individual and their families adversely and results in high economic cost to the NHS and society. Maintaining weight loss is often highly challenging due to various biological, environmental and psychological factors.

There is no 'one-size-fits-all' solution to this issue and all sections of society have a role to play, including government, the food industry, public health bodies, healthcare professionals and individuals. Nurses and other healthcare professionals must encourage healthy lifestyle behaviours at an individual level by promoting physical activity and the intake of healthful, gut-friendly food such as wholegrains, vegetables, fruits, legumes, nuts and seeds. Making such changes will also be better for the environment and support the aim of a healthier, more sustainable future.

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Table 1. Risk factors, foods and nutrients that can increase (↑) or decrease (↓) the risk of obesity and developing non-communicable diseases

Risk factors	Obesity	Cardiovascular disease	Type 2 diabetes	Cancers
Excess body weight	↑	↑	↑	↑*
Physical inactivity	↑	↑	↑	↑*
High energy (calories)	↑	↑	↑	↑*
Saturated fat	Insufficient evidence	↑	No association	No association with colorectal, pancreatic, lung, breast or prostate cancer
Polyunsaturated fats	No association	↓	Insufficient evidence	Insufficient evidence
Sugar	↑	No association for coronary events	No association	Insufficient evidence
Sugar-sweetened beverages	↑	Insufficient evidence	↑	No association
Salt	↑	↑	Insufficient evidence	↑ stomach
Red and processed meat	Insufficient evidence	Insufficient evidence	Insufficient evidence	↑ colorectum
Fish	Insufficient evidence	↓ oily fish	Insufficient evidence	↓ colorectum ↓ liver
Dairy	Insufficient evidence	Insufficient evidence	↓	↓ colorectum
Fermented (dairy) foods	↓	↓	↓	↓ colorectum ↓ bladder ↓ oesophageal
Wholegrains	↓	↓	↓	↓ colorectum
Dietary fibre	Insufficient evidence	↓ soluble	↓ soluble ↓ insoluble	↓ colorectum
Fruits	↓	↓	↓	↓ aerodigestive
Vegetables	↓	↓	Insufficient evidence	↓ aerodigestive
Nuts	Insufficient evidence	↓	↓	Insufficient evidence
Seeds	↓	↓	↓	Insufficient evidence
Legumes	↓	↓	Insufficient evidence	Insufficient evidence
Refined grains and starch	↑	Insufficient evidence	↓	Insufficient evidence
Alcohol	↑ heavy or binge drinking	↑	↑	↑**

*Thirteen cancers, including mouth, pharynx and larynx, oesophageal, stomach, pancreatic, gallbladder, liver, colorectal, post-menopausal breast, ovarian, endometrial, prostate and kidney
** Mouth, pharynx and larynx, oesophageal and breast cancer, with higher levels of alcohol intake increasing the risk of colorectal, stomach and liver cancer
(Scientific Advisory Committee on Nutrition 2015, 2019, Public Health England 2016, World Cancer Research Fund and American Institute for Cancer Research 2018)

Table 2. Recommendations for healthy and sustainable foods and factors to consider when providing dietary advice

