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TOX/2026/31

Committee on the Toxicity of Chemicals in Food, Consumer Products and the Environment

Discussion Paper on the Effects of Excess Selenium on Maternal Health

Introduction

1. The Scientific Advisory Committee on Nutrition (SACN) last considered maternal diet and nutrition in relation to offspring health in its reports on 'The influence of maternal, foetal and child nutrition on the development of chronic disease in later life' (SACN, 2011) and on 'Feeding in the first year of life' (SACN, 2018). In the latter report, the impact of breastfeeding on maternal health was also considered.

2. In 2019, SACN agreed to conduct a risk assessment on nutrition and maternal health focusing on maternal outcomes during pregnancy, childbirth and up to 24 months after delivery; this would include the effects of chemical contaminants and excess nutrients in the diet. The assessment would also consider infant outcomes, but only where they relate to the neonatal period. The neonatal period was normally considered to be up to 28 days after birth, but the relevant time window for neonatal effects would be determined on a case-by-case basis.

3. SACN agreed that, where appropriate, other expert Committees would be consulted and asked to complete relevant risk assessments e.g., in the area of food safety advice. This subject was initially discussed by the COT during the horizon scanning item at the January 2020 meeting with a scoping paper being presented to the Committee in July 2020. This included background information on a provisional list of chemicals proposed by SACN, which was subject to change following discussion by COT who would be

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guiding the toxicological risk assessment process: candidate chemicals or chemical classes can be added or removed as the COT considered appropriate. The list was brought back to the COT with additional information in September 2020 where it was agreed that papers on a number of components, including selenium, should be prioritised for review.

4. Following discussion of the first prioritisation paper on substances to be considered for risk assessment, the Committee decided that selenium should be considered in a separate paper. Whilst SACN previously evaluated the implications for health of dietary intakes of selenium in the UK population in 2013, the following statement discusses the risks posed specifically to maternal health by selenium in the diet and the environment.

Background

5. Selenium is an essential trace element found in nature, belonging to the chalcogen group (Perrone, Monteiro, and Nunes, 2015), that is required for the synthesis of selenoproteins, including enzymes involved in antioxidant defence, thyroid hormone metabolism and maintenance of cellular redox homeostasis (EVM, 2003). This element can have both metallic and non-metallic properties (EVM, 2003; Perrone et al, 2015). Selenium exists in several oxidation states, however it is most commonly reduced to the −2 (selenide, Se^{-2}) oxidation state, or oxidised to the +4 (selenite, SeO_3^{2-}) or +6 (selenate, SeO_4^{2-}) oxidation states (Perrone et al, 2015).

6. Selenium is found in a variety of foods, particularly nuts, offal, eggs, poultry, and mushrooms. Fruits and vegetables generally contain lower levels, except for *Brassica* vegetables (such as cabbage and cauliflower), which can contain comparatively higher amounts of selenium (COT, 2019). Brazil nuts contain 800 to 8300 µg 100 g^{-1} selenium making them the richest source of selenium in the diet (Perrone et al, 2015). Selenium content in soil directly impacts levels of selenium in plants, along with soil pH and redox potential (Perrone et al, 2015).

7. Selenium may also be present in enriched and fortified foods. Enriched foods are produced using selenium-enriched fertilisers, whereas fortified foods contain added selenium compounds. Selenium can also be consumed as supplements. Authorised selenium sources for use in UK food supplements include sodium selenate, sodium hydrogen selenite, sodium selenite and selenium-enriched yeast, with the latter being subject to specific legal specifications (Directive 2002/46/EC; EFSA NDA Panel, 2023 (hereafter referred to as EFSA, 2023)). Doses of selenium within supplements typically range from about 2.5 to 400 µg (EFSA, 2023; NIH ODS, 2025).

8. There are currently no UK-specific recommendations for selenium supplementation during pregnancy, and NHS advice does not suggest selenium supplementation for pregnant women. Most pregnant women are considered able to achieve adequate selenium intakes through a varied diet, with supplementation generally not recommended due to the relatively narrow margin between adequate and excessive intake (Hubalewska-Dydejczyk et al, 2020; Picciano and McGuire, 2018)

9. EFSA (2014) established an Adequate Intake (AI) of 70 µg/day for adult women, which also applies during pregnancy. This was based on the levelling off of Selenoprotein P (SelP) at intakes ranging from 60 to 100 µg/day in in population groups from Finland, the UK, New Zealand and the USA. For lactating women an additional 15 µg/day (based on an average amount of selenium secreted in breast milk of 12 µg/day and a 70% absorption efficiency from usual diets) was estimated, resulting in an AI of 85 µg/day (EFSA, 2014; 2023). However, selenium intakes across Europe are generally low. The suboptimal selenium status observed in the UK has been partly attributed to the low selenium content of UK soils, which results in lower selenium concentrations in produced foods, particularly wheat (Broadley et al., 2006). In line with this, dietary surveys have reported that a substantial proportion of the UK population have selenium intakes below recommended levels (Stoffaneller and Morse, 2015; Rayman, 2000; The Food Foundation, 2026).

