

DIET DISASTERS FOR THE SEVEN AGES OF WOMEN

How nutritional gaps are putting women's health under threat across the lifecycle





FOREWORD

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The latest National Diet and Nutrition Survey (NDNS)¹ reveals a range of worrying nutrient shortfalls across the age and sex categories, with more of these evident amongst women and girls. To complicate the issue, many females lack the nutrient know-how and skills to take action to plug these disastrous dietary gaps, according to a new survey commissioned by the Health and Food Supplements Information Service (HSIS; www.hsis.org).²

While eight in 10 (80%) respondents to the poll agreed that a woman's body requires different nutrients at different stages of life, only a quarter (26%) said there is enough information out there to help women get the nutrients they need.

Before mothers even begin to consider their child's conception, their diets have the potential to impact the health of the ensuing pregnancy and, consequently, the growing foetus. Following from that, the nutritional groundwork we put in during childhood and early adulthood can have a big impact on how healthily we age. Yet this message is not necessarily getting through to girls early enough.

“MANY FEMALES LACK THE NUTRIENT KNOW-HOW AND SKILLS TO TAKE ACTION TO PLUG THESE DISASTROUS DIETARY GAPS”

1

THE SEVEN AGES
OF WOMAN

According to the HSIS real-world research poll, almost two-thirds (64%) of British women have never researched the nutrients needed for their particular life stage. Yet girls and women face unique nutritional challenges related to their genes, physiology, biochemistry, and lifestyles. **The following high-level summary explains what we need to consider at each stage of a woman's life.**



“A life course approach to nutrition is of particular importance to girls and women, who undergo several key changes during their lifetime,” says dietitian Dr Carrie Ruxton, adding that: “Adolescence brings the beginning of the menstrual cycle. Between the ages of around 16 and 50 years, a woman could become pregnant, and later in life, she will go through the menopause. Her body requires additional nutrients during these key developmental moments, over and above what it needs to carry out all of its regular processes and functions to maintain good health.”

Nutritionist Dr Pamela Mason adds: “The amount of a particular nutrient a woman receives from her diet – as well as any supplements she takes – influences her nutrient status. An optimal status means she has the right levels of nutrients available for her body to function effectively and stay in

good health. While more Brits have been taking supplements in recent years, this does not always include those who need them. Teens, younger women, those with restricted diets and elderly women are often missing out on vital nutrients and as a result need to bridge dietary gaps with a vitamin and mineral supplement. In addition, certain nutrients such as vitamin D and folate remain a problem, with uptake of supplements far from what experts recommend.”

With the latest NDNS flagging up a range of nutrients of major concern among the British female population, this report will explore the seven ages of women from preschool to old age, as well as the specific nutrient needs of girls and women, key nutrient gaps among this population, and ways women can help themselves to a better nourished body and mind.

“TEENS, YOUNGER WOMEN,
THOSE WITH RESTRICTED
DIETS AND ELDERLY WOMEN
ARE OFTEN MISSING OUT ON
VITAL NUTRIENTS”

GIRLS 4-10 YEARS:

A growing girl needs a wide range of nutrients for healthy development, with vitamins A, C, and D being top priorities. During the first years of her schooling, she is learning and her brain is growing, placing omega-3s under the spotlight. Furthermore, her eating habits are forming. While parents may find food-refusal and fussiness trying, these behaviours can also be something to watch out for in terms of whether a growing girl is achieving the complete range of nutrients from her food that she needs to develop into a healthy young woman.



A study in the *British Journal of Nutrition*³ assessed the dietary intake of polyunsaturated fatty acids - PUFAs - among more than 8,000 seven-year-olds involved in the Avon Longitudinal Study of Parents and Children (ALSPAC) using food frequency questionnaires. The authors concluded that there is a need for public health initiatives to address the imbalanced intake ratio of omega-6 versus omega-3 PUFAs and the very low intake of long-chain omega-3 fatty acids in school-aged children. They explained that the best way to do this is to eat sustainably sourced fish (especially oily fish) and seafood, as well as lean red meat, eggs, and products enriched with omega-3s.

TOP NUTRIENT NEEDS:

Vitamins A, C, D, and omega-3s

ADOLESCENCE AND TEENS:

As she moves into her teenage years, a girl becomes more independent, making her own decisions about what she eats. This can be problematic for a body going through lots of changes - for example, skeletal growth spurts need calcium, and the onset of her menstrual cycle may mean she has additional iron needs. Skipping breakfast or following a fad diet in a bid to emulate her favourite influencer could result in inadequate intakes of B vitamins and fibre. Sugar and trans fat-laden junk foods can nevertheless be tempting, especially if her peers are indulging, but it does nothing to nourish her changing body.

A study in the *European Journal of Nutrition* found a link between eating in line with a Mediterranean dietary pattern and lower risk of cardiometabolic conditions in 24-year-olds, emphasising the importance of establishing good dietary habits early in life.⁴

“SKELETAL GROWTH SPURTS NEED CALCIUM, AND THE ONSET OF HER MENSTRUAL CYCLE MAY MEAN SHE HAS ADDITIONAL IRON NEEDS”



TOP NUTRIENT NEEDS:

B vitamins, calcium, and iron

20s:

When she reaches her 20s, a woman may feel she has years to go before worrying about the health effects of what she eats but being mindful of nutritional needs early on can help stave off serious health problems further down the track. University, college, or work commitments can lead to nutrition taking a back seat. Life is all about having fun – possibly drinking too much alcohol in some cases. Takeaways can be a more tempting option than cooking. She might still be susceptible to pressure to be a certain body shape. However, her 20s are when a woman reaches peak bone mass. Therefore, scrimping on bone health nutrients like vitamin D, calcium, magnesium, and vitamin K could spell disaster for healthy ageing of bones, leading to later problems such as fractures.



PLANT-BASED DIET WATCH

With so many young women following the trend for plant-based diets, many are unaware of the potential nutrient shortfalls resulting from removing animal-based foods. Several studies^{5,6,7} have warned about the potential nutritional inadequacy of vegetarian and vegan diets, with nutrients like vitamin B12, vitamin D, iron, iodine, zinc, selenium, niacin, riboflavin, and potassium placed on the watch list.

One study in the *Journal of Vitamins and Minerals*⁸ concluded: “Ongoing nutritional surveillance is needed as ‘plant-based’ and ‘vegan’ trends may further influence dietary profiles... taking a multivitamin and multi-mineral supplement, and a fish oil (omega-3) supplement daily may help to bridge dietary gaps.”

