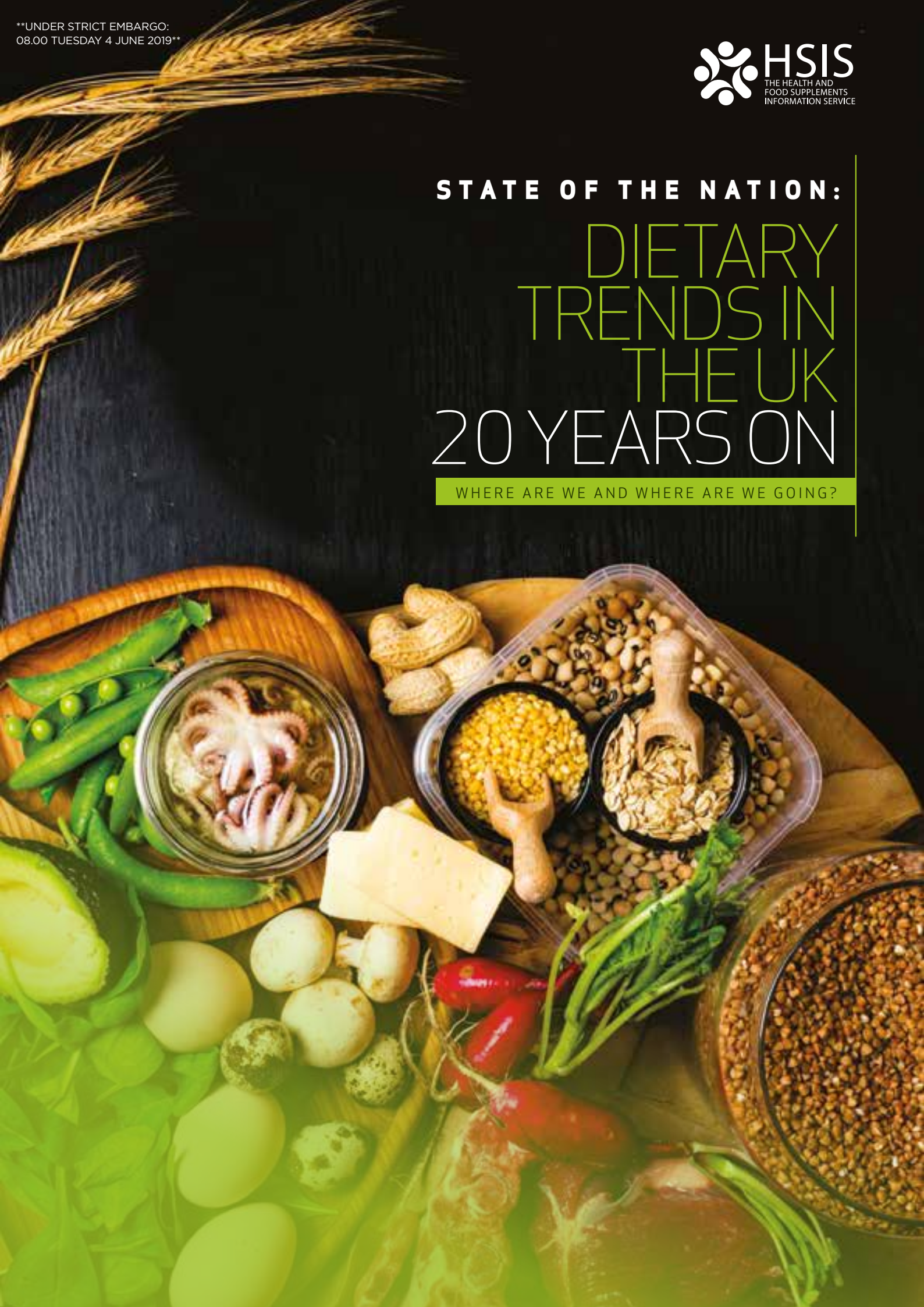
**UNDER STRICT EMBARGO:
08.00 TUESDAY 4 JUNE 2019**

HSIS
THE HEALTH AND FOOD SUPPLEMENTS INFORMATION SERVICE

STATE OF THE NATION:

DIETARY TRENDS IN THE UK 20 YEARS ON

WHERE ARE WE AND WHERE ARE WE GOING?



FOREWORD

Dr Pamela Mason, Dr Emma Derbyshire, Professor Robert Pickard, Dr Carrie Ruxton, Dr Gill Jenkins

The majority of people in the UK are not eating a healthy diet, with significant impact on vitamin and mineral intakes. Despite the high profile 5 A Day fruit and vegetable campaign, which has been running since 2003, less than a third of adults (aged 19-64) eat their 5 A Day. Intakes of fruit and vegetables have fallen during the past 10 years by almost one third in older adults and by 20 per cent in youngsters aged 11-18 years, the population group least likely to achieve 5 A Day. Oily fish intake has not improved over the same period and has remained consistently below recommended levels. The intake of AOAC fibre[i], is well below recommended levels, which is partly a reflection of poor fruit and vegetable intakes. The rise in popularity of flexitarian diets is leading to reduced meat intakes, often reflected in meat being consumed on fewer days of the week.[ii] All of these dietary changes impact on vitamin and mineral intake.

This report, which is based mainly on the National Diet and Nutrition Survey (NDNS) and DEFRA Family Food findings, shows that there has been a substantial downturn in intakes of adults of riboflavin, folate, vitamin A, vitamin D, iron, calcium, magnesium, iodine, selenium and potassium.

In children and youngsters through their teens, intakes of vitamin A, iron, iodine and zinc, in particular appear to be on the downturn.

- **Micronutrients**:
  - Intakes by teenagers of micronutrients, especially teenage girls, have been of significant concern throughout the past 20 years with downturns in intakes of iron, vitamin A, folate, calcium, zinc and iodine.
  - Women of childbearing age and middle years have also shown a downturn in micronutrient status with proportions not achieving the LRNI[iii] for vitamin A, folate, iron, iodine and calcium increasing.
  - Older people too, are not without issues in terms of micronutrient intake with increases in the proportions of people over 65 failing to achieve the LRNI for vitamin A, iron, calcium, magnesium, potassium, iodine and zinc over the last decade.

i: AOAC fibre is the total amount of non-digestible polysaccharides, and includes e.g. lignin and resistant starches, measured with a set of methods developed by the Association of Analytical Chemists (AOAC). **ii:** "https://www.ncbi.nlm.nih.gov/pubmed/?term=Derbyshire%20EJ%5BAuthor%5D&cauthor=true&cauthor_uid=28111625" Derbyshire EJ (2017) Flexitarian Diets and Health: A Review of the Evidence-Based Literature. "https://www.ncbi.nlm.nih.gov/pubmed/28111625"Front Nutr 3:55. **iii:** LRNI – Lower Reference Nutrient Intake – the level at which deficiency is likely

In summary, data over the last 20 years reveals the stark reality of a significant downturn in a number of nutrients but the seven key nutrients that have fallen the most dramatically in consumption levels from UK diets across all population groups are:

- **Vitamin A** - intakes are down by 21 per cent. Vitamin A helps metabolise iron, maintain healthy mucous membranes, skin and vision, immune function and cell specialisation.
- **Vitamin D** - intakes have declined by 22 per cent. Vitamin D helps with the absorption and utilisation of calcium and phosphorus and blood calcium levels, as well as maintaining normal bone, teeth, muscle and immune function.
- **Folate** - intakes have fallen by 10 per cent. Folate contributes to maternal tissue growth during pregnancy, normal blood formation, homocysteine metabolism, brain health, immune function as well as helping to reduce tiredness and fatigue.
- **Calcium** - intakes are down by 10 per cent. Calcium helps metabolise energy, healthy blood clotting, muscle function, neurotransmission, as well as keeping bones and teeth healthy.
- **Riboflavin** - consumption levels have fallen by 11 per cent. Known as vitamin B2, this nutrient helps metabolise energy, and iron, keeps the nervous system, mucous membranes and red blood cells healthy, and protects cells from oxidative stress.
- **Iron** - dietary intakes have dropped by 5 per cent. Iron contributes to normal energy metabolism, cognitive function, formation of red blood cells and haemoglobin, oxygen transport in the body and the reduction of tiredness and fatigue.
- **Potassium** - intakes from dietary sources have receded by 4 per cent. Potassium contributes to normal functioning of the nervous system, muscle function and the maintenance of normal blood pressure.

The UK population is bombarded with information about diet, yet a research poll for the Health and Food Supplements Information Service (HSIS) showed considerable confusion about healthy eating and the importance of vitamins and minerals. Moreover, many people turn to popular diets in an attempt to lose weight or because of concerns about allergies, cutting out whole food groups, which can result in reductions in micronutrient intakes. Busy lives, lack of time, reliance on ready meals and takeaways, skipping meals and grabbing food on the go all potentially impact nutrient intakes for the worse.

There is a massive education role for all healthcare professionals to provide evidence-based nutrition information to encourage better diets and attention to micronutrient intake. Public Health England (PHE) recommends the UK population takes a vitamin D supplement in autumn and winter, and a folic acid supplement for women of reproductive age. The Chief Medical Officer recommends vitamin A, C and D supplementation for children aged six months to 5 years. These recommendations should be followed but are not enough to bridge the dietary gap across the population. A multivitamin and mineral supplement containing the recommended amounts of a wide variety of nutrients plus a daily omega-3 food supplement is the most useful way to bridge the nutrient gaps across the population.

> “IN SUMMARY, DATA OVER THE LAST 20 YEARS REVEALS THE STARK REALITY OF A SIGNIFICANT DOWNTURN IN A NUMBER OF NUTRIENTS”

INTRODUCTION

A healthy diet is the cornerstone of good health. Healthy diets are generally defined as: "*eating patterns that include adequate nutrient intakes and sufficient but not excessive energy intake to meet the energy needs of the individual*". Unfortunately, however, the majority of people in the UK are not eating a healthy diet, with significant impact on micronutrient (vitamin, mineral and omega-3) intakes. Moreover, as shown by analysis of the UK's two major dietary surveys – the Department for Environment, Food and Rural Affairs (DEFRA) annual Family Food Survey[2] and the UK National Diet and Nutrition Survey Rolling Programme (NDNS-RP)[3] intakes of several micronutrients, in particular riboflavin, folate, vitamin A, vitamin D, iron, calcium, magnesium, iodine, selenium and potassium have declined over the last 20 years.[2,3]

5 A Day Intakes Continue To Fall Dramatically

Fruit, vegetable and dietary fibre intakes have also fallen. Sixteen years after the launch of the 5 A Day fruit and vegetable campaign, just 31 per cent of adults aged 19-64, 26 per cent of adults aged 65 and over and, most worryingly, eight per cent of 11-18-year-olds are achieving their 5 A Day.

Fibre intake is well below the recommended 30g a day for adults, with 19-64-year-olds consuming, on average, 19g a day and adults 65 and over consuming 17.5g daily. Fibre intake is low in children and youngsters too (see chapter 1). Oily fish intake, which is the main source of omega-3 long chain polyunsaturated fatty acids (LCPUFAs), has shown little change during the last decade and remains well below the Scientific Advisory Committee on Nutrition's (SACN) recommended intake of 140g a week.[4] Adults aged 19-64 and those aged 65 and over consume on average 56g and 84g a week respectively.

> "UNFORTUNATELY, HOWEVER, THE MAJORITY OF PEOPLE IN THE UK ARE NOT EATING A HEALTHY DIET, WITH SIGNIFICANT IMPACT ON MICRONUTRIENT (VITAMIN, MINERAL AND OMEGA-3) INTAKES."