10. Selenium's bioavailability, function, toxicity to humans, and adverse health effects depend on its chemical form, as organic or inorganic compounds (Perrone et al, 2015). In the diet, organic compounds of selenium are more prevalent. In plant-based foods, the amino acid analogue L-selenomethionine (SeMet) predominates, and in animal-derived foods, L-selenocysteine (SeCys) is the principal form of selenium present (COT, 2019; EFSA, 2023). Inorganic compounds such as selenate and selenite are present in lower amounts in food (COT, 2019).

11. SeCys is the biologically active selenium containing amino acid, which is incorporated into selenoproteins, of which over thirty have been identified (EVM, 2003). Selenoproteins, namely glutathione peroxidases (GPx), iodothyronine deiodinases, SelP, and thioredoxin reductases, carry out a range of essential metabolic and antioxidant functions. GPx's protect the cell from oxidative stress by degrading toxic H_2O_2, and in placental tissue, may additionally support placental differentiation (Kyriakou et al., 2026). Iodothyronine deiodinases are responsible for the production of thyroid hormones, converting thyroxine (T4) into the biologically active triiodothyronine (T3) (EVM, 2003; Labunskyy, Hatfield and Gladyshev, 2014). SelP functions as the major selenium transport protein in plasma (EFSA , 2023).

12. Selenium toxicity depends on the form of the compound, with soluble forms like selenite, selenate and SeMet having higher potential toxicity. Acute toxicity can cause hypersalivation, vomiting, garlic-like breath (due to the excretion of volatile selenium metabolites), severe gastrointestinal symptoms, hair loss, neurological disturbances and fatigue (SCF,2000; EVM,2003; CRN, 2025). Chronic toxicity, known as chronic selenosis, occurs following chronic ingestion of excess selenium from the diet and/or other sources, such as dietary supplements (CRN, 2025). Chronic selenosis is characterised by changes in hair (alopecia; hair loss, brittleness) and nails (dry, thickened, brittle, discoloured), garlic-like breath, skin lesions and neurological effects that can progress to numbness, convulsions and paralysis (EVM, 2003; CRN,

2025; IOM, 2000). Studies from seleniferous regions in the USA and China suggest selenosis occurs at intakes above 910 µg /day (15 µg/kg bw for a 60-kg adult) (EVM, 2003; CRN, 2025).

Previous Evaluations

13. The following section summarises the Health Based Guidance Values (HBGV's) for selenium set by scientific committees and regulatory bodies. Please note that further details on the toxicity studies used to set HBGV's are detailed in the toxicity section of this paper.

Scientific Committee on Food (SCF), Opinion of the Scientific Committee on Food on the Tolerable Upper Intake Level of Selenium (2000)

14. In 2000, the SCF derived a Tolerable Upper Intake Level (UL) for selenium from all sources of food and supplements, at 300 µg/day for adults ≥ 18 years, including pregnant and lactating women. The SCF concluded that the UL also applies to pregnant and lactating women, as there was no evidence of increased susceptibility in these groups, no adverse effects in infants of mothers with high selenium intakes, and no adverse effects reported in lactating women consuming dietary selenium below the adult UL.

15. The UL of 300 µg/day for adults ≥ 18 years was derived using a No Observed Adverse Effect Level (NOAEL) of 850 µg/day for clinical selenosis (i.e., hair or nail loss, nail abnormalities, mottled teeth, skin lesions and changes in peripheral nerves) in a study of 349 subjects (Yang et al., 1989b) and applying an uncertainty factor of 3 to account for uncertainties among studies used in deriving the UL. The NOAEL of 850 µg/day was derived based on the absence of clinical signs in individuals with blood selenium levels below 1000 µg/L.

16. The SCF stated that the study by Yang and Zhou (1994) supported this NOAEL and UL, finding that symptoms of selenosis disappeared after 5 subjects from the Yang et al 1989 study reduced their dietary intake to a mean of 819 µg Se/day.

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Institute of Medicine (IOM), Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium and Carotenoids (2000)

17. The Food and Nutrition Board of the IOM, in cooperation with scientists from Canada, published a report in 2000 in which they establish updated Dietary Reference Intakes (DRIs) for selenium, vitamin C and vitamin E for the United States and Canada. As part of the work, the Board also established ULs for these three compounds.

18. The IOM based their UL for selenium on the critical endpoints of hair and nail brittleness and loss, stating that these signs and symptoms were the most frequently reported signs and symptoms of chronic selenosis.

19. Similarly to the SCF (2000), the IOM identified Yang and Zhou (1994) as a useful data set in determining the dose-response of selenium toxicity from food sources. The IOM agreed that the mean NOAEL proposed by Yang and Zhou of 800 µg Se/day was reasonable (rounded down from 819 µg Se/day).