TOP NUTRIENT NEEDS:

Vitamins A, C, D, and omega-3s

PREGNANCY:

Before a couple even begins to try for a baby, it's essential to focus on nutrition. For a woman, folic acid, choline, and iodine are key to healthy conception. Once pregnant, a woman needs to up her intake of vitamin D and high-quality protein for tissue growth, as well as fibre for bowel health. If she is overweight at the start of pregnancy, she needs to be careful not to increase her energy consumption too much, as this can cause problems with her pregnancy. Healthy snacking and meals when hungry are key to minimising glycaemic load and reducing the risk of gestational diabetes. Once the baby has made a safe arrival, breastfeeding and lack of sleep are key issues that increase nutritional needs.

MORNING SICKNESS RELIEF

Vitamin B6 (pyridoxine) has been found to help ease mild symptoms of nausea and morning sickness.¹¹

BABY BRAIN HEALTH

Playing an important role in the production of key neurotransmitter acetylcholine, choline is essential for brain health and development in the foetus.¹² Yet worryingly only a fifth (21%) of those polled in the HSIS survey said they know how choline supports women's health.

Only one in eight (13%) women polled in the HSIS survey⁹ knew about the importance of vitamin D. The authors of a study in the *American Journal of Clinical Nutrition*¹⁰ found that, in women in Northern Ireland who started pregnancy with inadequate blood levels of vitamin D (25-hydroxyvitamin D concentrations below 50 nmol/L), supplementing with 20 µg vitamin D3 is needed daily to achieve optimal vitamin D status in mother and baby. They concluded that current UK recommendations (10µg a day) leave women with obesity and baseline poor vitamin D status at increased risk of low levels throughout pregnancy, and of having a baby who is deficient in vitamin D.



TOP NUTRIENT NEEDS:

Folic acid, choline, iodine, vitamin D, protein, and fibre

30s to 40s:

In her 30s and 40s, a woman tends to reach the peak of being pulled in too many directions, between work, relationships, children, elderly relatives, and trying to have a social life. While it can be a time of impressive achievements and increased disposable income, stress, conflicting responsibilities, tiredness, and lack of time can take their toll. This can lead to eating out (often with an accompanying glass of wine or two), as an appealing alternative to cooking at home. However, this is the stage at which a woman may be starting to consider her risk of chronic disease and potential unhealthy ageing. For example, key heart health nutrients that should be piquing her interest include polyphenols, potassium, and omega-3s, along with keeping intakes of saturated fats, trans fats (that spell cellular health disaster) and sugar (which can lead to insulin resistance in high amounts) in check.

Polyphenols recognised for supporting heart health include resveratrol, epigallocatechin gallate (EGCG), and curcumin.¹⁴



Vitamin B5 (pantothenic acid) is sometimes referred to as the “anti-stress” vitamin. Maintaining healthy levels of vitamin B5 over time is associated with lower levels of inflammation – the root of several chronic diseases in people over 40.¹³

TOP NUTRIENT NEEDS:

Polyphenols, potassium, omega-3s, and vitamin B5

MENOPAUSE:

Menopause is a health topic that is thankfully being given more airtime these days. While it is a perfectly natural stage in a woman’s life, it can be a tough process to go through, both physically and mentally. It is usually characterised by heavy periods initially, with iron deficiency a nutrient shortfall to watch out for. For many women, weight gain and bloating can become problematic, with gut health a key consideration. B vitamins are needed to tackle mood swings, and hot flushes can severely impact a woman’s day-to-day life. Women going through menopause also need to consider protecting their existing bone mineral density as they stop producing oestrogen from the ovaries. Key nutrients to consider here include calcium, magnesium, and vitamin D.

Sage advice

While there is no ‘cure’ for hot flushes and other life-impacting menopausal symptoms, there is some evidence¹⁵ that sage could help bring relief. A study in Original Research found that a fresh sage preparation was very well tolerated and significantly reduced the average total number of daily hot flushes from week one to week eight. Furthermore, the average number of mild, moderate, severe, and very severe hot flushes decreased by 46%, 62%, 79%, and 100% over the eight-week period, respectively.

Make it Mediterranean

The anti-inflammatory and antioxidant-rich Mediterranean diet has been linked¹⁶ to reductions in blood pressure, fat mass, and cholesterol levels, and may be a beneficial diet for preventing bone, metabolic, and cardiovascular diseases after menopause. The dietary pattern could significantly slow down bone mineral density loss in women with osteoporosis. This may be due to its calcium, vitamin D, vitamin K, selenium, magnesium, and beta-carotene content.



Over half (55%) of those polled in the HSIS survey said they had not recently given any thought to how their diet could help support them through the menopause.

TOP NUTRIENT NEEDS:

Calcium, magnesium, vitamin D, and B vitamins



OLDER AGE:

Following menopause, a woman needs to make every calorie count, due to having lower energy requirements combined with the same or greater micronutrient requirements. Multivitamins and multiminerals can really come into their own at this life stage. Minimising cognitive decline is a key focus for older women, with omega 3s being a key protective nutrient. Immune health can also decline with age, so it is essential to take in adequate vitamin D, vitamin A, and vitamin C. With gut bacterial diversity reducing, leaving the potential for pathogenic bacteria to take over, probiotics (think live yoghurt and sauerkraut) and prebiotic foods (such as garlic and onions) become important. Here, probiotic supplements can provide an alternative choice.



A global phenomenon

A recent study in the journal *Nutrients*¹⁷ analysed energy and nutrient intakes for 21 countries. The authors found that these countries were universally poor at achieving the World Health Organization (WHO) Reference Nutrient Intakes (RNI) – especially for adult women of all ages.

CHANGING VITAMIN D NEEDS

Vitamin D needs may change as we approach older age. A study in the journal *PLOS ONE*¹⁸ found that the higher the vitamin D status, the lower the rate of fractures in middle-aged adults. However, in older adults, the relationship between vitamin D status and fracture risk was J-shaped, meaning that both very low and very high intakes could be problematic. That's why it's important to stick within the safe intake level, set by the European Food Safety Authority of 100 micrograms daily.