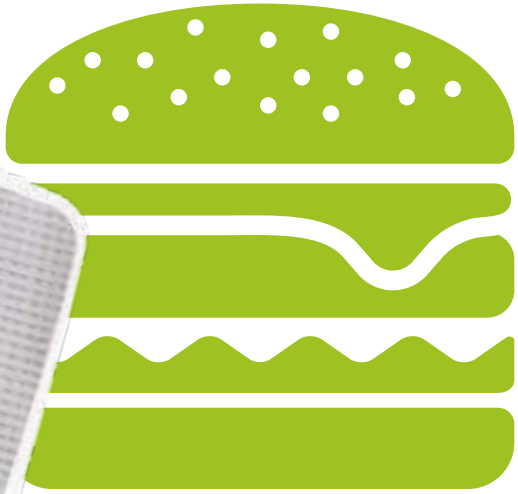
Burden Of Diet Related Illnesses

The burden of diet-related ill health in the UK is substantial, estimated to lead to 70,000 premature deaths annually,[5] which represents around 12 per cent of the total number of deaths. Poor diet has the highest impact on the NHS budget, costing around £6 billion per year, greater than alcohol consumption, smoking or physical inactivity.[5]

According to the findings of the Health Survey for England (HSE),[6] in 2017, 67 per cent of men and 62 per cent of women in England were overweight or obese. Almost one third of children aged 2-15 years were also overweight or obese. Obesity is estimated to cost the NHS £6.1 billion a year with costs projected to increase to £9.7 billion by 2050[7]. Obesity prevalence increased steeply between 1993 and around 2000 with a slower rate of increase after that and a levelling out in children since 2005, although in 2017, 29 per cent of adults were obese, a higher proportion than in recent years. Morbid obesity has also increased since 1993, with two per cent of men and almost five per cent of women morbidly obese in 2017, compared with less than 0.5 per cent of men and just over one per cent of women in 1993.

Obesity, in particular central obesity, is associated with type 2 diabetes. In 2017, 35 per cent of men and 49 per cent of women in England had a very high waist circumference; this compared with 20 per cent and 26 per cent respectively in 1993. Twelve per cent of men and nine per cent of women with a very high waist circumference had either diagnosed or undiagnosed diabetes. The proportion of adults with doctor-diagnosed diabetes also increased between 1994 and 2017 with some year-on-year fluctuation, from three per cent to eight per cent among men and from two per cent to five per cent among women. The increase has been greatest for those aged 45 and over.

The NDNS-RP to date has shown that sugar intake has remained high during the past nine years, and although there have been some improvements in both children and adults, intake of free sugars# continues to far exceed the recommended intake of no more than five per cent of dietary energy in all age/sex groups over the period of the programme to date.[3] In children the impact on dental health is all too evident. In 2013, the Children's Dental Health Survey[8] found that nearly a third (31 per cent) of five year olds, nearly a half (46 per cent) of eight year olds, more than a third (34 per cent) of 12 year olds and almost a half (46 per cent) of 15 year olds had "obvious decay experience" in their permanent teeth, although this represents a reduction since 2003.



The definition of free sugars includes all added sugars in any form; all sugars naturally present in fruit and vegetable juices, purees and pastes, and similar products in which the structure has been broken down; all sugars in drinks (except for dairy-based drinks) and lactose and galactose added as ingredients.

1 DIETARY TRENDS: A DEEP DIVE

Dietary trends over the last two decades are certainly a cause for some concern[2,3] (see Table 1, page 34). Neither fruit and vegetable intake nor oily fish intake has improved and there has been a worrying fall in fruit and vegetable intake in some population groups. No population group is achieving 5 A Day. Red meat intake has also fallen, likely because of the growing popularity of vegan, vegetarian and flexitarian diets. All of these dietary trends have contributed to the falling intakes of several micronutrients over the past two decades (seen in Table 2).

FRUIT AND VEGETABLE INTAKE - AT AN ALL TIME LOW

Public Health England recommends that we eat at least five portions of fruit and vegetables each day. Fruit and vegetables are a vital part of a healthy diet, as they are a good source of fibre with lots of essential vitamins and minerals, and they should make up at least a third of what we eat each day. Eating lots of fruit and vegetables can contribute to a healthy weight as they are largely naturally low in calories and the 5 A Day campaign is based on advice from the World Health Organization (WHO) which recommends 400g of fruit and vegetables to lower the risk of heart disease, stroke and some types of cancer.

However, relatively few people in the UK achieve the 5 A Day recommendation and no population group on average achieves it (see Table 1).

For those aged 65 years and over the percentage achieving 5 A Day reduced significantly from 36 per cent in 2008/9 to 26 per cent in 2015/16 – a 27.8 per cent reduction. Less than one third (31 per cent) of adults aged 19-64 years consume their 5 A Day. But it is youngsters aged 11-18 years that are the age group least likely to achieve their 5 A Day. Ten years ago, only one in 10 of 11-18-year-olds consumed their 5 A Day whilst by 2016 this had dropped to just eight per cent - representing a reduction of 20 per cent (see figure 1, page 32).

SO, WHY HAS THE 5 A DAY CAMPAIGN FAILED TO IMPROVE FRUIT AND VEGETABLE CONSUMPTION?

The UK Government launched 5 A Day in March 2003. It is the best known of all the Government's health campaigns, recognised by around 90 per cent of the population,[9] yet less than one third of adults and less than one in 10 11-18-year-olds follow the advice. Overall, in fact, no population group in the UK is achieving 5 A Day, a situation that has actually worsened over the past decade.[3]

UNDER STRICT EMBARGO: 08.00 TUESDAY 4 JUNE 2019

“NO POPULATION GROUP IN THE UK IS ACHIEVING 5 A DAY, A SITUATION THAT HAS ACTUALLY WORSENED OVER THE PAST DECADE.[3]”

Failure of the 5 A Day campaign may have happened for several reasons.

Confusion: whilst consumers clearly know about the campaign, there is evidence that they don't understand portion sizes. According to a survey commissioned by the National Charity Partnership, which polled over 2,000 people, only 23 per cent were correctly able to identify a portion of vegetable or fruit as a cupful or a handful. Over half (51 per cent) responded with a different answer while 26 per cent simply said they didn't know.[10] The National Charity Partnership went on to launch a "Hands on Healthy Eating" project to boost awareness of fruit and vegetable consumption through a series of educational activities and road shows. More than 20,000 people took part overall and by the end, 46 per cent of participants were eating more fruit and vegetables with a significant increase in those eating three or more portions each day.[11]

Consumers may have become confused, not to mention demotivated, by research reported in the media suggesting 5 A Day is not enough and that 7 A Day[12] and even 10 A Day[13] should be recommended. A survey of 40 students at Reading University found that whilst participants were aware of the 5 A Day recommendation, there was widespread confusion regarding the detail. In addition, men were less accepting of the message than women, reporting greater disbelief and a lack of motivation to increase intake.[14]

The perceived cost of fruit and vegetables is often high, particularly for those with inflexible food budgets. A range of other barriers have also been identified in the literature - from perceived lack of time to discouragement of friends and family, taste preferences, lack of motivation, exposure to adverts for less healthy snacks, the problem of obtaining fruit and vegetables when travelling, irregular working hours or when the daily routine is disrupted.[14-16]

Food deserts, areas which are poorly served by food stores, may hinder access to fruit and vegetables for people without a car or with disabilities.[17] For children, peer modelling programmes such as the Food Dudes, [17,18] as well as school lunch programmes have proved effective in increasing liking for and consumption of fruit and vegetables but intakes may return to baseline at the end of the intervention.[19]

OILY FISH CONTINUES TO BE UNDER-CONSUMED

Oily fish is an important source of high-quality protein, vitamins, minerals and long chain omega-3 fatty acids including eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), both of which play a valuable role in the promotion of health and disease prevention[20] yet intakes fail to shift. Current guidance is that two weekly portions of fish are recommended, of which one should be oily and a portion is defined as 140 grams.[21]

Oily fish intake has changed little and remained consistently below dietary guidelines over the nine years of the recent UK NDNS Rolling Programme.[3] (see Table 1) Weekly intakes for those aged 4 to 18 years were just 14 grams – equivalent to one-tenth of a portion (140 grams). An earlier analysis of years 1 to 4 of the UK NDNS showed that amongst children aged 2 to 18 years only 4.5 per cent met oily fish intake recommendations[22]. Amongst adults aged 19 to 64 years average oily fish intakes were 54 grams per week – just over one third of a portion. Potential barriers to oily fish consumption may include its strong taste, which may pose a particular barrier to younger generations.[23] Concerns about sustainability of fish stocks and media discussion about toxins may also put people off although there is no tangible evidence for this.

Red and processed meat intakes

Significant reductions in total red and processed meat intakes have occurred over the last decade (see Table 1)[3]. This change became significant in 2012 in adult populations aged 19 to 64 years and the trend towards reduced intakes was sustained until 2016. Overall, there was a 16 per cent reduction in red meat intakes with mean daily intakes reducing from 74g/day in 2008 to 62g/day in 2016.

Red meat is a source of several highly bioavailable micronutrients, in particular zinc and iron, as well as vitamin B12 and D. Zinc, iron and vitamin D are found in plant-based foods, including fortified foods, although generally in forms that are not so bioavailable. Vitamin B12 is found in yeast extract and some mushrooms. Reduction in red meat intake may prejudice intakes of these essential nutrients. Indeed, an analysis of UK women found that those consuming less than 40 grams total red meat daily were more likely to have reduced micronutrient intakes, especially zinc and vitamin D[24].

Free sugars

Intakes of free sugars have been continually high over the last 20 years.[2] There have been some improvements, but intake of free sugars continues to far exceed recommended guidelines. Although intakes of free sugars have decreased in all age groups, the NDNS-RP shows that these still exceed the current recommendation of no more than 5 per cent of total energy from free sugars in all age/sex groups over the past nine years.[3]

Dietary fibre

There was a significant decrease in AOAC dietary fibre intake during the NDNS Rolling Programme to date (see Table 1 and Figure 2). This decrease was evident across most age/sex groups, but especially amongst those aged 4-18 years. Men aged 19 to 64 years bucked the trend, showing a slight increase in AOAC fibre intake of 2.4g/day over the NDNS programme so far. Average intakes over the nine years remained well below current recommendations in all age/sex groups.[3] Adults aged 19-64 are currently consuming on average 19g a day and adults 65 and over consuming 17.5g daily, considerably less than the 30g daily recommendation.[25] Fibre intake is low in children and youngsters too, 14g daily in 4-10-year-olds, compared with the recommended intake of 20g daily for 5-11-year-olds and 15.3g daily in teenagers aged 11-18 compared with the recommended intake of 25g daily in 11-16-year-olds.

2 VITAMINS & MINERALS

VITAMINS AND MINERALS

Changes in UK vitamin and mineral intake over the last 20 years are shown in Table 2 and in Figures 3-8 for specific vitamins and minerals over the last decade. Proportions of population groups consuming less than the Lower Reference Nutrient Intake (LRNI) – the intake level at which deficiency is likely – over the last decade are shown in Table 3 and also by gender in Table 4.

Over the last two decades there have been significant declines for several micronutrients: intakes of riboflavin, folate, vitamin A, vitamin D, iron, calcium and potassium significantly fell whilst improvements were observed for zinc. In particular, vitamin A has declined by 6.8µg whilst calcium intake has fallen by 6.3 mg per day for every year recorded. Vitamin D intake has reduced by a significant 22 per cent over 20 years.

FOCUS ON VITAMIN A

Vitamin A is a fat-soluble vitamin, essential for the maintenance of normal vision, normal skin and mucous membranes.

During the last two decades,[2] daily vitamin A intake overall has declined by 6.8 micrograms or 20 per cent. During the last nine years,[3] children aged 1.5 to 3 years, 4 to 10 years and 11 to 18 years had an average yearly reduction in vitamin A intake of four per cent, three per cent and three per cent respectively. For adults aged 19-64 years, intakes decreased by two per cent and for adults aged 65 years and over, 4 per cent. (see Figure 3)

The previous NDNS-RP report from Years 5 and 6[27] showed that mean intake of vitamin A was above or close to the RNI in all age/sex groups. However, mean intakes do not capture nuance: intakes of vitamin A were below the LRNI in 13 per cent of adults aged 19-64, seven per cent of adults 65 and over, 21 per cent of 11-18-year-old's and 12 per cent of 4-10-year-old's in the latest NDNS-RP analysis.[3] There was a significant increase over 10 years in the proportion of girls aged 11 to 18 years with vitamin A intakes below the LRNI, rising from 14 per cent 10 years ago to 24 per cent most recently.