20. Using the NOAEL of 800 µg Se/day and an uncertainty factor of 2 to protect sensitive individuals, the IOM derived an UL of 400 µg Se/day from all sources of food and supplements for adults ≥ 19 years, including pregnant and lactating women. The IOM stated that the UL for pregnant and lactating women was the same as the general population as they were unable to identify any reports of selenosis or teratogenicity in infants resulting from high, but not toxic, intakes of selenium in mothers.

Expert Group on Vitamins and Minerals (EVM), Safe Upper Levels for Vitamins and Minerals (2003)

21. The EVM in 2003 established a Safe Upper Level (SUL) of 450 µg total Se/day for adults aged ≥ 18 years (assuming a maximum intake of 100 µg/day from food, and up to 350 µg/day selenium for supplementation). This was based on the key studies of Yang et al (1989a and b) from which the EVM

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used the Lowest Observed Adverse Effect Level (LOAEL) of 910 µg Se/day, and an uncertainty factor of 2 for LOAEL to NOAEL extrapolation, to calculate the SUL. No vulnerable groups were identified. It is not directly stated whether this SUL applies to pregnant and lactating women.

22. In their 1989b study, Yang et al correlated high selenium intakes with blood levels and determined that the LOAEL of 910 µg Se/day was the point at which marginal selenium toxicity occurred. Similarly to both the SCF and IOM, changes in the nails and hair were identified by the EVM as the most sensitive indicators of selenium toxicity.

23. The EVM highlighted discrepancies in the NOAELs described in the Yang et al studies. In their 1983 study, Yang et al investigated the average daily intake of selenium in areas of China where intakes were classified as either deficient, adequate, or high (with or without endemic selenosis). Results showed a range of selenium intakes from 240 to 1,510 µg Se/day, average 750 µg Se/day, where there was no selenosis. However, in a later study by Yang et al 1989b, the LOAEL of 910 µg Se/day was determined. The EVM proposed that the way dietary intakes were calculated across the two studies may have caused this difference, and it was also considered that the higher intakes in the 1983 study could be due to sensitisation to selenium in some of the population because of earlier outbreaks of selenosis.

24. Additionally, the SUL is described by the EVM as being consistent with the findings of both Clark et al (1996) and Longnecker et al (1991) who found that reported intakes of 0.2 mg (200 µg) supplemental Se/day and 0.24 mg (240 µg) total Se/day, respectively, were not associated with adverse effects.

World Health Organization (WHO) and Food and Agriculture Organization of the United Nations (FAO), Vitamin and Mineral Requirements in Human Nutrition (2004)

25. The WHO/FAO convened an expert consultation in 2004 to re-evaluate the role of micronutrients in human health and nutrition. The main goals were

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to review vitamin and mineral requirements, recommend nutrient intakes that could be used by Member States, identify data gaps, and make recommendations for future research. This document follows on from the 1987 joint publication from the WHO, United Nations Environment Programme and the International Labour Organisation, a comprehensive review of the chronic and acute toxicity of selenium from food, drinking water, and the environment.

26. In 2004, the WHO/FAO suggested a provisional UL (from all sources) of 400 µg Se/day for adults ≥18 years, aligning with that set by the IOM for adults ≥ 19 years. However, the WHO/FAO note that an UL for pregnant and lactating women had yet to be determined.

27. The provisional UL of 400 µg Se/day for adults ≥ 18 years was not determined from a specific LOAEL or NOAEL, however the authors describe the conclusions from Yang et al (1983) where foods grown in seleniferous soils in China, that supplied more than 900 µg Se/day, were associated with an increased incidence of nail dystrophy. The WHO/FAO do not explicitly state the study used for determining their point of departure.

28. In addition, the WHO/FAO noted from Levander (1987) that human overexposure to selenium was difficult to identify due to ill-defined signs and symptoms, and a lack of sensitive biochemical markers available for detecting impending selenium intoxication. It is unclear what uncertainty factor was applied to determine this provisional UL; however it is described as providing a fully adequate margin of safety.

National Health and Medical Research Council of Australia and New Zealand (NHMRC), Nutrient Reference Values for Australia and New Zealand (2006)

29. In 2006, the National Health and Medical Research Council (NHMRC) of Australia and New Zealand set an UL for adults ≥ 19 years, including pregnant and lactating women, of 400 µg Se/day, aligning with the IOM and WHO/FAO. This UL related to total selenium intake from the diet and

supplements and was based on a NOAEL of 800 µg Se/day. The NHMRC derived this NOAEL from the previously described Chinese studies (Yang et al (1983, 1989b; Yang and Zhou.,1994) which they describe as being consistent with the US study by Longnecker et al (1991). The endpoints identified from these studies were brittleness and loss of hair and nails, gastrointestinal disturbance, skin rash, fatigue, irritability and nervous system abnormalities. It was concluded by the NHMRC that there was no evidence suggesting pregnant and lactating women had an increased susceptibility to toxicity.