TOP NUTRIENT NEEDS:

Omega 3s, vitamin D, vitamin A, vitamin C, probiotics, and prebiotics



2 NUTRITION UNDERPINS LIFELONG HEALTH AND WELLBEING

Women need a wide range of nutrients to maintain good health across all the different life stages, especially in the face of busy 24/7 modern lives. GP Dr Nisa Aslam explains: “The B-vitamin group helps active teenage girls, busy mums and high-flying professionals maintain the energy they need to get through the day, whether they are playing football, wrangling kids, or making it through an endless stream of work calls. Yet, seven in 10 (71%) of those polled did not recognise B vitamins as important nutrients for energy levels.”

Then there are the key nutrients needed for one of the most important stages of life: pregnancy – from zinc helping to foster

healthy conception to folate (B9) preventing neural tube defects in the growing baby. Worryingly, only half (50%) of HSIS survey respondents said they know how this key pregnancy nutrient supports women’s health.

Pharmacist Noel Wicks notes: “Good nutrition also supports the immune system in fending off invading bacteria, viruses, and other pathogens, while poor nutrition depletes its power.¹⁹ Key nutrients needed for a healthy immune system include vitamins A, B2, B6, folic acid, B12, C, D, E, and iron, zinc, selenium, copper, and magnesium, many of which have been found to be lacking in women’s diets at varying stages of life.”

“GOOD NUTRITION ALSO SUPPORTS THE IMMUNE SYSTEM IN FENDING OFF INVADING BACTERIA, VIRUSES, AND OTHER PATHOGENS”

The following table details the roles of key micronutrients women need.

Vitamins	What do women and girls need it for? ²⁰
Vitamin A	Iron metabolism; maintenance of mucous membranes and skin; vision; immune function; cell specialisation (the process during which generic cells evolve to have specific functions)
Thiamin (Vitamin B1)	Energy metabolism; nervous system function; homocysteine metabolism (without which there can be excessive levels of this amino acid in the blood, which is linked to vitamins B6, folate, and B12 deficiencies and age-related diseases including osteoporosis, Alzheimer's disease, and cardiovascular disease); psychological function; red blood cell formation; immune function; cell division; reducing tiredness and fatigue
Riboflavin (Vitamin B2)	Energy metabolism; nervous system function; mucous membranes; red blood cells; skin; vision; iron metabolism
Niacin (Vitamin B3)	Energy metabolism; psychological function; mucous membranes; skin; reducing tiredness and fatigue
Pyridoxine (Vitamin B6)	Cysteine synthesis (the body must make this non-essential amino acid as it is needed to make protein such as the collagen in skin, hair, and nails); energy metabolism; nervous system function; homocysteine metabolism; protein and glycogen metabolism; psychological function; red blood cell formation; immune function; hormone regulation; reducing tiredness and fatigue
Folate (Vitamin B9)	Maternal tissue growth during pregnancy; amino acid synthesis; blood formation; homocysteine metabolism; psychological function; immune function; cell division; reducing tiredness and fatigue
Cobalamin (Vitamin B12)	Energy metabolism; nervous system function; homocysteine metabolism; psychological function; red blood cell formation; immune function; cell division; reducing tiredness and fatigue

Vitamins	What do women and girls need it for?
Vitamin C	Immune function during and after strenuous exercise; collagen formation for blood vessel function, bones, cartilage, gums, skin, and teeth; energy metabolism; nervous system function; psychological function; immune function; protecting cells from oxidative damage; reducing tiredness and fatigue; increasing iron absorption; regenerating vitamin E from its reduced form (when a molecule of α -Tocopherol, the form of vitamin E used by humans, exerts its antioxidant effect to neutralise a free radical, it loses its antioxidant ability, but vitamin C can regenerate it)
Vitamin D	Absorption of calcium and phosphorus; regulating blood calcium levels; bone and teeth maintenance; muscle function; immune function; cell division
Minerals	What do women and girls need it for? ²¹
Iron	Cognitive function; energy metabolism; red blood cell and haemoglobin formation; oxygen transport in the body; immune function; cell division; reducing tiredness and fatigue
Calcium	Normal blood clotting; energy metabolism; muscle function; neurotransmission; digestive enzyme function; cell division and specialisation; maintenance of bones and teeth
Magnesium	Reducing tiredness and fatigue; electrolyte balance; energy metabolism; nervous system function; muscle function; protein synthesis; psychological function; maintenance of bones and teeth; cell division
Potassium	Nervous system function; muscle function; blood pressure regulation

Minerals	What do women and girls need it for?
Zinc	DNA synthesis (making the unique genetic code of every individual); balancing the body's pH; carbohydrate metabolism; cognitive function; fertility and reproduction; macronutrient metabolism; fatty acid metabolism; vitamin A metabolism; protein synthesis; bone, hair, nails, and skin maintenance; testosterone regulation (regulating the amount of the primary male sex hormone in the blood, which women also need to a lesser extent for reproduction, growth, and general health); vision; immune function; protecting cells from oxidative stress; cell division
Copper	Maintenance of connective tissue; energy metabolism; nervous system function; hair and skin pigmentation; transporting iron in the body; immune function; protecting cells from oxidative stress
Iodine	Cognitive function; energy metabolism; nervous system function; skin maintenance; thyroid hormone production and thyroid function
Selenium	Maintenance of hair and nails; immune function; thyroid function; protecting cells from oxidative stress
Phosphorous	Energy metabolism; cell membrane function; maintenance of bones and teeth
Chloride	Contributes to normal digestion by producing hydrochloric acid in the stomach
Other nutrients	What do women and girls need it for? ²²
Omega 3: DHA & EPA²³	Regulation of blood pressure and blood triglyceride levels; heart function
Omega 3: DHA	Brain function; vision; visual development of infants up to 12 months; normal brain and eye development of the foetus and breastfed infant (maternal intake)

How much do women and girls need?