The Chief Medical Officer recommends that children aged six months to 5 years take a supplement containing vitamins A, C and D, but a healthy and varied diet is expected to contain all the vitamin A that is needed in the rest of the population. Yet the proportion of children aged 18 months to three years who are not achieving the LRNI of vitamin A, has almost doubled and now stands at 15 per cent — or one in six — up from eight per cent in the first survey in 2008. In 4 to 10-year-olds the number falling short has tripled (four per cent to 12 per cent).

FOCUS ON FOLATE

Folate is a water-soluble B vitamin, which is essential for normal cell division, formation of red blood cells and brain function. Deficiency can result in tiredness (caused by a macrocytic anaemia), weakness, diarrhoea and appetite loss.[26] Women throughout their reproductive lives, particularly when planning a pregnancy and for the first three months of pregnancy, are recommended to take a 400 microgram folic acid supplement each day to reduce the risk of neural tube defects such as spina bifida.

During the last nine years, a significant average yearly reduction in folate intake was observed for all age/sex groups (see Figure 4). This was around 3-4µg/day for children and adults aged 19 to 64 years, and 5µg/day (equivalent to 45µg/day over the 9 years) for adults aged 65 years and over. The previous NDNS-RP report[27] showed that mean intake of folate was above the RNI in all age/sex groups with the exception of girls aged 11 to 18 years. However, the most recent NDNS report[3] revealed that, in 2014/2015 – 2015/2016, 15 per cent of 11-18-year-old girls and 6 per cent of 19-64-year-old women failed to achieve the LRNI for folate. Blood folate concentrations also decreased significantly over the last nine years for most age/sex groups, and the proportion of participants with folate concentrations indicating risk of anaemia increased.

Of significant concern is a 2014 paper published in PLOS One[28] which found that two thirds of women in the UK are not taking a folic acid supplement before pregnancy. The proportion of women taking folic acid supplements before pregnancy declined from 35 per cent in 1999–2001 to 31 per cent in 2011–2012.

Just six per cent of women aged under 20 took folic acid supplements before pregnancy compared with 40 per cent of women aged between 35 and 39.

The NDNS-RP analysis found that in women of childbearing age (16 to 49 years), red blood cell folate fell by 34 per cent over the period of the programme to date. Time-trend analysis of the proportion of women of childbearing age (16 to 49 years) with a red blood cell folate concentration below the threshold for increased risk of neural tube defects-affected pregnancies (748nmol/L) increased from approximately two thirds to almost 90 per cent over the nine years. In other words, nine out of ten women of child-bearing age now have such low levels of folate that if they became pregnant, their child would be at increased risk of neural tube defects.

FOCUS ON VITAMIN D

Vitamin D is essential for healthy bones, muscles and teeth. SACN report on Vitamin D and Health[29] highlights the importance of vitamin D in protecting muscle strength and preventing rickets, osteomalacia and falls. Sunshine, rather than food, is the main source of vitamin D and, because there are limited food sources, it is difficult to get recommended amounts of vitamin D even from a healthy diet. PHE recommends that all adults and children over the age of one year should consider taking a 10 microgram supplement of vitamin D especially during autumn and winter.[30]

Table 2 shows that during the past two decades, vitamin D intake decreased in the UK population overall by 22 per cent. With regard to specific age/sex groups there was a downward trend over the 9-year period of the NDNS-RP in vitamin D intake for children aged 11 to 18 years and adults, and this was statistically significant for boys aged 11 to 18 years (two per cent per year) and adults aged 19 to 64 years (one per cent per year). Mean intakes of vitamin D were below the RNI in all age/sex groups.

Low vitamin D status is common in the UK. In the latest NDNS-RP, during January to March, 19 per cent of children aged 4 to 10 years, 37 per cent of children aged 11 to 18 years and 29 per cent of adults had 25-OHD below 25nmol/L, the threshold indicating risk of deficiency.[31,32]

FOCUS ON VITAMIN B12

Vitamin B12 is a water-soluble vitamin, which is essential for the health of the nerves and blood cells, helping cells to make the genetic material, DNA. This vitamin requires the presence of hydrochloric acid and intrinsic factor, both of which are made in the stomach. Vitamin B12 deficiency can occur either through a lack of vitamin B12 in the diet or due to difficulty absorbing the vitamin. Deficiency leads to a form of anaemia (pernicious anaemia). Lack of vitamin B12 leads to tiredness, weakness, loss of appetite, constipation and weight loss and can cause permanent nerve damage even in people who do not develop pernicious anaemia.

During the last nine years, the NDNS-RP shows no change in vitamin B12 with overall intakes meeting recommendations. However, vitamin B12 is found in animal foods such as meat and dairy foods and in some fortified plant-based foods such as some breakfast cereals. People following vegan diets are at particular risk from low vitamin B12 intakes, but the growing number of vegetarians and flexitarians who are reducing meat intake could also be at risk. A vitamin preparation containing B12 is an important safeguard for these groups of people.

MINERALS

FOCUS ON IRON

Iron has many roles in the body. It is particularly important for making haemoglobin, a protein contained in red blood cells that transports oxygen round the body. Iron also plays an essential role in maintaining a healthy immune system. A mild iron deficiency causes tiredness, lack of energy and increased susceptibility to infections. With more severe iron deficiency, symptoms such as heart palpitations, thinning hair, brittle nails, itchy skin and mouth sores or ulcers can develop.

During the past 20 years, iron intakes have reduced by five per cent overall (see Table 2). An average yearly reduction in iron intake was seen in most age/sex groups, the largest of which was seen in girls aged 4 to 10 years (reduction of 0.2mg/day). Some age/sex groups had mean intakes of iron below the RNI and substantial proportions with intakes below the LRNI, in particular girls aged 11 to 18 years and women aged 19 to 64 years. There was a statistically significant increase of two and one percentage points in the proportion with iron intakes below the LRNI for girls aged 11 to 18 years and women aged 19 to 64 years respectively (see Table 3 and Figure 4). More than half (54 per cent) of girls aged 11-18 years and more than one quarter (27 per cent) of women aged 19-64 have intakes of iron below the LRNI, a level at which the risk of deficiency, and as a consequence, iron deficiency anaemia, increases.

Red meat is a source of highly bioavailable haem iron and reductions in iron intake appear to coincide with reduced meat intakes. For example, mean intakes of red and processed meat in women aged 19 to 64 declined from 58 g/day in 2008 to 47 g/day by the period during which the proportion of women in that age group with iron intakes below the LRNI increased for 21 to 27 per cent.[3] Plant-based sources of iron (pulses, grains, vegetables etc) contain iron, but in a less bioavailable form that the iron in meat. Where red meat is being reduced a general lack of nutrition knowledge may result in alternative sources of iron not being included.

UNDER STRICT EMBARGO 08.00 TUESDAY 4 JUNE 2019

> THE GROWING NUMBER OF VEGETARIANS AND FLEXITARIANS WHO ARE REDUCING MEAT INTAKE COULD ALSO BE AT RISK.

FOCUS ON ZINC

Zinc is an essential nutrient found in cells throughout the body. Zinc helps the immune system fight off invading bacteria and viruses. The body also needs zinc to make proteins and DNA, the genetic material in all cells. During pregnancy, infancy, and childhood, the body needs zinc to grow and develop properly. Zinc also helps wounds heal and is important for proper sense of taste and smell.

During the last 20 years,[2] some improvements have been seen for zinc intake, although not in all age/sex groups (see Table 2). A significant average yearly reduction in zinc intake of 0.1mg/day was observed in children aged 1.5 to 3 years, girls aged 4 to 10 years, boys aged 11 to 18 years and women aged 65 years and over. The previous NDNS RP report (years 5-6)[27] showed that mean intake of zinc was above the RNI in all age/sex groups with the exception of girls aged 4 to 10 and 11 to 18 years. Over the NDNS-RP to date, there was a statistically significant one percentage point increase per year in the proportion of boys aged 11 to 18 years and women aged 19 to 64 years with zinc intakes below the LRNI (see Table 4).

More than one in five (22 per cent) of 11-18-year-olds, 11 per cent of 4-10-year-olds, eight per cent of 19-64-year-olds and seven per cent of people 65 and over have a zinc intake below the LRNI. Amongst girls aged 11-18 years, more than a quarter (27 per cent) have a zinc intake below the LRNI (Table 4). Red meat makes a particularly good contribution to zinc intakes, in fact a greater proportion to zinc intakes in females than to iron. Reducing meat intake amongst those with lower intakes of zinc as well as those with lower iron intakes could drive up the risk of deficiency of these essential minerals.[33]

FOCUS ON CALCIUM

Calcium is the most abundant mineral in the body. It is important at all ages for strong bones and teeth. Calcium is also required for vascular contraction and vasodilation, muscle function, nerve transmission, intracellular signalling and hormonal secretion.
During the last 20 years there has been an overall decline in calcium intakes of 20 per cent (see Table 2 and Figure 5). A significant average yearly reduction in calcium intake of 10mg/day was observed in children aged 1.5 to 3 years and 4 to 10 years. A 5-8mg/day yearly reduction was seen in children aged 11 to 18 years and adults aged 65 years and over. Mean intake of calcium was above the RNI in all age/sex groups with the exception of boys and girls aged 11 to 18 years. There was a statistically significant one percentage point increase per year in the proportion of children aged 11 to 18 years and women aged 65 years and over with calcium intakes below the LRNI.

Almost one in 10 adults (aged 19-64) and 16 per cent of those aged 11-18 years had a calcium intake below the LRNI. More than a fifth (22 per cent) of girls aged 11-18 and 11 per cent of women aged 19 and over have calcium intakes below the LRNI (see Table 4). Such low intakes are likely to prejudice bone health and these population groups are likely to benefit from supplemental calcium.[34]

FOCUS ON POTASSIUM

The mineral potassium is the most abundant intracellular cation. Potassium is present in all body tissues and is required for normal cell function because of its role in maintaining intracellular fluid volume and transmembrane electrochemical gradients. Potassium has a strong relationship with sodium, the main regulator of extracellular fluid volume, including plasma volume.

FACT: Insufficient potassium in the diet will first show as a disturbance of the cardiac rhythm, abnormal neural activity and increased blood pressure. Loss of control of potassium levels tends to be fatal, especially in older people.

During the last 20 years there has been an overall reduction in potassium intake of 4 per cent (see Table 2). The proportion of 11-18-year-olds not achieving the LRNI has increased from 24 per cent to 28 per cent over the last 10 years. For adults aged 19-64 the proportion not achieving the LRNI has increased from 16 per cent to 17 per cent whilst for the over 65s this figure has increased from 13 to 19 per cent. The situation is worse for women than men. The proportion of 11-18-year-old girls not achieving the LRNI has increased from 32 per cent to 38 per cent, for women aged 19-64 from 21 to 23 per cent and for women of 65 and over the increase has been from 13 to 27 per cent.

FOCUS ON IODINE

Iodine is an essential component of the thyroid hormones thyroxine (T4) and triiodothyronine (T3). Thyroid hormones regulate many important biochemical reactions, including protein synthesis and enzymatic activity, and are critical determinants of metabolic activity. They are also required for proper skeletal and central nervous system development in foetuses and infants. Iodine also plays a part in immune function.

The NDNS-RP has tracked iodine intake over the last nine years, and intake has decreased by five per cent overall during that time period (Figure 6). A downward trend in iodine intake over time was observed for most age/sex groups.

Children aged 1.5 to 3 years and 4 to 10 years had a significant average yearly reduction in iodine intake of 3µg/day and 2µg/day respectively (Table 2). Women 65 years and over had a significant average yearly reduction in iodine intake of 3µg/day. A significant average year-by-year increase in the proportion with iodine intake below the LRNI of one percentage point was seen in most age/sex groups (Table 3 and 4).