30. The NHMRC applied an uncertainty factor of 2 to the NOAEL of 800 µg Se/day to protect sensitive populations due to data gaps, highlighting that although the toxic effect of selenium is not severe, the toxicity may be irreversible.

31. As part of their rationale for setting the UL, the authors considered The Nutritional Prevention of Cancer Trial (Duffield-Lillico et al, 2003) which showed at 200 µg supplemental Se/day, individuals with a high risk of non-melanoma skin cancer had an increased risk of squamous cell carcinoma and total non-melanoma skin cancer. It was concluded that there was uncertainty around how this risk would be applied to the general population.

32. In 2026, a public consultation was launched by the NHMRC requesting feedback on updated Nutrient Reference Values (NRVs) for selenium. This update is the result of emerging scientific evidence for selenium toxicity since the original evaluation in 2006 and includes new recommendations for the UL for selenium.

33. In their 2026 draft recommendations, the UL is lowered from 400 µg Se/day to 330 µg Se/day for adults ≥ 18 years, including pregnant and lactating women, based on a different rationale to the initial 2006 assessment. The NHMRC used a weight of evidence approach, utilising the 2023 European Food Safety Authority (EFSA) recommendations along with

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published primary studies, Australian and New Zealand population data, and advice published by key international bodies. The proposed UL of 330 µg Se/day was based on a study from Lippman et al (2009) where alopecia was selected as the critical effect. This study is described in more detail when discussing EFSA's 2023 assessment below and in the toxicity section of this assessment.

Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT), Overarching Statement on the Potential Risks from Contaminants in the Diet of Infants Aged 0 to 12 Months and Children Aged 1 to 5 Years (2019)

34. The Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) last reviewed selenium in 2019, as part of a review of the risk of toxicity of chemicals in the diets of infants and young children aged 0 to 5 years, in support of a review by the SACN of Government recommendations on complementary and young child feeding.

35. The COT noted the existing UL's from both the SCF (2000), and the EVM (2003). The SCF extrapolated the ULs from adults to children based on reference bodyweights, proposing UL values for children and adolescents of 60, 90, 130, 200 and 250 µg/day for children aged 1-3, 4-6, 7-10, 11-14 and 15-17 years respectively. The COT used these extrapolated values as the Health Based Guidance Values (HBGVs) in their risk assessment.

36. In their review, the COT concluded that 'estimated dietary exposures for children aged 0 to < 12 months and 1 to < 5 years were below the UL, either from breastmilk or other foods and are therefore unlikely to be of toxicological concern'.

European Food Safety Authority (EFSA) Panel on Nutrition, Novel Foods, and Food Allergens (NDA Panel), Scientific Opinion on the Tolerable Upper Intake Level for Selenium (2023)

37. The European Commision (EC) requested that the EFSA Panel on Nutrition, Novel Foods and Food Allergens (NDA) re-evaluate the ULs for

selenium for all populations, following on from an opinion adopted in 2019 'Safety of selenium-enriched biomass of *Yarrowia lipolytica* as a novel food pursuant to Regulation (EU) 2015/2283'. In this opinion, it was identified that in recent years, large population-based randomised controlled trials had emerged along with other sources of new data, thus warranting a reassessment of the UL that was established in 2000 by the SCF.

38. The Panel reviewed the previous NOAEL of 850 µg Se/day (Yang et al., 1989b), as used by the SCF, stating that available studies have evidenced selenium toxicity at exposures below this level, therefore the NOAEL should be revisited. However, they concluded that studies published after Yang et al (1989a) were not suitable for deriving a NOAEL.

39. EFSA therefore set an UL of 255 µg Se/day for adults ≥18 years, including pregnant and lactating women. This UL covers selenium intake from all dietary sources, including forms authorised for addition to food and use in food supplements (i.e. sodium selenate, sodium hydrogen selenite, sodium selenite, L-selenomethionine and selenium-enriched yeast).

40. The UL was derived from a LOAEL of 330 µg Se/day (130 µg/day from background diet plus supplemental intake of 200 µg/day) from the SELECT trial (Lippman *et al*, 2009). The critical endpoint selected was alopecia, an early observable feature of selenosis and a well-established adverse effect resulting from altered protein metabolism.

41. EFSA noted that the outcomes of this study showed an increased risk of developing alopecia at selenium intakes of around 330 µg/day (baseline plus supplemental intake), compared with mean baseline serum selenium concentrations of 130 µg/day.

42. An uncertainty factor of 1.3 was applied to the LOAEL of 330 µg Se/day, to account for the mild and likely reversibility of alopecia, and two uncertainties: the use of a LOAEL as a reference point, and a lack of data in

women. However, despite the lack of sex specific data for women, EFSA note the literature suggests there are no sex differences in susceptibility to selenium toxicity, and therefore EFSA consider that this UL also applies to pregnant and lactating women.