Data from UK government recommended nutrient intakes²⁴ unless otherwise stipulated

	1-3 yrs	4-6 yrs	7-10 yrs	11-14 yrs	15-18 yrs	19-64 yrs	65+ yrs
Fibre²⁵	15g (from 2yrs)	15g (to 5 yrs) 20g (from 5 yrs)	20g	20g (to 11 yrs) 25g (from 11 yrs)	25g (to 16 yrs) 30g (from 16 yrs)	30g	30g
Vitamin A	400µg	400µg	500µg	600µg	600µg	600µg	600µg
Riboflavin (B2)	0.6mg	0.8mg	1.0mg	1.1mg	1.1mg	1.1mg	1.1mg
Folate (B9)	70µg	100µg	150µg	200µg	200µg	200µg	200µg
Vitamin D	10µg	10µg	10µg	10µg	10µg	10µg	10µg
Iron	6.9mg	6.1mg	8.7mg	14.8mg	14.8mg	14.8mg (19-50 yrs)	14.8mg
Calcium	350mg	450mg	550mg	800mg	800mg	700mg	700mg
Magnesium	85mg	120mg	200mg	280mg	300mg	270mg	270mg
Potassium	800mg	1,100mg	2,000mg	3,100mg	3,500mg	3,500mg	3,500mg
Iodine	70µg	100µg	110µg	130µg	140µg	140µg	140µg
Selenium	15µg	20µg	30µg	45µg	60µg	60µg	60µg
Zinc	5mg	6.5mg	7mg	9mg	7mg	7mg	7mg
Vitamin B12	0.5µg	0.8µg	1.0µg	1.2µg	1.5µg	1.5µg	1.5µg

Disease-busting nutrients

There is emerging evidence from prospective cohort studies (which follow a group of people who differ by certain characteristics over a period of time) showing increased disease risk with lower intakes of particular nutrients.

Coronary heart disease and omega-3

A study in the *British Medical Journal*²⁶ found a 26% lower risk of dying from coronary heart disease (CHD) among the group taking omega-3 supplements compared with those who did not take supplements. The study followed 22,035 men and women aged 39–79 recruited for an average 19 years, during which time 1,562 died of CHD.

Calcium and vitamin D for healthy bones

Another *British Medical Journal*²⁷ study investigated the relationships between long-term dietary calcium intake and risk of fracture of any type, hip fractures, and osteoporosis in a population of 61, 433 women in Sweden, born between 1914 and 1948. The authors found a link between low dietary calcium intake (the lowest fifth of the study population) and a greater risk of fractures and osteoporosis. Furthermore, low vitamin D intake increased the risk of fracture in this fifth. Interestingly, hip fracture risk was greater in women with high dietary calcium intakes, perhaps indicating that bone health isn't just about one nutrient but a suite of bone-health nutrients, including vitamin D, phosphorus, magnesium, and vitamin K.

Emphasising this point that nutrients often work together to exert their health-promoting effects, a study in the *Journal of the American Medical Association*²⁸ analysed six randomised clinical trials involving 49,282 participants, finding that taking vitamin D with calcium was linked to a 16% reduction in hip fracture risk.

While nearly three-quarters of HSIS survey respondents (73%) understood the importance of calcium, only a third (36%) marked vitamin D as a key nutrient to support bone health.



Vitamin D and disease risk

Vitamin D clearly has an important role to play in building and maintaining healthy bones, and there is growing evidence that it could help improve insulin sensitivity (the body's ability to use insulin) and reduce insulin resistance (the body's inability to use insulin properly), which can lead to type 2 diabetes.²⁹ Indeed, low vitamin D status has been connected with a wide range of diseases, such as osteoporosis, tuberculosis, cardiovascular disease, multiple sclerosis, and type 1 diabetes.³⁰

Foundations of foetal health

The National Diet and Nutrition Survey report³¹ explains that folate is essential for metabolism and maintaining optimal health. It is needed to make DNA, which is essential for normal cell development and growth. Dr Nisa Aslam notes: "Folate shortfalls can therefore result in megaloblastic anaemia in adults and children and neural tube defects (affecting the brain, spine, or spinal cord) and other poor health outcomes for the developing foetus.

"It is recommended that women of childbearing age take a 400µg folic acid supplement daily until the 12th week of pregnancy. This is to help prevent neural tube defects, like spina bifida, in the baby. Some women may need to take a higher dose of folic acid if they have a family history of neural tube defects, diabetes, or are taking anti-epileptic medicines."

Nutrients to stave off cognitive decline

Meta-analyses (regarded as the highest quality scientific evidence) show benefits for higher omega 3 intakes in relation to cognitive function and cardiovascular disease, especially in those with low baseline blood levels of omega 3.³⁴ While people are aware of how much to eat and which foods (predominantly oily fish) contain omega 3, many appear to be put off by taste, cost, and knowing how to cook it. High-quality fish oil supplements can help bridge the nutrient gap. A wide range of cross-sectional studies, longitudinal studies and meta-analyses also consistently show a connection between low vitamin D levels and Alzheimer's disease and cognitive impairment.³⁵

“META-ANALYSES SHOW BENEFITS FOR HIGHER OMEGA 3 INTAKES IN RELATION TO COGNITIVE FUNCTION AND CARDIOVASCULAR DISEASE”

3 | DIET DISASTERS – KEY NUTRIENT GAPS AMONG UK WOMEN

Hypertension and potassium

Insufficient levels of potassium in the blood compared with sodium (from salt) can lead to sudden death from a heart attack in people with hypertension, diabetes, heart failure, and chronic kidney disease.³⁶ A study in the *New England Journal of Medicine*³⁷ explored 24-hour sodium and potassium excretion in the urine and cardiovascular risk. The authors found a dose-response relationship between higher sodium and lower potassium intakes and higher cardiovascular risk. They, therefore, suggested reducing sodium and increasing potassium intakes.

Supplement users more likely to meet nutrient goals

There is evidence that people who take vitamin and mineral supplements are more likely to meet recommended intakes for nutrients. For example, in a study of older adults in the *Journal of the American Dietetic Association*,³⁸ significantly fewer supplement users had intakes of vitamins A, B6, and C, folate, zinc, and magnesium from food alone below the Estimated Average

Requirement (which covers the needs of half the population), when compared with non-users of supplements. Similarly, for younger generations, research shows³⁹ that most US adolescents do not take vitamin or mineral supplements. Those who do, even infrequently, have more nutrient-dense diets overall than those who do not take supplements.

“RESEARCH SHOWS THAT MOST US ADOLESCENTS DO NOT TAKE VITAMIN OR MINERAL SUPPLEMENTS”



CHILD DEVELOPMENT AND OILY FISH

Women who consume higher quantities of fish during pregnancy have been shown to give birth to children with higher verbal IQ scores at six to eight months³² and higher development scores at 15 to 18 months.³³

With less than half (48%) of HSIS survey respondents admitting to thinking proactively about their nutrient intake, the worrying results from the latest National Diet and Nutrition Survey Rolling Programme (NDNS) come as no surprise. Indeed, a third (33%) of British women say they have been told they have a nutrient deficiency, according to the poll.