The previous NDNS-RP report (years 5-6)[27] has shown that there was evidence of low intakes of iodine for children aged 11 to 18 years with 20 per cent having an intake below the LRNI compared with 23 per cent 10 years ago (Table 3). Again, intakes in women are worse than those of men. The proportion of 11-18-year-old girls not achieving the LRNI has increased from 19 per cent to 27 per cent, for women aged 19-64 from nine to 15 per cent. Given the crucial importance of iodine for the growing foetus these low iodine intakes in women of reproductive age are a cause for concern.

FOCUS ON SELENIUM

Selenium is a constituent of more than two dozen selenoproteins that play critical roles in reproduction, thyroid hormone metabolism, DNA synthesis, and protection from oxidative damage and infection. The earth's soils contain varying amounts of selenium, which has an impact on the selenium content of crops. Selenium insufficiency has been associated with poor immune function, cardiovascular disease and poor thyroid function.[35]

> MORE THAN A FIFTH (22 PER CENT) OF GIRLS AGED 11-18 AND 11 PER CENT OF WOMEN AGED 19 AND OVER HAVE CALCIUM INTAKES BELOW THE LRNI

There was little change observed in selenium intakes over the nine-year period across the age/sex groups (Table 2 & Figure 7), but there was evidence of low intakes of selenium for youngsters aged 11 to 18 years, adults aged 19 to 64 years and adults aged 65 years and over (Table 3). Women aged 19 to 64 years showed an average decrease of one percentage point per year in the proportion with selenium intake below the LRNI. In contrast, women aged 65 years and over showed an average increase in the proportion with selenium intake below the LRNI of two percentage points.

In the latest iteration of the NDNS-RP, 26 per cent of 11-18-year-olds, 25 per cent of 19-64-year-olds and 36 per cent of those aged 65 and over had selenium intakes below the LRNI. For women across these age ranges the figures were 45 per cent, 46 per cent and 66 per cent respectively.

Reductions in selenium intakes and status have been linked to the replacement of milled wheat grown on selenium rich North American soils with UK-sourced wheat having low grain levels of selenium due to it being grown on low selenium soils.[36]

FOCUS ON MAGNESIUM

Magnesium is a cofactor in more than 300 enzyme systems that regulate diverse biochemical reactions in the body, including protein synthesis, muscle and nerve function, blood glucose control, and blood pressure regulation. Magnesium is required for energy production, oxidative phosphorylation, and glycolysis. It contributes to the structural development of bone and is required for the synthesis of DNA, RNA, and the antioxidant glutathione. Magnesium also plays a role in the active transport of calcium and potassium ions across cell membranes, a process that is important to nerve impulse conduction, muscle contraction, and normal heart rhythm.

There was little change observed in magnesium intakes over the NDNS-RP 9-year period across the age/sex groups but there was evidence of low intakes of magnesium for children aged 11 to 18 years, adults aged 19 to 64 years and adults aged 65 years and over (Tables 2 and 3 & Figure 8). Women aged 65 years and over showed an average increase of one percentage point per year in the proportion with magnesium intake below the LRNI.

In the latest iteration of the NNDS-RP, 38 per cent of 11-18-year-olds, 13 per cent of 19-64-year-olds and 16 per cent of those aged 65 and over had magnesium intakes below the LRNI. For women across these age ranges the figures were 50 per cent, 11 per cent and 18 per cent respectively.

UNDER STRICT EMBARGO: 08.00 TUESDAY 4 JUNE 2019

“WOMEN AGED 19 TO 64 YEARS SHOWED AN AVERAGE DECREASE OF ONE PERCENTAGE POINT PER YEAR IN THE PROPORTION WITH SELENIUM INTAKE BELOW THE LRNI”

3 HOW AND WHY DIETARY PATTERNS HAVE CHANGED

Dietary patterns and eating habits have changed dramatically over the past 20-50 years.[37] Our diets have been influenced by a range of factors, including urbanisation and the availability of different foods, busy lifestyles, more unpredictable working hours, increase in unstructured eating, more eating out and the rise in the number of women in the workforce.[38]

Traditionally, meals took place at set hours of the day. Now meals are dictated by work and leisure activities and must be more flexible. Eating habits are far less rigid than they were 20 years ago and this will likely become more pronounced in the future as people eat what they like when they can, mixing and matching rather than conforming to traditional values. Food sensitivities to substances such as wheat, gluten and dairy are increasingly impacting dietary choices with more than half of UK households buying at least one "free-from" product over a three-month period.[39]

There is growing interest in sustainable, plant-based diets with an increasing number of people taking up flexitarian, vegan or vegetarian ways of eating. The Waitrose Food and Drink Report 2018-2019[40] found that one in eight people in the UK is now vegan or vegetarian. A further 21 per cent claim to be flexitarian, where a largely vegetable-based diet is supplemented occasionally with meat, which means a third of UK consumers have deliberately reduced the amount of meat they eat or removed it from their diet entirely. The number of vegans in the UK, who avoid all animal products including dairy and eggs, has grown fourfold in the past four years from 150,000 to 600,000 according to the Vegan Society.

Plant-based diets, particularly vegan diets, need to be very carefully planned to reduce the risk of micronutrient deficiencies such as selenium, iodine, zinc, iron, calcium, vitamin D and vitamin B12.

POPULAR DIETS

A new "diet" seems to appear almost every week and a 2019 HSIS survey of 1022 adults (488 men; 534 women)[41] found a range of diets popular with the respondents. Slimming World and Weight Watchers were popular with 21 and 17 per cent respectively whilst 18 per cent had tried a shake type meal replacement. Almost one in 10 (nine per cent) had tried the 5:2 diet, eight per cent had tried Atkins, five per cent the ketogenic diet, four per cent the Dukan diet and three per cent the Palaeolithic diet. Diets come and go in magazines and best-seller lists. Some diets prove lastingly popular whilst others such as the cabbage soup diet, which had been tried by six per cent of the HSIS survey respondents, disappear from the diet headlines.

> OUR DIETS HAVE BEEN INFLUENCED BY A RANGE OF FACTORS, INCLUDING URBANISATION AND THE AVAILABILITY OF DIFFERENT FOODS

Meanwhile dietitians and nutritionists give the sensible nutrition advice they have been giving for years: to lose weight we need to eat less and exercise more. Yet many people seem to be put off by this advice, likely because it involves long-term change in diet and lifestyle.

Diets encouraging intermittent fasting like the 5:2 diet, for example, may seem more achievable than eating less over seven days, so encouraging the person to persevere with the diet and lose weight. A low carb, high protein diet, like the Dukan diet, or a low-carb high fat diet, like the New Atkins diet can lead to fast initial weight loss, which can be motivating. It's also easy to follow with no need to weigh food or count calories. Another popular diet, the Paleo Diet, is simple and doesn't involve calorie counting. It encourages the consumption of less high fat and high sugar processed food high in calories. Reducing intake of high calorie foods will again help fast weight reduction. The alkaline diet, based on the idea that eating certain foods can help maintain the body's ideal acidity (in fact the body maintains its pH balance regardless of the food we eat), recommends cutting down on meat, and avoiding sugar, processed foods and alcohol whilst eating more fruit and vegetables and legumes; again, this diet will likely encourage weight loss through reducing calories.

Whilst some people may also be more concerned by their appearance than their health and therefore want fast results from a diet, increasing numbers of people have dietary concerns because of health problems, like diabetes, coeliac disease, concern about food allergies, cardiovascular disease and inflammatory conditions.

Cultural factors may also influence dietary change, as are trying to improve overall fitness and well-being by eating food that is healthier. In the HSIS survey, 10 per cent of respondents had tried a gluten-free diet, which involves the removal of wheat and other gluten containing grains.

Overall, many popular diets can seem easy to follow and whilst some can be prescriptive in terms of reducing or increasing the intakes of certain foods, increasingly popular diets involve no calorie counting or weighing of food. They may also work for weight loss in the short term. The problem with many popular diets, though, is that they recommend removal of whole food groups from the diet – meat, dairy, bread, cereals and so on. In fact, a 2019 HSIS survey found that one in six adults are restricting entire food groups, often because of following fad diets. Such diets can prejudice nutrient intake and may be a factor in the decline in the micronutrient density of the UK diet over the past 20 years.

CURRENT CONFUSION ON DIET

Many people are confused by what it means to eat a healthy diet. As in every area of life, for diet and nutrition, we are living in an era of false and over-information. Partly this is linked to the explosion of information online. For several centuries the dominant form of information was the printed page, delivering knowledge in a fixed format, which encouraged readers to believe in settled and stable truths. Now we are caught in a battle between fact and rumour, between truth and falsehood. So called "facts" about diet can circulate with great speed. The rise of blogging and instagramming means people will follow those who may be popular but not necessarily appropriately qualified. So, if you ask people what type of diet is healthy or less healthy you would get lots of different answers. Yet dietitians and nutritionists have solid opinions on these issues based on real science and are quick to note where genuine uncertainty lies.

The recent HSIS survey[41] serves to illustrate this huge confusion about diet and nutrition. Almost three quarters (74 per cent) of respondents thought their knowledge of nutrition and healthy eating was excellent, very good or good. The most common sources of diet and nutrition advice were friends (25 per cent), family (24 per cent), the internet (23 per cent) and doctors (22 per cent) with advice from a dietitian, a key professional expert in diet and nutrition being sought by only 12 per cent.

But half the respondents had never obtained any dietary advice. When it came to knowledge about healthy diet, almost half of respondents (four in ten) thought that people in their 20s or 30s knew most about healthy eating and had the healthiest diets, a belief which is not born out by the NDNS-RP analysis with mineral intakes in particular being low in young women. More than half (57 per cent) thought there was not enough focus on nutrition in the school curriculum and 77 per cent thought the curriculum should include more on how to buy, store and cook food.

COMPLETE LACK OF KNOWLEDGE ON WHAT WE SHOULD EAT

Despite the high proportion of respondents happy with their healthy eating knowledge, there was significant lack of knowledge on the recommended balance of a healthy plate. Just 14 per cent were correct in thinking that fruit and vegetables should make up 30 to 40 per cent of the plate whilst almost two thirds (63 per cent) thought that fruit and vegetables should constitute less than 30 per cent of a healthy eating plate. A tiny four per cent thought correctly that starchy food should make up a similar proportion of the plate as fruit and vegetables with 95 per cent giving an incorrect answer. Well over half (58 per cent) had not heard of PHE's Eatwell Guide.

Awareness of the Eatwell Guide was higher than average in 16-29-year-olds (40 per cent), vegans (63 per cent) and in Plymouth (44 per cent) and Leicester (42 per cent). Almost three quarters (72 per cent) of respondents think we are better informed about nutrition and healthy eating than we were 20 years ago. This applied particularly to women (77 per cent) and people in Cambridge and Norwich, (92 and 82 per cent respectively).

However, 80 per cent did think that advice on healthy eating and nutrition was often or sometimes contradictory and more than three quarters (76 per cent) thought dietary advice had changed during the past 20 years. The 5 A Day fruit and vegetable campaign was launched in 2003 yet less than one third (31 per cent) thought that advice about fruit and vegetables had changed in the last 20 years. Around half were correct in identifying red and processed meat and sugar for which dietary advice has changed with recommended reductions in intake. Almost a half (44 per cent) had cut their processed meat intake and 35 per cent had reduced red meat. Almost a fifth (18 per cent) of those HSIS surveyed said they did not eat meat with eight per cent consuming a vegetarian diet, seven per cent a pescatarian diet and three per cent a vegan diet. Almost four out of 10 respondents (39 per cent) said they ate meat occasionally, 28 per cent once a week and 26 per cent occasionally.

> DESPITE THE HIGH PROPORTION OF RESPONDENTS HAPPY WITH THEIR HEALTHY EATING KNOWLEDGE, THERE WAS SIGNIFICANT LACK OF KNOWLEDGE ON THE RECOMMENDED BALANCE OF A HEALTHY PLATE.

Non-meat eaters were more commonly women than men (21 per cent vs. 18 per cent) with more young people (29 per cent of 16-29-year-olds) not eating meat compared with seven per cent of people over 60.