Table 1. Basis for Tolerable Upper Intake Levels (ULs) and Safe Upper Levels (SULs) for Selenium in Adults, Established by International Regulatory Bodies.

Regulatory Body (Year)	**Upper Level (µg/day)**	**Point of Departure (µg/day)**	**Uncertainty Factor**	**Key study/ Studies (Year)**	**Population / Age Group**
SCF (2000)	300	NOAEL = 850	3	Yang *et al* (1989b)	Adults ≥ 18 years [(a)]
IOM (2000)	400	NOAEL = 800	2	Yang and Zhou (1994)	Adults ≥19 years [(a)]
EVM (2003)	450 (SUL)	LOAEL = 910	2	Yang *et al* (1989a,b)	Adults ≥ 18 years
WHO/FAO (2004)	400	Not Specified	Not Specified	Not Explicitly Stated	Adults ≥ 18 years
NHMRC (2006)	400	NOAEL = 800	2	Yang *et al* (1983,b), Yang and Zhou (1994), Longnecker *et al* (1991)	Adults ≥19 years [(a)]
EFSA (2023)	255	LOAEL = 330	1.3	Lippman et al (2009)	Adults ≥ 18 years [(a)]

[(a)] Including pregnant and lactating women.

Data on Effects on Maternal Health

43. EFSA conducted a comprehensive reassessment of selenium in 2023, as described in the Previous Evaluations section of this report. As the most recent assessment, the 2023 EFSA opinion forms the basis of this current assessment. EFSA also reviewed selenium in 2014, however this has not been described in detail due to the availability of the updated 2023 assessment, although information from the 2014 opinion has been included where relevant. In addition, a literature search was carried out for articles published from 1st January 2022 to 1st January 2026 to identify recent

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publications linking selenium to adverse effects in the maternal diet. Further details on the terms used for this search can be found in Annex A.

ADME

Absorption

44. In the diet, organic SeMet and SeCys are the most abundant forms of selenium. Inorganic selenium compounds, selenite and selenate, represent a smaller proportion of overall dietary intake (EFSA, 2023; EFSA 2014).

45. SeMet is synthesised by plants, but not animals. SeMet can be incorporated into the non-specific protein pool by both plants and animals, where it may non-specifically replace methionine in proteins forming 'selenium-containing' proteins (EFSA, 2023; Combs, 2015).

46. The form of selenium used for selenoprotein synthesis is SeCys. SeCys is cotranslationally synthesised from selenide (formed from the reduction of selenite), and the amino acid serine, and is incorporated into peptides in selenoprotein mRNA at the site of UGA (stop) codons (EFSA, 2023; Labunskyy et al, 2014). Selenoproteins can only be synthesised by animals, some microorganisms and algae, but not plants (EFSA, 2023).

47. All forms of selenium are readily absorbed, as confirmed by human studies (EFSA, 2023; Jäger et al., 2016a and b). Selenium absorption can be influenced by other dietary constituents and has been reported to range from 50-90% in humans (EFSA, 2023; Combs, 2015).

48. Animal studies showed selenium containing amino acids are absorbed through active transport processes following digestion of the respective proteins (EFSA, 2023; Combs, 2015). SeMet is absorbed by intestinal methionine transporters after which it enters the methionine pool within the body (EFSA, 2023). The absorption of SeCys is less well characterised than

that of SeMet, but it may be absorbed in a similar way to cysteine (EFSA, 2023; Ha et al., 2019).

49. Absorption of inorganic forms of selenium do not require digestion. Both are efficiently absorbed, by either passive diffusion (selenite) or carrier-mediated diffusion (selenate) (EFSA, 2023). During absorption, selenite is quickly reduced to selenide by thioredoxin reductase or glutathione in the intestinal mucosal cells (EFSA, 2023). Selenate must be reduced to selenite before further metabolism can take place (EFSA, 2023).

Distribution

50. After absorption, selenium forms are transported via the bloodstream , predominantly to the liver, where they are metabolised (Ha et al. 2019). In addition to the liver, metabolites are distributed throughout the body to multiple organs and tissues including the nervous system, lungs, kidneys, pancreas, skin, hair, bone, testes, and skeletal and cardiac muscle (ATSDR, 2013). Excess selenium can therefore result in organ specific pathological and biochemical effects (EFSA, 2023).

51. SelP and GPx3 are the most abundant selenoproteins in the plasma. SelP typically carries 30-60% of circulating selenium, and GPx3 10-30% (EFSA NDA Panel, 2014; hereafter referred to as EFSA, 2014). The remaining plasma selenium is mainly present as SeMet in albumin and other proteins, and a minor amount (<3%) present as small molecular compounds such as selenosugars (EFSA, 2014). The proportions of these selenium forms depends on both the amount and the chemical form of selenium in the diet. Selenium is also present inside platelets and red blood cells as glutathione peroxidase GPx1 (EFSA, 2014).