State of the nation's diet

The UK's NDNS⁴⁰ is an annual survey of 1,000 people from age 1.5 years and up. It aims to assess the diet, nutrient intakes, and nutritional status of a representative sample of the general population. The latest iteration of the report encompasses survey data gathered between April 2016 and June 2019, and reveals a range of nutrient shortfalls, with some of the most worrying numbers appearing among girls and women across the age categories.

“A THIRD OF BRITISH WOMEN SAY THEY HAVE BEEN TOLD THEY HAVE A NUTRIENT DEFICIENCY, ACCORDING TO THE POLL”

Omega 3s are among the essential polyunsaturated fatty acids (PUFAs) that women and girls must get from their diet or supplements because the body cannot make them. The main types include eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Omega 6 essential fatty acids include gamma linolenic acid (GLA) and linoleic acid (LA). The ratio of omega 6: omega 3 for optimal health is stated to be 1:2/1.⁴¹

Omega 3s

- **Girls, 4-10 years:** 1.3g
- **Girls, 11-18 years:** 1.6g
- **Women, 19-64 years:** 1.9g
- **Women, 65+ years:** 1.8g

In the UK, there is no officially recommended intake of omega-3s. **However, the British Dietetic Association (BDA)⁴² offers guideline portion amounts of omega-3-rich oily fish per age group:**

- 18-36 months, 1/4 to 3/4 of a small fillet or one to three tablespoons;
- 4-6 years, 1/2 to one small fillet or two to four tablespoons;
- 7-11 years, one to 1 1/2 small fillets or four to six tablespoons;
- 12 years-adult, 140g (5oz) fresh fish or one small can.

Dr Carrie Ruxton says: “*The Eatwell Guide*⁴³ says we should aim for two of these portions of fish a week, with one being oily fish which includes salmon, mackerel, anchovies, sardines, herring, or trout. The BDA also explains that the recommended intake of fish for an adult equates to about 450mg EPA and DHA daily - or just over 3000mg a week.

“A recent study in *Frontiers in Nutrition*⁴⁴ found that only a quarter (25.2%) of the UK population eats oily fish (the best source of DHA and EPA). Within that quarter, only 7% of children, 13% of teenagers, and 16% of 20–29-year-olds are eating recommended amounts of oily fish. Survey data from 10 publications revealed that EPA and DHA intake levels are consistently lower than recommendations, and that children, teenagers, females, and pregnant women have some of the biggest dietary gaps.”

LRNI: Lower Reference Nutrient Intake - the amount of a nutrient that is enough for only a small proportion (2.5%) of the population. More than nine in 10 people will need more than the LRNI to meet their nutrient needs for normal health. Women continually eating below the LRNI will almost certainly risk becoming deficient.

RNI: Reference Nutrient Intake - the amount needed to meet the needs of 97.5% of the population and viewed as sufficient for most people

“ ONLY A QUARTER OF THE UK POPULATION EATS OILY FISH (THE BEST SOURCE OF DHA AND EPA) ”



The following nutrient tables compare the daily intake amounts of women and girls, according to the latest NDNS data,⁴⁵ with current UK intake recommendations.

Falling short on fibre

Dr Carrie Ruxton explains: “The Scientific Advisory Committee on Nutrition (SACN) recommendations were prompted by evidence that getting plenty of fibre in the diet is linked to reduced risk of developing cardiovascular disease, type 2 diabetes, and bowel cancer.⁴⁷ Yet despite the recommendations, the latest NDNS data reveal that all age groups are failing to get enough fibre in their diet. Nevertheless, there is some good news in that girls aged 11 to 18 years increased their average fibre intake by 1.3g since the previous iteration of the NDNS (Years 7 and 8).”

For some of the nutrients listed below, the average daily intake among the population group exceeds the RNI, yet a certain percentage of the group may still be failing to meet the LRNI. For example, girls aged 4-10 years and women aged 19-65+ years are more than meeting the Vitamin A RNI on average. However, there are still some in these population groups who are not even achieving the LRNI.

Fibre			
	Average daily intake	SACN ⁴⁶ daily recommendations	Intake shortfalls
Girls, 4-10	13.5g	Up to 5 yrs - 15g From 5 yrs - 20g	Up to 5 yrs - 1.5g From 5 yrs - 6.5g
Girls, 11-18	15.4g	Up to 16 yrs - 25g From 16 yrs - 30g	Up to 16 yrs - 9.6g From 16 yrs - 14.6g
Women, 19-64	18.1g	30g	11.9g
Women, 65+	17.6g	30g	12.4g

“GETTING PLENTY OF FIBRE IN THE DIET IS LINKED TO REDUCED RISK OF DEVELOPING CARDIOVASCULAR DISEASE, TYPE 2 DIABETES, AND BOWEL CANCER”



Vitamin A			
	Average daily intake	% of RNI achieved from average daily intake	% of the population group failing to meet the LRNI
Girls, 4-10	524µg/day	116%	13%
Girls, 11-18	535µg/day	89%	18%
Women, 19-64	876µg/day	146%	8%
Women, 65+	984µg/day	164%	7%

Riboflavin			
	Average daily intake	% of RNI achieved from average daily intake	% of the population group failing to meet the LRNI
Girls, 4-10	1.24mg	137%	2%
Girls, 11-18	1.16mg	105%	22%
Women, 19-64	1.41mg	128%	13%
Women, 65+	1.44mg	131%	10%

Folate (diet only)			
	Average daily intake	% of RNI achieved from average daily intake	% of the population group failing to meet the LRNI
Girls, 4-10	164µg	130%	1%
Girls, 11-18	171µg	86%	10%
Women, 16-49 (childbearing age)	202µg	101%	8%
Women, 19-64	211µg	105%	7%
Women, 65+	211µg	106%	4%

Folate (diet + supplements)			
	Average daily intake	% of RNI achieved from average daily intake	% of the population group failing to meet the LRNI
Girls, 4-10	175µg	140%	1%
Girls, 11-18	182µg	91%	10%
Women, 16-49 (childbearing age)	278µg	139%	7%
Women, 19-64	293µg	146%	6%
Women, 65+	258µg	129%	4%

“ NINE IN 10 (89%) OF THIS POPULATION GROUP HAD A RBC FOLATE CONCENTRATION BELOW THE LEVEL AT WHICH THERE IS AN INCREASED RISK OF NEURAL TUBE DEFECTS ”

Red blood cell folate		
	Average concentration (nmol/L)	% below clinical threshold of 305 nmol/L
Girls, 4-10	511 nmol/L	1%
Girls, 11-18	380 nmol/L	18%
Women, 16-49 (childbearing age)	447 nmol/L	18%
Women, 19-64	480 nmol/L	15%
Women, 65+	538 nmol/L	13%

Average RBC folate concentration in women aged 65 years and over decreased by 16% between the last two releases of the NDNS. Indeed, in all age/sex groups, there has been a 22-31% reduction in RBC folate concentration since 2008.