Recommendations	Examples of foods	How to incorporate into the diet	Factors to consider
Increase omega-3 polyunsaturated fats to replace saturated fats from foods such as animal products, biscuits, cakes and pastries	Omega-3 can be found in oily fish such as mackerel, kippers and fresh or frozen tuna (not canned) or flaxseed, rapeseed oil, walnuts, fortified foods and soya foods such as soya milk and tofu	» If consumed, aim for two portions (140g each) of fish per week, with one being oily fish » If fish is not consumed, use alternatives, for example cooking with rapeseed oil and adding flaxseeds (one tablespoon) or walnuts (three) to meals	» Consider those with an allergy to fish and/or those following a plant-based diet. Promote alternative sources of omega-3 for those who do not consume oily fish » Encourage fish from certified fisheries with the Marine Stewardship Council certificate
Increase wholegrains. Aim for three servings per day	Wholegrain cereals and grains such as wheat, rice, rye, oats, barley, buckwheat and quinoa	» Swap white, refined breads, cereals, pasta and rice for wholegrain varieties » One serving equates to one medium slice of wholemeal bread, or 2-3 heaped tablespoons of cooked brown rice or two oatcakes	» Consider those with coeliac disease, allergies, intolerances or irritable bowel disorders
Increase fibre from soluble and insoluble sources. Adults should consume 30g of fibre per day	Soluble fibre dissolves in water and can be found in foods such as oats, nuts and seeds, legumes, fruits and vegetables. Insoluble fibre does not dissolve in water and includes foods such as wholegrains, root vegetables, fruits with edible seeds, legumes, nuts and seeds	» Swap white, refined breads, cereals, pasta and rice for wholegrain varieties » Add beans, peas and lentils to meals	» Consider those with coeliac disease, allergies, intolerances or irritable bowel disorders
Increase fruits and vegetables, preferably those that are seasonal. Aim for a minimum of five 80g portions per day, two from fruit and three from vegetables	Encourage seasonal and locally grown fruits and vegetables, such as apples, pears, berries, root vegetables, onions and mushrooms, and cruciferous vegetables such as cabbage and kale	» Include at least one portion of fruit and vegetables at each meal. For example, add a portion of dried fruit (30g) to breakfast cereal or oats	» Consider those with irritable bowel disorders and triggering foods » Consider cost and potential food waste. Frozen or tinned fruit and vegetables can be more affordable and may reduce food waste. Check these do not have added sugar or salt
Increase legumes (pulses)	Examples include peas, lentils and beans	» Legumes count as one of five portions of fruit and vegetables per day. They can be added to soup, casseroles	» Consider those with irritable bowel disorders

		and meat dishes, and can be used as an alternative source of protein to meat	» If buying tinned legumes, check they do not have added sugar or salt
Increase nuts	Unsalted and unflavoured varieties such as walnuts, cashews, almonds, Brazil nuts, peanuts and pistachios	» Sprinkle nuts onto meals, for example on breakfast cereal or oats » Consume nuts as a snack	» Consider nut allergy (a common food allergy) and recommend nut avoidance where necessary
Increase seeds	Unsalted and unflavoured varieties such as pumpkin, flax, sesame, hemp and chia	» Sprinkle seeds onto meals, for example on breakfast cereal or oats » Consume seeded breads	» Consider allergy to seeds, especially sesame, sunflower, mustard and poppy
Increase fermented foods	Sauerkraut, kimchi, kefir and bio-live yogurts such as Greek varieties	» Include a Greek yogurt or kefir with breakfast » Sauerkraut can be added as a condiment to meals or in a salad » Kimchi can be included in stews or stir fried with rice	» Ensure trusted recipes are followed carefully to minimise the risk of foodborne illness if making homemade fermented foods » For shop-bought products, check the salt content as some may be high in salt
Moderate dairy, if consumed	Encourage moderation of dairy and include some plant-based alternatives fortified with calcium and preferably iodine too	» Try fortified plant-based milks or plant-based yogurts or desserts	» Consider those with low calcium or iodine intake and those with an allergy or intolerance to milk products » Suggest non-dairy sources of calcium, such as kale or fortified cereals. For iodine, a supplement of no more than 150 micrograms may be suggested
Moderate meat consumption and increase intake of plant proteins	Encourage some meat-free days and, when consumed, keep meat portions small (70g)	» Suggest including plant-based proteins in meals, such as beans, lentils, nuts or seeds, or meat alternatives, such as soya mince or tofu » Replace half the meat in recipes with plant-based alternatives	» Consider groups vulnerable to low iron status, such as children and women. For these groups, red meat can be encouraged with portions no more than 50g-70g per day. Fortified cereals, soya, pulses, legumes and dark green vegetables are alternative sources of iron » Consider vulnerable groups for low zinc status, such as young girls, teenagers and women aged over 75 years. For these groups, fortified cereals, beans, lentils and seeds and nuts are alternative sources of zinc » Eggs are a rich source of protein and contain vitamin D, vitamin A, iodine, folate and B vitamins. They are more environmentally sustainable than red meat

(British Dietetic Association 2018, 2021, NHS 2019)