52. From the liver, selenium is transported typically as SeCys via SelP, but also in other selenoproteins (EFSA, 2023). It is not distributed evenly, with animal studies showing that some organs and tissues require more selenium than others (EFSA, 2023; Ha et al, 2019). Observations from in vitro studies

showed that for a cell to utilise SelP, it is incorporated into the cell then degraded in the lysosome, enabling released SeCys to become available for selenoprotein synthesis (EFSA ,2023).

53. Rodent studies have evidenced a selenoprotein hierarchy, with prioritised incorporation of selenium into particular selenoproteins, and the prioritisation of selenium supply to organs such as the brain, endocrine and reproductive organs (EFSA, 2014).

54. Geographic location leads to significant variation in selenium concentrations in human tissues, with low soil selenium concentrations resulting in lower selenium concentrations in subjects (EFSA, 2014).

55. Regarding pregnancy, EFSA (2014) summarised evidence showing that selenium accumulates in the organs of the growing foetus during pregnancy, with hepatic concentrations of selenium in the foetus remaining constant (details on concentrations were not described by EFSA). Following birth, hepatic selenium levels fall, suggesting the liver stores selenium during pregnancy and redistributes selenium stores after birth to other organs.

56. EFSA (2014) describe how a study in mice demonstrated a selenoprotein dependent maternal-foetal selenium transfer mechanism: apolipoprotein E receptor-2 (apoER2) mediated uptake of maternal SelP from maternal blood, as well as an additional mechanism that remained unidentified from the study (EFSA, 2014; Burk et al, 2013). Maternal transfer of SeMet or SeMet-containing proteins also provide selenium to the foetus (EFSA, 2014; Burk et al, 2013).

Metabolism

57. The liver is the key site of metabolism of selenium (EFSA, 2023). Animal and in vitro studies have evidenced the fate of selenium in the liver, and its transport throughout the body to other cells for metabolism (EFSA,

2023). All selenium compounds except SeMet, MeSeCys and γ-Glu-MeSeCys, are metabolised to hydrogen selenide in the liver (EFSA, 2023).

58. Following absorption, SeCys, selenate and selenite are metabolised through pathways that support selenoprotein synthesis. This process involves free SeCys degradation by SeCys lyase producing hydrogen selenide and alanine within the cell. SeCys has not been found freely in tissues as it is highly reactive, with SeCys lyase maintaining low intracellular concentrations through its conversion to hydrogen selenide (EFSA, 2023). Hydrogen selenide is then converted into selenophosphate and attached to selenocysteine-tRNA, enabling insertion of SeCys into selenoproteins during translation (EFSA, 2014). For selenate or selenite to be utilised for selenoprotein synthesis, they must be reduced to hydrogen selenide by a series of redox reactions utilising reduced glutathione and thioredoxin reductases to reduce selenate to selenite, and finally to hydrogen selenide (EFSA, 2014, EFSA, 2023).

59. EFSA (2023) describe a study on the human metabolic profile of urinary selenium by Lajin et al (2016), which demonstrates that once hydrogen selenide is generated it can be incorporated into selenoproteins, used to form selenosugars, or methylated for excretion.

60. Dietary SeMet can be metabolised to SeCys via the transsulfuration pathway however there is no physiological pathway for the synthesis of SeMet from SeCys in humans, making this an irreversible conversion (EFSA, 2023). Selenium deposited in the non-specific protein pool (as SeMet) can be released by degradation of proteins, where it can be used to form selenoproteins thereafter as SeCys (EFSA, 2023). SeMet may also be metabolised by γ-lyase to methylselenol for excretion as evidenced in mouse liver, although it’s unclear if this happens in humans (EFSA, 2023).

Excretion

61. Urinary excretion is the primary elimination route for selenium, with balance studies showing at selenium intakes between 10 and 80 µg/day,

around 40-60% is excreted (EFSA, 2014; 2023). Selenium can also be excreted in the faeces from selenoproteins in intestinal mucosal cells and when simply unabsorbed (EFSA, 2014).

62. The rate of excretion is highest within 24 hours of ingestion, however the fraction of selenium excreted in urine depends on the chemical nature of selenium ingested (EFSA, 2014; Burk et al, 2006). In a randomised, placebo-controlled intervention study, Burk et al. (2006) supplemented 88 selenium replete adults with 200-600 µg/day selenium as SeMet, sodium selenite or selenium-enriched yeast for 16 weeks. Urinary excretion differed between selenium forms, with average excretion of 60 ± 26% for SeMet, 41 ± 15% for sodium selenite and 52 ± 23% for selenium-enriched yeast (EFSA, 2014; Burk et al., 2006). For groups receiving SeMet and sodium selenite, the difference reached significance (EFSA, 2014).