“ THERE HAS BEEN A 22-31% REDUCTION IN RBC FOLATE CONCENTRATION SINCE 2008 ”

Folate red flags

Red blood cell (RBC) folate is an indicator of longer-term folate status, as it is less affected by short-term fluctuations in intake and metabolism than serum folate. In the latest iteration of the NDNS-RP (2016 to 2019, Years 9 to 11),⁴⁸ 18% of women of childbearing age (aged 16 to 49 years) had an RBC folate concentration less than 305 nmol/L. What's more, nine in 10 (89%) of this population group had a RBC folate concentration below the level at which there is an increased risk of neural tube defects (less than 748nmol/L). The proportion in this group has increased by 20% since 2008.



Vitamin D			
	Average daily intake	% of RNI achieved from average daily intake	% of the population group failing to meet the LRNI
Girls, 4-10	3.6µg	36%	N/A
Girls, 11-18	2.9µg	29%	N/A
Women, 19-64	5.5µg	55%	N/A
Women, 65+	8.3µg	83%	N/A

Vitamin D is only found in a small number of foods and in relatively low quantities. Therefore, it can be difficult to get enough from the diet alone. The UK government recommends that everyone, including pregnant and breastfeeding women, consider taking a daily 10µg vitamin D supplement.



“This can be especially important from late March/April to the end of September in the UK, when we don’t get enough UVB radiation of the right wavelength from the sun to make enough vitamin D via the skin. Once our vitamin D status dips below 25 nmol/L, we risk having a long-term negative impact on our bones and muscles,”⁴⁹ explains Dr Pamela Mason.

Pharmacist, Noel Wicks notes further: “People who don’t get much sun on their skin, such as elderly people who live in care homes or people who choose to cover their skin for cultural or religious reasons should? consider taking a vitamin D supplement throughout the year. Other people who may want to take vitamin D year-round include people with darker skin, who may not be able to get enough from sun exposure. The European Food Safety Authority (EFSA) has reported that getting enough vitamin D can help older people avoid falls, a major reason for fractures and hospitalisation in the over 70s.”

According to EFSA, “a cause and effect relationship has been established between the intake of vitamin D and a reduction in the risk of falling. In order to obtain the claimed effect, 800 I.U. (20 µg) of vitamin D from all sources should be consumed daily. The target population is men and women 60 years of age and older.”⁵⁰

Yet two-fifths (39%) of British women never take a vitamin D supplement, according to the HSIS survey.

Percentage of women and girls with inadequate vitamin D status (serum 25-hydroxyvitamin D)		
	Average concentration (nmol/L)	% below the adequate level of 25 nmol/L
Girls, 4-10	56.6nmol/L	3%
Girls, 11-18	42.1nmol/L	17%
Women, 19-64	51.3nmol/L	15%
Women, 65+	57.2nmol/L	13%

Averting vitamin D disaster

A study in the journal *Nutrients*⁵¹ confirmed that vitamin D intake is low among the UK population, and that vitamin D status is not adequate for many individuals to maintain optimal health. The study explored food fortification as a means to improve the population’s vitamin D status. Using a mathematical model, the researchers tested the effect of fortifying breakfast cereal by 4.2µg vitamin D per 100g. They found that fortification increased serum levels by around 1.0 nmol/L in children and about 6.5 nmol/L in the elderly, concluding that fortifying breakfast cereals can help improve overall vitamin D status. However, it’s worth noting that relatively few foods are fortified, which is why the government recommends vitamin D supplementation from autumn to spring.

“VITAMIN D INTAKE IS LOW AMONG THE UK POPULATION, AND THAT VITAMIN D STATUS IS NOT ADEQUATE FOR MANY INDIVIDUALS TO MAINTAIN OPTIMAL HEALTH”

Furthermore, a study of Scottish adults found a link between deprivation and low income and poor vitamin D status,⁵² and acknowledged a range of other factors that can affect vitamin D status including: body fat, ability to synthesis vitamin D in the skin, age, season, latitude, time of day, clothing, and sunscreen.

Additionally, a study in the journal Nature⁵³ suggested that vitamin D requirements depend on the geographical location and age of the population. This systematic review and meta-analysis of randomised controlled trials (the highest form of scientific evidence) reviewed 136 studies involving children, adults, postmenopausal women, the elderly, and pregnant or lactating women. Overall, the groups taking vitamin D supplements achieved a better vitamin D status (blood concentrations of 25-hydroxyvitamin D). The authors deemed 75 nmol/L to be a sufficient concentration for serum 25-hydroxyvitamin D.

To achieve this, they recommended supplements of:

- 1340 IU (33.5µg)/day for children
- 2250 IU (56.25µg)/day for pregnant women
- 2519 IU (62.98µg)/day for European adults aged 18-64
- 797 IU (19.93µg)/day for European adults aged 65-85 years
- 729 IU (18.23µg)/day for adults in North America
- 2026 IU (50.65µg)/day for adults in Asia
- 1229 IU (30.73µg)/day for adults in Africa (40 IU of vitamin D equals 1µg).