Overall, 60 per cent of respondents thought their diet was excellent, very good or good. However, almost half (46 per cent) had some worries about their diets, the chief worry being too much sugar (57 per cent), too much saturated fat (46 per cent) and too many calories (39 per cent). Respondents claimed to consume on average four portions of fruit and vegetables each day with just 12 per cent saying they ate 5 A Day every day and 14 per cent saying they never did. Almost a fifth (18 per cent) said they did not eat oily fish at all with less than a third (32 per cent) claiming to follow government recommendations to eat it once a week.

Almost one third (32 per cent) thought they had an insufficient intake of some vitamins, a view, which is backed by the NDNS-RP findings. Yet more than one third of respondents (36 per cent) did not think about vitamins and minerals when planning what to eat. A research question polled about folate revealed a significant lack of knowledge. Tiredness is a major symptom of folate deficiency yet almost half (45 per cent) did not mention this. When it comes to food sources of folate, 60 per cent did not know that leafy greens are a key source and 69 per cent did not know that beans and pulses are a source whilst 34 per cent incorrectly thought that oily fish is a good source.

TOO BUSY TO COOK

Not surprisingly, the busy lives of these respondents were associated with a lack of daily cooking and also significant use of ready meals. Just 26 per cent said they made their own meals every day and 36 per cent said they skipped meals because they were too busy. Only 28 per cent and 34 per cent said they never ate out or had takeaways, respectively, with over half (55 per cent) having takeaways once or twice a week. Almost one third (30 per cent) said they did not plan ahead with their meals. The big weekly shop remains popular with 70 per cent saying they do this. A fifth said they followed food trends like avocado on toast whilst 15 per cent said they did this sometimes. When it comes to lunch there was a huge variety of responses but home-made sandwiches were the most popular (33 per cent). Salads were consumed by just five per cent, with 12 per cent admitting to eating whatever they could grab on the go. Fruit was not mentioned at all.

UNDER STRICT EMBARGO: 08.00 TUESDAY 4 JUNE 2019

“NOT SURPRISINGLY, BUSY LIVES WERE ASSOCIATED WITH A LACK OF DAILY COOKING AND SIGNIFICANT USE OF READY MEALS.”

CHAPTER

4 NUTRITIONAL DOWNTURN

In spite of the abundance of information on nutrition and health, UK diets have not improved over the past two decades with significant declines in intakes of vitamins and minerals across the board. Whilst people may think they are better informed about diet than they were 20 years ago, confusion about what constitutes healthy eating is all too common. Knowledge of guidance designed to improve diets such as PHE's Eatwell Guide and portion sizes of fruit and vegetables is limited. Busy lives lead to some reliance on takeaways, ready meals and grabbing food on the go with little thought given to the vitamin and mineral content of food. And whilst many people may be concerned about their weight, the temptation is to turn to popular diets and nutrition information on social media, which may lead to fast short-term weight loss but with serious impacts on micronutrient intake.

The last 20 years have seen a significant downturn in intakes of riboflavin, folate, vitamin A, vitamin D, iron, calcium, magnesium, iodine, selenium and potassium. In children, intakes of vitamin A, iron, iodine and zinc, in particular appear to be on the downturn.

MICRONUTRIENT CRISIS

Micronutrient intakes of teenagers remain of significant concern with 32 per cent failing to achieve the LRNI for iron compared with 24 per cent 10 years ago, 21 per cent failing to achieve the LRNI for vitamin A compared with 13 per cent 10 years ago, nine per cent failing to achieve the LRNI for folate compared with four per cent 10 years ago with respective figures for calcium of 16 vs. 11 per cent, for zinc of 22 vs. 16 per cent and for iodine 20 vs. 13 per cent 10 years ago.

For teenage girls, the figures are even starker. Whilst 43 per cent failed to achieve the LRNI for iron 10 years ago, this has now risen to 54 per cent. Ten years ago, 14 per cent of 11-18-year-old girls did not achieve the LRNI for vitamin A, a figure that has now increased to 24 per cent. The percentage of this group not reaching the LRNI for iodine has increased from 19 to 27 per cent, for calcium 15 to 22 per cent, and for riboflavin 18 to 26 per cent in the short space of 10 years. Most worryingly – folate, with the proportion of 11-18-year-old girls not achieving the LRNI having more than doubled over 10 years from seven to 15 per cent.

Women of childbearing age and middle years have also shown a downturn in micronutrient intake. The proportion not achieving the LRNI for vitamin A has doubled from five to 10 per cent, for folate from three to six per cent, for iron from 21 to 27 per cent, for iodine from nine to 27 per cent and for calcium from six to 11 per cent, figures which are very worrying in the context of women during their childbearing years whose pregnancies are nurturing the next generation.

Intriguingly, almost half the respondents in the 2019 HSIS survey thought that younger people in their 20s and 30s knew most about healthy eating and had the healthiest diets, a view not born out by the evidence. Perhaps neither Generation Y nor Generation Z are quite as nutritionally savvy as maybe they believe!

Older people, too, are not without problems in terms of micronutrient intake with increases in the proportions of people over 65 failing to achieve the LRNI for in vitamin A, iron, calcium, magnesium, potassium, iodine and zinc over the last nine years. In older women, the proportion not achieving the LRNI for iron has increased by 10 times from one per cent to 10 per cent over the last 10 years. The proportion failing to achieve the LRNI for calcium has almost quadrupled from three to 11 per cent, for potassium there has been a more than doubling in this figure from 13 to 27 per cent, whilst for zinc, in 2008 one per cent of older women failed to achieve the LRNI, but this has now increased to seven per cent.

> “THE PROPORTION FAILING TO ACHIEVE THE LRNI FOR CALCIUM HAS ALMOST QUADRUPLED FROM THREE TO 11 PER CENT”

5 SUPPLEMENTS: HELPING TO BRIDGE GAPS

Whilst a healthy and balanced diet is paramount, supplements have a key role to play in topping up habitual intakes. This appears to be important in modern life as UK diets are lacking in a range of nutrients. A significant proportion of people in all population groups are not achieving the LRNI for a whole range of micronutrients – vitamin A, folate, iron, calcium, magnesium, iron, potassium, iodine, selenium and zinc. In fact, there is not a single nutrient or important food group tracked in the NDNS where there are not significant numbers of people falling short of the LRNI or target recommendation. Omega-3 fatty acids are likely to remain low too as oily fish intake is not improving. As plant-based sustainable diets increase in popularity with individual concerns about the sustainability of fish stocks, it is likely that oily fish intake will not increase. Consumption of red and processed meat now seem to be on a downturn with potential impacts on zinc, iron and vitamin B12 nutrition.

WHO IS TAKING SUPPLEMENTS AND WHICH ONES?

Food supplements can help bridge these nutrient gaps yet not all who could benefit are taking them. Amongst the 1,022 respondents in the recent HSIS survey[41], 38 per cent took no supplements at all (Figure 9). Only 20 per cent took vitamin D, which is recommended by PHE for all of the population during autumn and winter. Less than one in five (17 per cent) took a multivitamin; 12 per cent took a multivitamin/mineral, the type of preparation which would make a significant contribution to bridging the multitude of dietary gaps faced by the UK population.

Just 13 per cent took an omega-3 supplement, which again would bridge the nutritional gap resulting from low oily fish intake. Food supplements are intended for the maintenance of good health and 38 per cent of respondents taking supplements said they did so to stay healthy. (Figure 10). Almost half (49 per cent) took them because they thought their diet is or might be lacking in nutrients, a reasonable supposition given the data unearthed in the current report. More than half (51 per cent) said they checked product labels for vitamin content whilst almost half (49 per cent) said they did not, suggesting a need for education to deliver optimal choice and benefit from supplements.

According to a 2019 Mintel report on the UK vitamin and mineral supplement (VMS) market, over the past year, six in 10 (59 per cent) people in Britain had taken VMS, a similar proportion found in the 2019 HSIS study (62 per cent). The Mintel report found that around one in three (34 per cent) took VMS daily, with women (38 per cent) considerably more likely than men (29 per cent) to do so. Well over half (56 per cent) of VMS users took multivitamins. However, more than a quarter (26 per cent) of all people in Britain had never taken VMS.

Mintel found that vitamin D is used by 33 per cent of VMS users, increasing from 26 per cent in 2017, but usage is still low. The HSIS survey[42] found that although usage of vitamin D has increased for all age groups; usage has increased particularly in 35-54-years-olds from 22 per cent in 2017 to 35 per cent in 2018. Calcium and iron usage among VMS users also increased in the last year. Calcium usage increased from 20 per cent in 2017 to 29 per cent in 2018, and iron usage increased from 22 per cent to 28 per cent. The biggest increase for calcium was seen among 25-34-year-olds (up from 25 per cent to 39 per cent), while for iron, it is 35-44-year-olds who have increased their supplement use the most (up from 22 per cent to 36 per cent). Cod liver oil/fish oil was taken by 37 per cent of VMS users in the last year whilst omega-3s were taken by 13 per cent of respondents in the HSIS survey.

Although vegetarianism remains relatively small, Mintel reveals that a flexitarian lifestyle is likely to be affecting what people look for in their vitamins and supplements. More than one in 10 (11 per cent) of people who use and buy VMS see a vegetarian/vegan claim as an important factor when choosing one vitamin/supplement over another. Mintel also comments in its report that "the trend towards meat reduction diets – including both strict vegan diets and the more lenient flexitarian approach – is likely boosting usage of iron. With as many as half of meat eaters believing their red meat intake should be limited, it is likely that people are looking to supplements to fill the iron gap left if they are reducing the amount of red meat they eat. The rise in usage of calcium could also be linked to the growing focus on plant-based foods, both in terms of vegan diets and dairy avoidance."

Mintel found that Britain's most popular single-nutrient supplements are Vitamin D (33 per cent), Calcium (29 per cent), Iron (28 per cent), Vitamin C (27 per cent), Magnesium (16 per cent), Zinc (16 per cent) Vitamin A (12 per cent) and Vitamin E (10 per cent).

CONTRIBUTION OF SUPPLEMENTS TO VITAMIN AND MINERAL INTAKES AND BLOOD LEVELS

Studies in adults have shown that supplement use can make a significant contribution to vitamin and mineral intake. The NDNS in British adults found that supplement users had higher intakes of vitamins and minerals and were less likely to have intakes below the Reference Nutrient Intakes (RNI) than non-supplement users.[42] Similar findings have been shown in Ireland,[43] Germany,[44,45] the USA[46-48] and Canada.[49]

An epidemiological study in 4,384 US adults evaluated the influence of supplement use on the overall intake of nutrients and the possibility that supplements could compensate for dietary deficits. Of the total, 1,777 took supplements daily, 428 were infrequent users and 2,179 did not take supplements.[50] A significantly smaller proportion of supplement users than non-users had intakes from food alone that were below the Estimated Average Requirement (EAR)* for vitamins A, B6 and C, and for folate, zinc and magnesium. However, fewer than 50 per cent of both users and non-users met the EAR for folate, vitamin E and magnesium from food sources alone, indicating that a large proportion of older US adults do not achieve the EAR for several nutrients from food alone. Overall, supplements improved the nutrient intake of older adults. After accounting for the contribution of supplements, 80 per cent or more of users met the EAR for vitamins A, B6, B12, C, E, folate, iron and zinc, but not magnesium, showing that supplements compensate to some extent.

Food supplements have also been shown to make a substantial contribution to the intakes of vitamins and minerals in toddlers[51,52] and teenagers.[53-56] In addition, several studies[57,58] have shown that supplementation with vitamins and minerals can improve plasma levels of micronutrients status and reduce the prevalence of suboptimal plasma concentrations.

* The EAR is an estimate of the average requirement of energy or a nutrient needed by a group of people (i.e. approximately 50% of people will require less, and 50% will require more).