63. In humans, urinary selenium metabolites include Se-methyl-*N*-acetylgalactosamine, a methylated selenosugar, which is a major selenium compound excreted in urine after typical dietary selenium intake (EFSA, 2014). The main urinary selenium metabolites in humans are selenosugars 1 and 3, trimethylselenonium (TMSe), and selenate, while selenium methylselenoneine may also be excreted following the methylation of selenoneine derived from fish consumption (EFSA, 2014; EFSA, 2023). In the urine, there are also a number of unidentified selenium metabolites which are influenced by the selenium compound ingested, the dose, and an individual's genetics (EFSA, 2023).

64. TMSe is produced through the sequential methylation of hydrogen selenide. Hydrogen selenide is first methylated to methylselenol and then to dimethylselenide (DMSe), primarily in the liver. It has been suggested that DMSe is subsequently converted to TMSe in the lungs. When selenium intake is high and the capacity to convert DMSe to TMSe is exceeded the excess DMSe is exhaled, resulting in the characteristic garlic-like odour on the breath (EFSA, 2023).

65. Some individuals may be unable to excrete TMSe due to a genetic polymorphism in the human indolethylamine N-methyltransferase (INMT) gene, they are known as TMSe non-eliminators (EFSA, 2023). Although more evidence is needed, it is suggested by EFSA (2023) that these individuals may be more susceptible to selenium toxicity due to the reduced ability to excrete excess selenium in urine. Selenosugars 1 and 3 are predominant in TMSe non-elimator urine, whilst TMSe is more prominent in TMSe eliminators (EFSA, 2023). Selenosugar 2 Is usually only detected when selenium intake is high (EFSA, 2023).

66. Selenate has been shown to be excreted mostly unmetabolized in humans, at a single dose of 50 µg (EFSA,2023; Jäger et al., 2016a).

67. Selenium is also excreted via breast milk, reflecting maternal selenium intake from mostly organic, but sometimes inorganic sources (EFSA, 2014). EFSA (2014) state, from a study by Dorea (2002), that selenium concentration is highest in colostrum, and decreases as lactation progresses, however high variability in maternal plasma/serum selenium to milk selenium has been noted therefore excretion via breast milk may vary on an individual basis.

Biomarkers

68. Selenium can be measured in a range of biological matrices, including serum, plasma, erythrocytes, urine, hair, placental tissue and amniotic fluid. Key biomarkers used in many studies determining selenium status or effects on selenium status include plasma selenium, GPx and SelP.

69. Plasma selenium concentration can be a useful biomarker of selenium intake and exposure, but not functional selenium status as it reflects both selenoproteins (from the functional pool of selenium) and other plasma proteins where SeMet non-specifically substitutes for methionine (EFSA, 2014; Burk et al, 2001; Hurst et al, 2010). Plasma selenium responds to supplementation across a wide range of intakes (20-700 µg/day) and is

therefore a useful marker of recent selenium exposure, particularly in studies using SeMet or selenium-enriched yeast supplements (Ashton et al, 2009; Burk et al, 2006). However, plasma selenium concentrations can be influenced by the chemical form of selenium consumed (Fairweather-Tait et al., 2010), inflammation (Nichol et al., 1998; Maehira et al., 2002; Huang et al., 2012), and, to a lesser extent, age, sex and smoking status (Robberecht and Deelstra, 1994) meaning it's use for determining selenium status requires interpreting carefully (EFSA, 2014). Plasma selenium does not appear to plateau with increasing intake although concentrations of around 70-100 µg/L have been proposed to reflect 'selenium adequacy' (Combs, 2001; EFSA, 2014).

70. Additionally, SelP is widely used as a biomarker of selenium status along with GPx activity as a functional indicator of selenium sufficiency, although GPx reaches a plateau at higher selenium intakes (EFSA, 2014; Labunskyy et al, 2014; Kyriakou, 2026) .

71. Glutathione peroxidase (GPx) activity is a biomarker of selenium function and reaches saturation at relatively low selenium intakes. Plasma GPx3 activity generally plateaus at selenium intakes of around 40-60 µg/day (EFSA,2014; Yang et al., 1987; Duffield et al., 1999; Xia et al., 2005; Xia et al., 2010), while maximum platelet and whole-blood GPx activity has been associated with plasma selenium concentrations in supplementation studies of approximately 95-115 µg/L (Alfthan et al., 1991;EFSA, 2014). As GPx becomes saturated before other functional selenium pools (e.g. SelP), EFSA (2014) considered it less informative than SelP for defining selenium requirements.

72. EFSA (2014) identified SelP as the most informative biomarker of selenium status because of its role in selenium transport and homeostasis, suggesting it more accurately reflects selenium status of the whole organism. SelP represents a saturable pool of selenium , with maximum concentrations generally associated with plasma selenium concentrations of approximately

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90-140 µg/L in supplementation studies (EFSA, 2014; Hurst et al., 2013). EFSA (2014) considered the levelling-off of SelP to indicate adequate selenium supply to tissues and saturation of the functional selenium pool, making it the preferred biomarker for deriving selenium dietary reference values.