Iron			
	Average daily intake	% of RNI achieved from average daily intake	% of the population group failing to meet the LRNI
Girls, 4-10	7.3mg	98%	2%
Girls, 11-18	8.3mg	56%	49%
Women, 19-64	9.4mg	76%	25%
Women, 65+	8.8mg	101%	5%

Calcium			
	Average daily intake	% of RNI achieved from average daily intake	% of the population group failing to meet the LRNI
Girls, 4-10	676mg	135%	1%
Girls, 11-18	655mg	82%	16%
Women, 19-64	740mg	106%	9%
Women, 65+	750mg	107%	7%

Magnesium			
	Average daily intake	% of RNI achieved from average daily intake	% of the population group failing to meet the LRNI
Girls, 4-10	172mg	109%	3%
Girls, 11-18	196mg	68%	47%
Women, 19-64	244mg	90%	11%
Women, 65+	235mg	87%	11%

Potassium			
	Average daily intake	% of RNI achieved from average daily intake	% of the population group failing to meet the LRNI
Girls, 4-10	1,951mg	130%	1%
Girls, 11-18	2,084mg	63%	37%
Women, 19-64	2,561mg	73%	24%
Women, 65+	2,578mg	74%	20%

Iodine			
	Average daily intake	% of RNI achieved from average daily intake	% of the population group failing to meet the LRNI
Girls, 4-10	116µg	110%	8%
Girls, 11-18	100µg	75%	28%
Women, 19-64	141µg	100%	12%
Women, 65+	153µg	109%	7%

Selenium			
	Average daily intake	% of RNI achieved from average daily intake	% of the population group failing to meet the LRNI
Girls, 4-10	29µg	117%	2%
Girls, 11-18	36µg	70%	41%
Women, 19-64	46µg	76%	46%
Women, 65+	40µg	67%	59%

Dr Carrie Ruxton adds: “A study in the journal *Nutrients*⁵⁴ analysed the results of the Newcastle 85+ survey and found that low selenium intake is common among the very elderly and, in cross-sectional analyses, is linked to poorer musculoskeletal function.”

Zinc			
	Average daily intake	% of RNI achieved from average daily intake	% of the population group failing to meet the LRNI
Girls, 4-10	5.6mg	83%	15%
Girls, 11-18	6.5mg	84%	16%
Women, 19-64	7.6mg	109%	7%
Women, 65+	7.1mg	102%	4%

Vitamin B12 status		
	Average concentration (pmol/L)	% below the blood level suggested to define deficiency (150pmol/L)
Girls, 4-10	445pmol/L	0%
Girls, 11-18	319pmol/L	2%
Women, 19-64	291pmol/L	5%
Women, 65+	280pmol/L	4%

Teen troubles

The latest NDNS data⁵⁶ reveal that teenage girls have the worst micronutrient shortfalls. They also show some of the worst micronutrient declines over time. For example, 43% failed to meet the LRNI for iron in 2008/9, and this figure has increased between 48-54% in subsequent iterations of the NDNS-RP. In the 2008/9 survey, 14% of 11-18-year-old girls did not meet the LRNI for vitamin A, and this has increased to 24%. For riboflavin, 18% did not meet the LRNI, and this has increased to 26%. Additionally, 6% did not meet the LRNI for folate and this has risen to 10%.



Folate fail

The proportion of women aged 19 to 64 years not achieving the LRNI for folate has more than doubled from 3 to 7% over the course of the NDNS rolling programme. For vitamin A it has increased from 5 to 8% and for iron this has risen from 21 to 25%.

Not so golden years

Furthermore, the proportion of older women not meeting the LRNI for iron has risen from 1 to 5% during the NDNS period. For zinc, the proportion has increased from 1 to 4%, suggesting that intakes of key nutrients are getting worse, not better.

Similarly, in the North/South Ireland food consumption survey,⁵⁷ serious nutrient shortfalls surfaced for women:

- **FIBRE:** almost half of women had a mean daily fibre intake below the recommended range, which is likely to impact bowel function, and could lead to chronic gastrointestinal disease
- **CALCIUM:** 23% of women had inadequate calcium intakes, exposing them to reduced bone mass and increased osteoporosis risk
- **IRON:** 48% of women of reproductive age (18-50 years) consumed inadequate iron – one in three Irish women was reported to have inadequate iron stores, with one in 30 presenting with iron deficiency anaemia
- **FOLATE:** few women of reproductive age (2% of women aged 18-35 years and 5% of women aged 36-50 years) met the recommended folate requirement to lower the chance of having a baby with a neural tube defect (600µg/day), and only those taking folate supplements met the requirement
- **VITAMIN D:** a large proportion of women and men had low vitamin D intakes and are? mainly getting their vitamin D from sunlight
- **VITAMIN A:** 17% of women had inadequate intakes
- **RIBOFLAVIN:** 20% had inadequate intakes
- **VITAMIN E:** 11% had average daily intakes below the lowest threshold intakes

4

NOURISHING THE SEVEN AGES HOW WOMEN CAN BOOST THEIR NUTRITIONAL HEALTH

While the story of British women and girls' nutritional status makes for worrying reading, there is plenty that we can do – fairly simply and inexpensively – to rectify the situation. **These seven action points are a good place to start:**

- 1. Remember: it's never too late.** While we know that nutrition, even before we are conceived, can affect our health and disease susceptibility, it is always possible to make positive changes whatever stage of life you are at.
- 2. Don't aim for dietary perfection.** Attempting to make too many changes at once or trying to make a huge sweeping change to your diet is setting yourself up to fail. Be realistic about the positive changes you can make. Maybe it's simply to keep moderate alcohol consumption to the weekends.
- 3. Aim for 5-A-Day.** Eating a rainbow of veg and fruit each day is the best way for women to meet a wide range of their micronutrient needs. However, don't stress yourself out if you don't always achieve it.

Some easy ways to up your veg and fruit intake include:

- a.** adding a piece of fruit or a small glass of pure fruit juice to your breakfast each day
- b.** batch cooking soups and stews to defrost on days when you've no time to cook
- c.** including at least one fruit or vegetable with every meal or snack – remember that fresh, frozen, tinned, and dried all count



4. Include inflammation-fighting fish. Oily fish in particular is rich in omega 3 as well as being a healthy source of protein. If you're concerned about use-by dates, keep a few tins of sardines or mackerel in the cupboard and aim to eat one tin a week (adults), in a salad, pasta sauce, or simply as a snack. If fish isn't for you, an omega 3 supplement can help plug the gap.

5. Supplement appropriately. With nutrient shortfalls a clear issue for many British women, taking a multivitamin and multimineral supplement can be a good way of plugging the gaps. It's also important to choose a supplement that best suits your nutritional needs, which differ depending on whether you're just starting your periods, trying for a baby, keeping fit, or going through menopause. Following a vegetarian or vegan diet may mean you need to supplement additional nutrients.