6 WHERE TO GO FROM HERE?

Given that vitamins and minerals are essential for the maintenance of health and we need them daily to fuel our bodies, the shortfall in nutrients across all UK population groups is a worry. With nutrient intakes having declined substantially over the last 20 years, these vitamin and mineral shortfalls are not likely to disappear any time soon. With the increase in plant-based diets, it could be predicted that iron shortfalls along with zinc and B12 will be ongoing areas of major health concern. Iodine too, as a lack of this trace mineral, as for other nutrients, including omega-3s, can impact on the health of the developing foetus and growing child. Omega-3 intakes are also likely to remain low due to the fact that over the last 20 years, there have been unchanging levels of oily fish consumption. The move towards sustainable diets and concern about fish stocks, may reduce omega-3 intakes further.

The UK population's knowledge of nutrition is very poor. The HSIS survey[42] found that significant numbers of people do not think about vitamins and minerals when they plan what to eat and more than half appear not to read VMS labels for nutrient content. Clearly there is a big education job to be done and evidence-based information needs to be communicated across the life-cycle. Whilst current generations have been bombarded with nutrition information, engagement with quality information appears to be minimal.

In the meantime, supplements play a key role in helping to bridge dietary shortfalls. The value of these should be disseminated through a range of communication channels from registered nutritionists and dietitians, GPs, pharmacists and other healthcare professionals plus other evidence-based communication channels.

> "WITH NUTRIENT INTAKES HAVING DECLINED SUBSTANTIALLY OVER THE LAST 20 YEARS, THESE VITAMIN AND MINERAL SHORTFALLS ARE NOT LIKELY TO DISAPPEAR ANY TIME SOON"

UNDER STRICT EMBARGO: 08.00 TUESDAY 4 JUNE 2019

LAST WORD

In summary, we may be in the information era but this does not necessarily mean that we are accessing the information we need to ensure our diets are where they need to be. The consistently low intakes of vitamins and minerals as well as omega-3s in the UK population with, for many nutrients, further downturns, during the past 20 years are a cause for concern. Whilst women, particularly young women, fare worse than men, poor vitamin and mineral intakes are seen across the population. No single population group is without a significant number of individuals whose intakes for many vitamins and minerals are below the LRNI.

Efforts must continue to be made to improve the British diet, but in the meantime, adults and children should bridge dietary gaps with a multivitamin and multimineral as well as an omega-3 supplement, appropriate to their age group.

> “ADULTS AND CHILDREN SHOULD BRIDGE DIETARY GAPS WITH A MULTIVITAMIN AND MULTI-MINERAL AS WELL AS AN OMEGA-3 SUPPLEMENT”

For more information on vitamin, mineral and food supplements visit www.hsis.org

For further information or to arrange an interview with an HSIS spokesperson, please contact the HSIS press office HSIS@junglecatsolutions.com or call 020 3600 0228. Out of hours please call 07867 513 361.

ABOUT HSIS

HSIS (the Health and Food Supplements Information Service) is a communication service providing accurate and balanced information on vitamins, minerals and other food supplements to the media and to health professionals working in the field of diet and nutrition. Find out more at www.hsis.org.

UNDER STRICT EMBARGO: 08.00 TUESDAY 4 JUNE 2019

REFERENCES

1. Haines J, Haycraft E, Lytle L, Nicklaus S, Kok FJ, Merdji M, et al. Nurturing Children's Healthy Eating: Position statement. Appetite. 2019;137:124-33.
2. DEFRA. Family food statistics 2018; Available from: https://www.gov.uk/government/collections/family-food-statistics. 2018.
3. NatCen Social Research. National Diet and Nutrition Survey: Years 1 to 9 of the Rolling Programme (2008/2009 – 2016/2017): Time trend and income analyses. A survey carried out on behalf of Public Health England and the Food Standards Agency. 2019.
4. SACN. Advice on fish consumption. Benefits and risks. 2004.
5. BMA. Obesity and diet-related illness in the UK. Media Brief bma.org.uk. 2016.
6. NatCen Social Research. Health Survey for England. Available: https://digital.nhs.uk/data-and-information/publications/statistical/health-survey-for-england/2017. Accessed 12 March 2019. 2018.
7. Public Health England. Health matters: obesity and the food environment. Available: https://www.gov.uk/government/publications/health-matters-obesity-and-the-food-environment/health-matters-obesity-and-the-food-environment--2. Accessed 18 March 2019. 2017.
8. Health and Social Care Information Centre. Children's Dental Health Survey 2013. Executive Summary: England, Wales and Northern Ireland Available: https://files.digital.nhs.uk/publicationimport/pub17xxx/pub17137/cdhs2013-executive-summary.pdf. Accessed 12 March 2019. 2015.
9. Cocozza P. The five-a-day disaster: why the numbers don't add up https://www.theguardian.com/lifeandstyle/2014/may/14/five-a-day-fruit-vegetables-portion-supermarket. 2014.
10. Askew K. UK consumers confused about portion size. https://www.foodnavigator.com/Article/2017/11/15/UK-consumers-confused-about-portion-size, Accessed 20 March 2019.
11. Anon. Three years, Three Partners, One Goal. Project Evaluation. National Charity Partnership, 2015-2017. . 2017.
12. Oyebode O, Gordon-Dseagu V, Walker A, Mindell JS. Fruit and vegetable consumption and all-cause, cancer and CVD mortality: analysis of Health Survey for England data. Journal of Epidemiology and Community Health. 2014;68(9):856-62.
13. Aune D, Giovannucci E, Boffetta P, Fadnes LT, Keum N, Norat T, et al. Fruit and vegetable intake and the risk of cardiovascular disease, total cancer and all-cause mortality-a systematic review and dose-response meta-analysis of prospective studies. International journal of epidemiology. 2017;46(3):1029-56.
14. Herbert G, Butler L, Kennedy O, Lobb A. Young UK adults and the 5 A DAY campaign: perceived benefits and barriers of eating more fruits and vegetables. International Journal of Consumer Studies. 2010;34(6):657-64.
15. Data on file
16. Blanchette L, Brug J. Determinants of fruit and vegetable consumption among 6–12-year-old children and effective interventions to increase consumption. Journal of Human Nutrition and Dietetics. 2005;18(6):431-43.
17. Horne PJ, Hardman CA, Lowe CF, Tapper K, Le Noury J, Madden P, et al. Increasing parental provision and children's consumption of lunchbox fruit and vegetables in Ireland: the Food Dudes intervention. European journal of clinical nutrition. 2009;63(5):613-8.
18. Horne PJ, Tapper K, Lowe CF, Hardman CA, Jackson MC, Woolner J. Increasing children's fruit and vegetable consumption: a peer-modelling and rewards-based intervention. European journal of clinical nutrition. 2004;58(12):1649-60.
19. Hendy HM, Williams KE, Camise TS. "Kids Choice" school lunch program increases children's fruit and vegetable acceptance. Appetite. 2005;45(3):250-63.
20. Gil A, Gil F. Fish, a Mediterranean source of n-3 PUFA: benefits do not justify limiting consumption. Br J Nutr. 2015;113 Suppl 2:S58-67.
21. NHS. Fish and shellfish. https://www.nhs.uk/live-well/eat-well/fish-and-shellfish-nutrition/. Accessed 20 March 2019.
22. Kranz S, Jones NRV, Monsivais P. Intake Levels of Fish in the UK Paediatric Population. Nutrients. 2017;9(4).
23. Adolphus K, Baic S. Oily fish consumption in young adults: current intakes, knowledge, barriers and motivations. Journal of Human Nutrition and Dietetics. 2011;24(4).
24. Derbyshire E. Associations between Red Meat Intakes and the Micronutrient Intake and Status of UK Females: A Secondary Analysis of the UK National Diet and Nutrition Survey. Nutrients. 2017;9(7).
25. SACN. Carbohydrates and health. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/445503/SACN_Carbohydrates_and_Health.pdf. Accessed 24 March 2019. 2015.
26. British Dietetic Association. Folic Acid. Available:https://www.bda.uk.com/foodfacts/FolicAcid.pdf. Accessed 22 March 2019. 2018.
27. NatCen Social Research. National Diet and Nutrition Survey: Results from Years 5 and 6 (combined) of the Rolling Programme (2012/2013 – 2013/2014)
28. Bestwick JP, Huttly WJ, Morris JK, Wald NJ. Prevention of neural tube defects: a cross-sectional study of the uptake of folic acid supplementation in nearly half a million women. PloS one. 2014;9(2):e89354.
29. SACN. SACN Vitamin D and health report. Available: https://www.gov.uk/government/publications/sacn-vitamin-d-and-health-report. Accessed 22 March 2019. 2016.
30. PHE. PHE publishes new advice on vitamin D. Available: https://www.gov.uk/government/news/phe-publishes-new-advice-on-vitamin-d. Accessed 22 March 2019. 2016.
31. Cancer Research UK. Vitamin D Expert Review. Available: https://www.nice.org.uk/guidance/ph32/documents/expert-paper-3-vitamin-d2. Accessed 18 April. 2019
32. Spiro A, Buttriss . Vitamin D: An overview of vitamin D status and intake in Europe. Nutr Bull. 2014 Dec; 39(4): 322–350.
33. Derbyshire E. Associations between Red Meat Intakes and the Micronutrient Intake and Status of UK Females: A Secondary Analysis of the UK National Diet and Nutrition Survey. Nutrients. 2017;9(7):768.
34. Francis RM. What do we currently know about nutrition and bone health in relation to United Kingdom public health policy with particular reference to calcium and vitamin D? British Journal of Nutrition. 2008;99(01).
35. Mason P. Dietary Supplements. Pharmaceutical Press. On-line via Medicines Complete. https://www.pharmpress.com/product/MC_DIET/dietary-supplements.
36. Broadley MR, White PJ, Bryson RJ, Meacham MC, Bowen HC, Johnson SE, et al. Biofortification of UK food crops with selenium. Proc Nutr Soc. 2006;65(2):169-81.
37. Nielsen. We are what we eat. Healthy eating trends around the world. Global health and wellness report. Available at: http://www.nielsen.com/content/dam/nielsenglobal/eu/nielseninsights/pdfs/Nielsen%20Global%20Health%20and%20Wellness%20Report%20-%20January%202015.pdf. Accessed 23 March 2019. 2015.
38. O'Shaunessy N. The changing face of global eating patterns. Available: https://khni.kerry.com/wp-content/uploads/2017/03/The-Changing-Face-of-Global-Eating-Patterns_FINAL.pdf. Accessed 23 March 2013. 2017.
39. BBC. Fashion for gluten and dairy free continues to grow. Available: https://www.bbc.co.uk/news/business-39488047. Accessed 23 March 2019. 2017.
40. Anon. Waitrose Food and Drink Report. Available: https://www.waitrose.com/content/dam/waitrose/Inspiration/Waitrose%20&%20Partners%20Food%20and%20Drink%20Report%202018.pdf. Accessed 24 March 2019. 2018.
41. Anon. GINUK20019 - HSIS. Data on file. 2019.
42. Henderson L IK, Gregory J et al. The National Diet and Nutrition Survey: adults aged 19 to 64 years. Volume 3. Vitamin and mineral intake and urinary analysis. HMSO, London, 2003. 2003.
43. Kiely M, Flynn A, Harrington KE, Robson PJ, O'Connor N, Hannon EM, et al. The efficacy and safety of nutritional supplement use in a representative sample of adults in the North/South Ireland Food Consumption Survey. Public health nutrition. 2001;4(5a):1089-97.
44. Beitz R, Mensink GB, Fischer B, Thamm M. Vitamins--dietary intake and intake from dietary supplements in Germany. European journal of clinical nutrition. 2002;56(6):539-45.
45. Schwarzpaul S, Strassburg A, Luhrmann PM, Neuhauser-Berthold M. Intake of vitamin and mineral supplements in an elderly german population. Annals of nutrition & metabolism. 2006;50(2):155-62.
46. Archer SL, Stamler J, Moag-Stahlberg A, Van Horn L, Garside D, Chan Q, et al. Association of dietary supplement use with specific micronutrient intakes among middle-aged American men and women: the INTERMAP Study. Journal of the American Dietetic Association. 2005;105(7):1106-14.
47. Blumberg JB, Frei B, Fulgoni VL, Weaver CM, Zeisel SH. Contribution of Dietary Supplements to Nutritional Adequacy in Various Adult Age Groups. Nutrients. 2017;9(12).
48. Blumberg JB, Frei BB, Fulgoni VL, Weaver CM, Zeisel SH. Impact of Frequency of Multi-Vitamin/Multi-Mineral Supplement Intake on Nutritional Adequacy and Nutrient Deficiencies in U.S. Adults. Nutrients. 2017;9(8).
49. Troppmann L, Gray-Donald K, Johns T. Supplement use: is there any nutritional benefit? Journal of the American Dietetic Association. 2002;102(6):818-25.
50. Sebastian RS, Cleveland LE, Goldman JD, Moshfegh AJ. Older adults who use vitamin/mineral supplements differ from nonusers in nutrient intake adequacy and dietary attitudes. Journal of the American Dietetic Association. 2007;107(8):1322-32.
51. Briefel R, Hanson C, Fox MK, Novak T, Ziegler P. Feeding Infants and Toddlers Study: do vitamin and mineral supplements contribute to nutrient adequacy or excess among US infants and toddlers? Journal of the American Dietetic Association. 2006;106(1 Suppl 1):S52-65.
52. Fox MK, Reidy K, Novak T, Ziegler P. Sources of energy and nutrients in the diets of infants and toddlers. Journal of the American Dietetic Association. 2006;106(1 Suppl 1):S28-42.
53. Dwyer JT, Garcea AO, Evans M, Li D, Lytle L, Hoelscher D, et al. Do adolescent vitamin-mineral supplement users have better nutrient intakes than nonusers? Observations from the CATCH tracking study. Journal of the American Dietetic Association. 2001;101(11):1340-6.
54. Stang J, Story MT, Harnack L, Neumark-Sztainer D. Relationships between vitamin and mineral supplement use, dietary intake, and dietary adequacy among adolescents. Journal of the American Dietetic Association. 2000;100(8):905-10.
55. Kim SH, Han JH, Keen CL. Vitamin and mineral supplement use by healthy teenagers in Korea: motivating factors and dietary consequences. Nutrition (Burbank, Los Angeles County, Calif). 2001;17(5):373-80.
56. Sichert-Hellert W, Wenz G, Kersting M. Vitamin intakes from supplements and fortified food in German children and adolescents: results from the DONALD study. The Journal of nutrition. 2006;136(5):1329-33.
57. Girodon F, Blache D, Monget AL, Lombart M, Brunet-Lecompte P, Arnaud J, et al. Effect of a two-year supplementation with low doses of antioxidant vitamins and/or minerals in elderly subjects on levels of nutrients and antioxidant defense parameters. Journal of the American College of Nutrition. 1997;16(4):357-65.
58. Wolters M, Hermann S, Hahn A. Effects of 6-month multivitamin supplementation on serum concentrations of alpha-tocopherol, beta-carotene, and vitamin C in healthy elderly women. International journal for vitamin and nutrition research Internationale Zeitschrift fur Vitamin- und Ernahrungsforschung Journal international de vitaminologie et de nutrition. 2004;74(2):161-8.