“IT'S IMPORTANT TO GET OUT AND ENJOY THE SUN SAFELY DURING THE SUMMER MONTHS”



Keep in mind the following key nutrient needs:

- a. Teens:** B vitamins, vitamin A, iron, vitamin D
- b. Pregnancy:** folic acid, choline, iodine, vitamin D, protein, and fibre
- c. Menopause:** calcium, magnesium, vitamin D, and B vitamins
- d. Plant-based:** vitamin B12, vitamin D, iron, iodine, zinc, selenium, niacin, riboflavin, and potassium

6. Sun yourself safely. Low vitamin D levels have been linked to a wide range of health problems. As it's not possible to get enough from food, it's important to get out and enjoy the sun safely during the summer months. However, taking a vitamin D supplement may also be beneficial to keep your blood levels of the 'sunshine vitamin' at optimal levels, especially during the winter.

7. Smooth your path to a healthy menopause. Supporting yourself with a healthy diet, regular exercise and appropriate weight management throughout the whole life course is one of the best ways to safeguard against menopause woes.

While diet is the cornerstone for health, regular exercise is also vital. Dr Carrie Ruxton, who is a Level 1 CrossFit trainer as well as a dietitian, says: “Women often shy away from weight training and focus on endless amounts of low-intensity cardio, but this is missing a trick. Muscle drives the metabolic rate and helps to burn calories, contributing to weight management,

especially when combined with calorie control. Muscle is also important for good posture and body tone. It’s a myth that women who do a few weekly sessions of weight or resistance training are going to develop huge muscles – that takes dedication, combined with a very high protein diet. So, consider adding in some weight sessions to your normal routine.”

DR RUXTON’S TIPS FOR WEIGHT TRAINING:

- Get signed up to a gym where you can access help and support to create a personalised programme and receive expert supervision to get you started. Some gyms offer group classes which are a great way to stay motivated. If that doesn’t appeal, buy some light weights to try at home.
- Develop proper technique on the barbell or dumbbells before increasing weight, especially by bracing your core to protect your back. If you’re training at home, there are lots of useful videos online which demonstrate technique.
- Key exercises are squats, push press, push-ups, bench press, deadlift, and low row. Aim to work arms on one day, rest one day, then work on legs the next day. Aim for 2-4 sessions a week of 30-60 minutes.

- Always remember to warm up properly and stretch or use a foam roller afterwards.



If resistance training isn’t your thing or your range of motion is limited by injury, try the following 5 low impact exercises:

- 1. Walking for 30-60 minutes daily:** as you get fitter, increase your speed, and pump your arms more
- 2. Air squat:** stand with feet hip width apart and toes pointing slightly out. Now drop into a squat keeping your head and chest up. Then stand up and repeat. Aim for three sets of 8-10 reps daily. If that’s too difficult, sit down slowly onto a low chair then stand up again.
- 3. Good mornings:** hold your hands behind your neck with elbows out wide. Now, keeping your knees soft, bend forwards until you feel a gentle stretch up your hamstring. Repeat 10-12 times each morning.
- 4. Front and side planks:** face down on the floor, come off the ground on your toes and elbows and hold in your core for 15-60seconds, depending on how fit you are. Repeat 2-3 times daily.
- 5. Leg raises:** this is a great one for the core. Lie on your back with legs straight. Now raise and lower one leg at a time, keeping your core tight. Once you can do this comfortably, try raising both legs at the same time. Always keep your back flat by tucking your belly button into the floor. Aim for three sets of 8-12 reps.

Food for thought: do supplements replace healthy eating?

While over half (57%) of HSIS survey respondents said they take a multivitamin and multimineral, fewer than one in eight (13%) choose supplements specifically aimed at women. Interestingly, the results of a study in the *American Journal of Clinical Nutrition*⁵⁸ showed that people using mineral supplements had higher mineral intakes from their diet than those who did not take supplements. This emphasises that current supplement users are not using them to replace healthy foods, but it also suggests that people in greater need of dietary interventions are not yet considering supplements.

“ FEWER THAN ONE IN EIGHT CHOOSE SUPPLEMENTS SPECIFICALLY AIMED AT WOMEN ”

LAST WORD

Women are often the most likely to be influenced by dietary trends and health-related messages but, as this report reveals, they are missing a trick by not focussing sufficiently on the nutrients they need across the lifecycle. While the foundations of good nutrition and, consequently, our future risk of disease will be laid before we reach toddlerhood, there is plenty that girls and women at every stage of life can do to improve their nutrient intakes and support their healthy ageing. Our experts give their last word on which nutrients are especially important for women:

GP Dr Nisa Aslam says: “Folate status is poor during the years when many women will be considering having a family, as well as in adolescence where there is a small chance of teenage pregnancy. Experts recommend that women take a 400µg folic acid supplement daily from the time they could potentially conceive until the 12th week of pregnancy. This helps to prevent foetal neural tube defects, such as spina bifida, which can lead to lifelong disabilities – something no parent would want for their child.”

Nutritionist Dr Pamela Mason says: “For me, what stands out is the gap in vitamin D status across the UK, but particularly in women who are overweight or from poorer communities. Official advice has been strengthened recently to encourage everyone to take a vitamin D supplement during winter and spring. It’s less well known that certain at-risk groups, for example, women with darker skins or those who are housebound, should take a vitamin D supplement all year round. While uptake of vitamin D supplements has improved, there are still millions of women missing out on an appropriate vitamin D status – and that could impact on their future bone health.”

Pharmacist Noel Wicks adds: “If the pandemic has taught us anything, it’s that we need to look after our immune function by ensuring we get the right balance of nutrients in our diets. A range of vitamins and minerals support normal immunity, particularly vitamins A, C and D, as well as iron, zinc, and selenium. As well as eating a varied, balanced diet, an A-Z multivitamin plus minerals is worth considering.”

Dietitian Dr Carrie Ruxton says: “We’ve focused a lot on vitamins and minerals but getting the right balance of fats is also important for heart and cognitive health. Eating a weekly serving of oily fish, choosing rapeseed or olive oil and minimising saturated (animal) fats is a good way forward. Top up with a marine or vegan omega-3 supplement if eating fish isn’t a regular option for you.”

In conclusion, by following our seven tips for nourishing the Seven Ages, and including regular exercise, women can take the first steps to fulfil their unique nutritional needs, paving the way for a healthy, happy life.



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