Figure 1: Trends in fruit and vegetable intake (g/day)

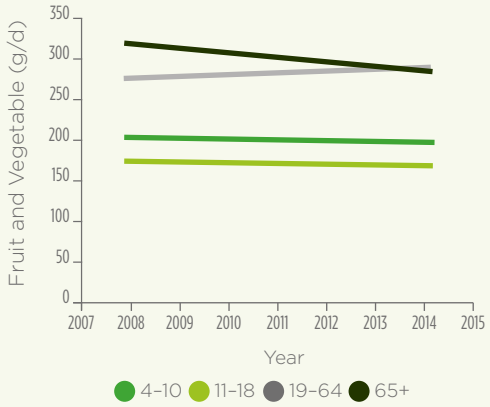


Figure 2: Trends in AOAC Dietary Fibre intake (g/day)

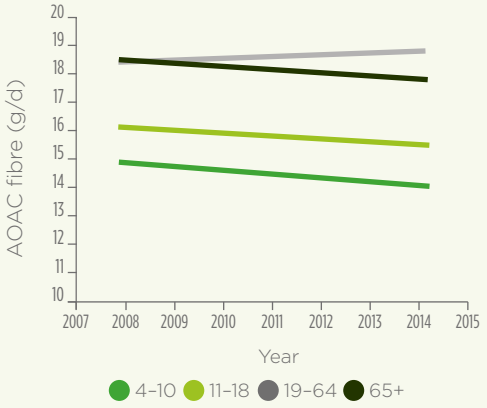


Figure 3: Trends in vitamin A intake (µg/day)

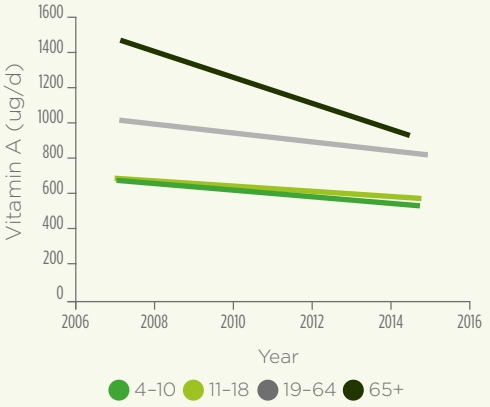


Figure 4: Trends in iron intake (mg/day)

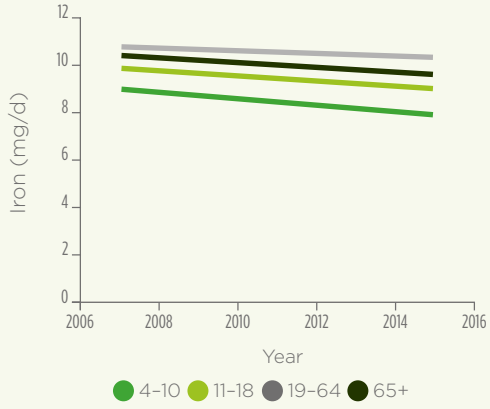


Figure 5: Trends in calcium intake (mg/day)

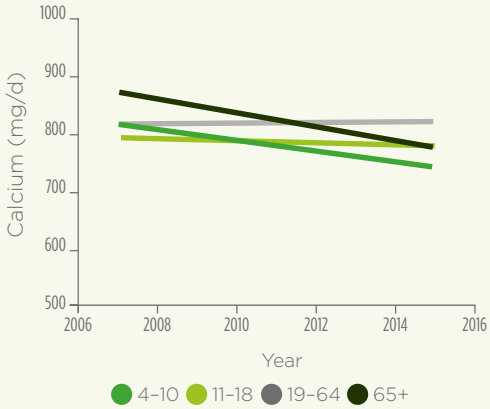


Figure 6: Trends in iodine intake (µg/day)

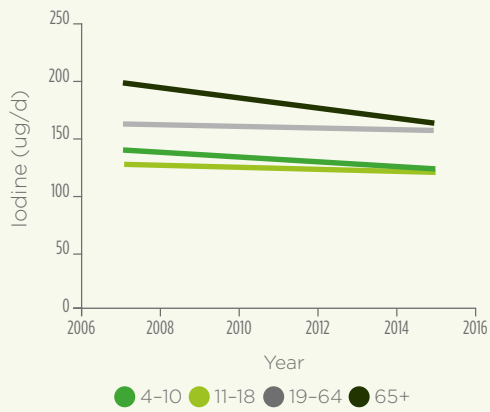


Figure 7: Trends in selenium intake (µg/day)

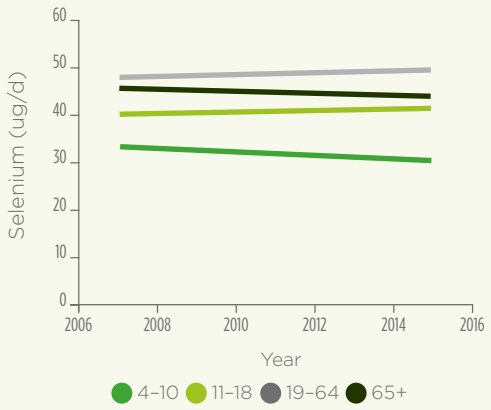


Figure 8. Trends in magnesium intake (mg/day)

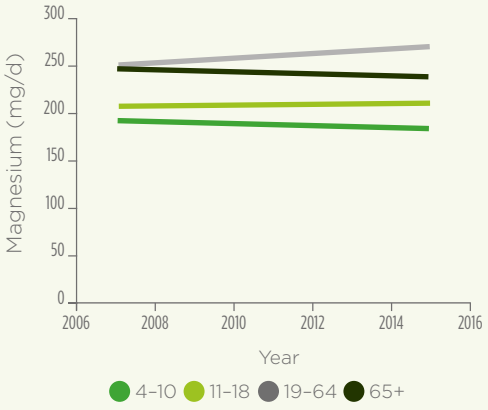


Figure 9: Supplements taken by respondents in the HSIS study

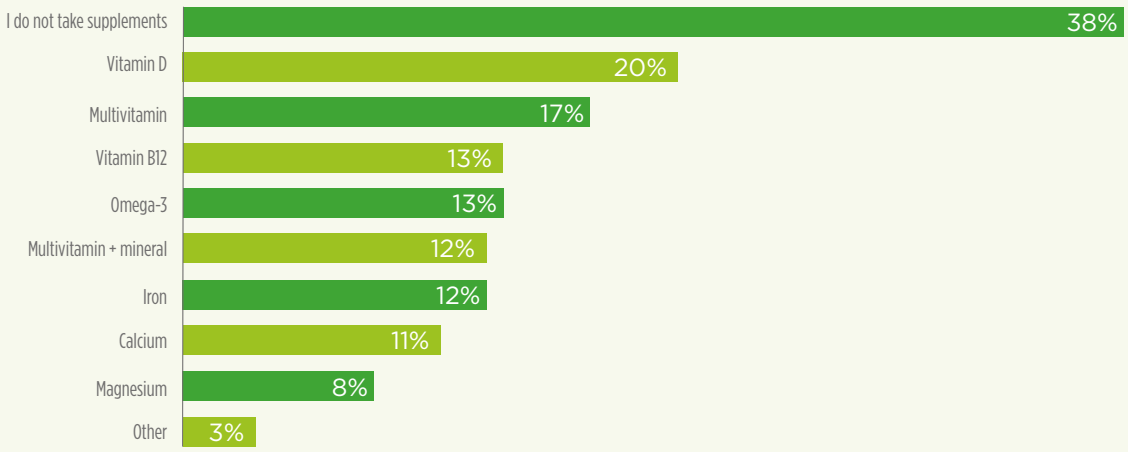


Figure 10: Reasons for taking supplements in the HSIS study.

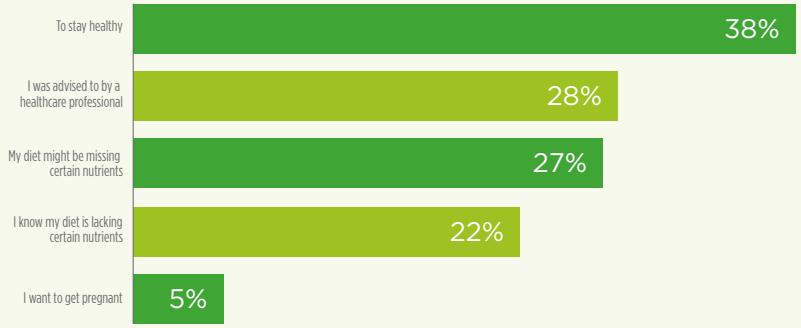


Table 1: Dietary Changes over the Last Decade.[3]

	Years 1-2 2008/9-2009/10				Years 3-4 (2010/11 - 2011/12)				Years 5-6 (2012/13 - 2013/14)				Years 7-8 (2014/15-2015/16)				per cent Change Since 2008			
	4-10y	11-18y	19-64y	65+y	4-10y	11-18y	19-64y	65+y	4-10y	11-18y	19-64y	65+y	4-10y	11-18y	19-64y	65+y	4-10y	11-18y	19-64y	65+y
Total energy intake (kcal/d)	1548	1816	1896	1710	1515	1735	1825*	1682	1462**	1779	1849	1643	1432**	1716**	1860	1633	-7.4	-5.5	-1.9	-4.5
Protein intake (g/d)	55.5	65.4	76.7	70.5	54.4	65.3	73.7	69.1	54.1	67.1	74.4	68.8	53.4	65.4	76.9	67.4	-3.7	0	0	-4.4
Fat intake (g/d)	58.9	69.0	70.6	66.7	55.8	65.1	67.1	63.1	54.4	66.5	67.8	60.9	53.5	64.9	69.5	61.6	-9.1	-5.9	-1.6	-7.6
Fat intake (g/d)	61.5	78.4	61.8	50.3	63.2	74.3	58.6	52.7	55.6	76.3	61.6	49.0	52.2	67.1	57.1	49.7	-15.3	-14.4	-7.6	-1.2
AOAC fibre (g/d)	14.9	16.1	18.5	18.1	14.7	15.5	18.0	18.8	14.1*	15.9	18.4	18.0	14.0**	15.3*	19.0	17.5	-6.0	-4.9	2.7	-3.3
Fruit and Vegetables† (g/d)	199	178	286	313	206	161	273	318	201	174	278	301	193	168	298	279	-3.0	-5.6	4.1	-10.9
Fruit and Vegetables (portions/d)	--	2.8	4.1	4.4	--	2.6	3.9	4.5	--	2.8	4.0	4.2	--	2.7	4.2	3.9	--	0	0	-11.3
Fruit and Vegetable (per cent achieving 5 A Day)	--	10	29	36	--	6	27	37	--	8	27	35	--	8	31	26*	--	-20	6.8	-27.8
Red and Processed Meat (g/d)	46	64	74	65	43	57	68*	62	42	59	65**	67	38**	53	62**	59	-17.4	-17.2	-16.2	-9.2
Oily Fish (g/d)	2	2	8	12	2	2	7	14	2	4	8	12	2	2	8	12	0	0	0	0
Oily fish (g/wk.) ††	14	14	56	84	14	14	49	98	14	28	56	84	14	14	56	84	--	--	--	--

Key: †Does not include juice. ††Oily fish intakes were multiplied up. Source: Data Extracted from: PHE (2018) Data Tables.
The UK NSNS Undertook statistical comparisons for: Years 3-4 vs Years 1-2, Years 5-6 vs Years 1-2, Years 7-8 vs Years 1-2
*indicates p<0.05 and ** indicates p<0.01.
Comparisons were only performed where the goodness-of-fit statistic R-squared was above 5 per cent.

Table 2: Dietary & micronutrient changes over the last two decades.[2]

	1996	1997	1998	1999	2000	2001-02	2002-03	2003-04	2004-05	2005-06	2006	2007	2008/9-2009/10	(2010/11-2011/12)	(2012/13-2013/14)	(2014/15-2015/16)	per cent Change Since 1996	Absolute Change per year (se)	P value for trend	Estimated per cent change over 18 years (95 per cent CI)	Trend
Energy (kcal/g)	2241	2168	2102	2056	2152	2098	2101	2079	2050	2082	2074	2052	1896	1825	1849	1860	-17	-20.2 (2.7)	<0.0001**	-17 per cent (-21, -12)	↓
Protein (g/d)	70	70	70	68	72	72	72	71	71	72	72	71	77	74	74	77	10	0.36 (0.07)	0.0002**	9 per cent (5, 14)	↑
Fat (g/d)	93	89	86	83	86	86	85	85	83	85	85	84	71	67	68	70	-25	-1.28 (0.20)	<0.0001**	-25 per cent (-32, -18)	↓
Vitamin A* (µg/d)	1040	1003	940	911	931	805	802	818	782	796	797	796	988	904	873	825	-21	-6.8 (3.8)	0.10	-13 per cent (-30, 3.2)	↓
Riboflavin (mg/d)	1.8	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.6	1.5	1.6	1.6	-11	-0.018 (0.004)	0.001**	-18 per cent (-25, 9)	↓
Folate (µg/d)	268	267	260	254	269	257	259	258	257	267	261	264	264	251	244	240	-10	-1.05 (0.31)	0.004**	-7 per cent (-11, -3)	↓
Vitamin D (µg/d)	3.5	3.5	3.4	3.3	3.4	3.3	3.3	2.9	2.9	2.9	2.8	2.8	2.9	2.8	2.8	2.7	-22	-0.050 (0.006)	<0.0001**	-25 per cent (-30, -19)	↓
Iron (mg/d)	11.0	11.0	11.0	11.0	11.0	11.0	11.1	11.2	11.2	11.5	10.9	10.7	10.8	10.5	10.4	10.5	-5	-0.034 (0.011)	0.008**	-6 per cent (-9, -2)	↓
Calcium (mg/d)	910	908	891	881	967	937	936	930	906	921	918	908	824	790	827	821	-10	-6.3 (1.8)	0.004*	-12 per cent (-19, -5)	↓
Magnesium (mg/d)	266	262	258	255	266	258	259	254	256	265	266	262	258	250	264	270	2	0.12 (0.27)	0.654	1 per cent (-3, 5)	↑
Potassium (g/d)	3.00	2.90	2.90	2.90	3.00	2.89	2.89	2.86	2.86	2.94	2.93	2.90	2.84	2.73	2.82	2.87	-4	-0.007 (0.003)	0.011*	-5 per cent (-8, -1)	↓
Iodine (µg/d)	--	--	--	--	--	--	--	--	--	--	--	--	164	155	160	156	--	-0.95 (0.90)	0.404	-	-
Selenium (µg/d)	--	--	--	--	--	--	--	--	--	--	--	--	48	48	49	50	--	0.35 (0.09)	0.056	-	-
Zinc (mg/d)	8.4	8.3	8.1	8.0	8.7	8.5	8.6	8.4	8.4	8.6	8.5	8.5	8.8	8.5	8.5	8.7	4	0.022 (0.009)	0.024*	5 per cent (1, 9)	↑

Key: *The total vitamin A content of the diet is usually expressed as retinol equivalents; 1µg/d retinol equivalent is equal to 1µg retinol or 6µg/d total carotene (Β-carotene equivalent)
*indicates p<0.05 and ** indicates p<0.01.

Table 3: Overall Micronutrient Changes since 2008/9 (per cent below LRNI).

	2008/9-2009/10				(2010/11 - 2011/12)				(2012/13 - 2013/14)				(2014/15-2015/16)				Trend			
	4-10y	11-18y	19-64y	65+y	4-10y	11-18y	19-64y	65+y	4-10y	11-18y	19-64y	65+y	4-10y	11-18y	19-64y	65+y	4-10y	11-18y	19-64y	65+y
Vitamin A (µg/d)	4	13	8	3	7	13	8	3	10	16	8	4	12	21	13	7	↓	↓	↓	↓
Riboflavin (mg/d)	0	13	7	2	1	17	10	6	0	13	8	5	1	20	10	6	↔	↓	↔	↓
Folate (µg/d)	0	4	2	1	0	4	4	1	0	4	3	3	1	9	5	3	↔	↓	↔	↓
Iron (mg/d)	0	24	11	2	2	29	13	2	2	28	14	3	2	32	15	6	↓	↓	↓	↓
Calcium (mg/d)	1	11	5	2	3	16	9	5	1	15	6	6	1	16	9	7	↔	↓	↓	↓
Magnesium (mg/d)	1	38	12	12	2	41	15	14	1	37	12	15	1	38	13	16	↔	↔	↔	↓
Potassium (mg/d)	0	23	16	13	0	26	18	14	0	24	18	17	0	28	17	19	↔	↓	↓	↓
Iodine (µg/d)	2	13	7	1	5	18	10	3	6	21	8	7	5	20	12	5	↓	↓	↓	↓
Selenium (µg/d)	1	35	38	42	1	32	38	42	2	33	36	44	1	38	36	52	↔	↔	↑	↓
Zinc (mg/d)	8	16	6	5	10	17	8	5	8	19	6	4	11	22	8	7	↔	↓	↔	↓

Data is from food sources only. ↓ Intakes have gone down. ↔ Intakes show no distinct trend; much the same. ↑ Intakes have improved.

Table 4: Micronutrient Changes since 2008/9 by Gender (per cent below LRNI).

	2008/9-2009/10				(2010/11 - 2011/12)				(2012/13 - 2013/14)				(2014/15-2015/16)				Trend			
	4-10y	11-18y	19-64y	65+y	4-10y	11-18y	19-64y	65+y	4-10y	11-18y	19-64y	65+y	4-10y	11-18y	19-64y	65+y	4-10y	11-18y	19-64y	65+y
Males																				
Vitamin A (µg/d)	3	12	10	5	6	10	12	2	7	14	11	4	13	19	16	6	↓	↔	↔	↔
Riboflavin (mg/d)	0	8	3	2	1	9	7	8	0	8	3	5	0	13	6	2	↔	↓	↔	↔
Folate (µg/d)	0	2	1	1	0	5	3	1	0	5	2	2	0	3	3	1	↔	↔	↔	↔
Iron (mg/d)	0	6	1	3	1	9	2	1	1	9	1	2	0	12	2	1	↔	↓	↔	↑
Calcium (mg/d)	0	8	3	2	2	9	7	5	1	12	4	3	2	11	7	2	↔	↓	↔	↔
Magnesium (mg/d)	0	26	16	18	1	30	16	20	0	27	12	16	0	27	14	13	↔	↔	↔	↑
Potassium (mg/d)	0	15	10	12	0	18	11	14	0	15	11	9	0	18	11	9	↔	↔	↔	↑
Iodine (µg/d)	1	7	5	0	4	11	8	2	5	16	5	5	6	14	9	3	↓	↓	↔	↔
Selenium (µg/d)	0	21	24	30	1	23	27	29	1	23	26	34	1	26	25	36	↔	↑	↔	↑
Zinc (mg/d)	5	12	9	11	9	11	10	8	4	17	6	6	9	18	7	7	↔	↑	↑	↑
Females																				
Vitamin A (µg/d)	5	14	5	1	9	15	5	2	12	18	8	4	11	24	10	8	↓	↓	↓	↓
Riboflavin (mg/d)	0	18	11	2	2	25	12	4	1	20	13	5	1	26	14	10	↔	↓	↔	↓
Folate (µg/d)	0	7	3	2	0	9	5	1	0	8	4	4	1	15	6	5	↔	↓	↔	↓
Iron (mg/d)	1	43	21	1	2	49	24	3	3	48	27	3	3	54	27	10	↓	↓	↓	↓
Calcium (mg/d)	2	15	6	3	3	23	10	5	1	19	8	8	1	22	11	11	↑	↓	↓	↓
Magnesium (mg/d)	1	51	9	8	5	54	14	8	3	48	11	15	3	50	11	18	↓	↔	↔	↑
Potassium (mg/d)	0	32	21	13	0	34	24	15	0	33	26	24	0	38	23	27	↔	↓	↔	↑
Iodine (µg/d)	3	19	9	2	6	26	12	3	7	26	11	8	4	27	15	7	↔	↓	↓	↑
Selenium (µg/d)	1	49	53	51	2	42	48	53	2	44	47	52	1	45	46	66	↔	↑	↑	↑
Zinc (mg/d)	10	20	4	1	11	25	5	2	13	22	6	3	14	27	8	7	↓	↓	↓	↑

Data is from food sources only. ↓ Intakes have gone down. ↔ Intakes show no distinct trend; much the same. ↑ Intakes have improved.

UNDER STRICT EMBARGO: 08.00 TUESDAY 4 JUNE 2019

hsis.org | **@HealthSuppsInfo**

Published Summer 2019 ©2019

The Health and Food Supplements Information Service is funded by PAGB, the consumer healthcare association, which represents manufacturers of branded OTC medicines, self care medical devices and food supplements in the UK.

HSIS
THE HEALTH AND FOOD SUPPLEMENTS INFORMATION SERVICE