73. EFSA (2014) noted that maternal selenium biomarkers such as plasma selenium concentrations and GPx activity decline during pregnancy. These changes may reflect physiological adaptations including an increase in plasma volume and maternal-foetal selenium transfer, and are therefore difficult to interpret in relation to selenium requirements in pregnancy.

Interaction With Other Nutrients

74. Selenium is likely to interact with other nutrients involved in the antioxidant-pro-oxidant balance of the cell due to its role in the antioxidant network (EFSA, 2014). Data are limited for interactions between selenium and ascorbic acid, however selenium and iodine play key roles in thyroid hormone metabolism and deficiencies of both, impacting thyroid function, have been observed in animals and humans (EFSA, 2014).

Mechanism(s) of Toxicity

75. The SCF (2000) and EVM (2003), note that molecular mechanisms of selenium toxicity are unclear. Many mechanisms have been reviewed (i.e. redox cycling of auto-oxidisable metabolites, glutathione depletion, inhibition of protein synthesis, depletion of S-adenosyl-methionine and the replacement of sulphur in sulphydryl groups of proteins and cofactors), however the mechanisms may vary depending on the selenium compound, and several may operate at once.

76. EFSA (2023) reviewed the available evidence and reported that the most common mode of action for selenium toxicity is likely oxidative stress, which interrupts cellular and mitochondrial functions. Hydrogen selenide is a

key intermediate in selenium metabolism and is required for selenoprotein synthesis, however once this pathway is saturated, excess selenium metabolites may undergo oxidation, leading to the formation of reactive oxygen species (ROS) causing cellular and subcellular damage, and cell death.

77. Another suggested mechanism by EFSA (2023) involves inhibition of methylation, the primary detoxification pathway for selenium, which enables the accumulation of metabolites such as hydrogen selenide and other selenides, contributing to hepatic toxicity. Studies in mice suggest that excessive exposure to SeCys can impair methylation through inhibition of methionine adenosyltransferase (EFSA, 2023; Rayman et al., 2008a).

78. Other mechanisms that have been reported include the selective accumulation of selenium in growth hormone-producing cells of the pituitary gland, which has been proposed as a possible contributor to the growth reductions observed in experimental animals (SCF, 2000; EFSA, 2023). In addition, high selenite exposure has been shown in vitro to activate endoplasmic reticulum stress and increase ROS production, resulting in endothelial dysfunction (EFSA, 2023; Zachariah et al., 2021).

79. Finally, EFSA (2023) noted that substitution of sulphur with selenium in proteins may disrupt their structure and function leading to toxic effects. This mechanism has been proposed to be the underlying mechanism for the characteristic features of selenosis such as hair loss and nail damage through alterations in keratin structure.

80. Overall, EFSA (2023) concluded that multiple modes of action are likely to operate in parallel, with their importance dependent on selenium dose and chemical form.

Toxicity

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81. Study data regarding acute toxicity, carcinogenicity, genotoxicity or reproductive effects were not included in the 2023 EFSA opinion, with their focus being chronic toxicity, epidemiology studies and human data. A further search of the literature was conducted by the Secretariat for additional studies published between 1st January 2022 and 1st January 2026, linking selenium to toxic maternal effects, however no additional studies were identified. Therefore, previous evaluations describing the acute toxicity, carcinogenicity, genotoxicity or reproductive effects of selenium have been used to provide information for these sections e.g. EVM (2003), SCF (2000) etc.

Acute/Subacute Toxicity

82. Symptoms of acute selenium toxicity, or 'acute selenosis', in humans include hypersalivation, emesis, garlic aroma on the breath, vomiting, diarrhoea, hair loss, neurological disturbances, hypotension, tachycardia, pulmonary oedema, and fatigue (EVM, 2003; EFSA, 2023).

83. The SCF (2000) reported that symptoms of selenium toxicity have been observed following a single dose of 250 mg (250,000 µg) selenium. The SCF also cited reports of toxicity associated with the consumption of misformulated supplements containing 27 to 31 mg (27,000 to 31,000 µg) selenium per tablet, with symptoms developing after repeated daily use over a period ranging of 11 days to 2 months (SCF, 2000; Jensen, Clossen and Rothenberg, 1984). In comparison, the EVM (2003) stated that acute selenium poisoning appears to occur at doses >0.5 mg/kg bw (>500 µg/kg). In animals, selenium is described by the EVM (2003) as having moderate to high acute toxicity, with effects seen in the nervous system, liver and lungs.

Reproductive toxicity

84. The SCF (2000) and EVM (2003) reviewed animal data and concluded that selenium may cause adverse effects on reproductive parameters such as the oestrous cycle, while multigenerational studies showed that high levels of

selenium exposure may lead to reduced weight of offspring and reduced survival after birth.

85. Adverse reproductive and developmental effects have been observed in rodents but have typically been associated with maternal poisoning and nutritional deprivation (SCF, 2000). In mice, increased pre-weaning mortality, runt offspring and impaired breeding was reportedly observed at 3 ppm selenium in drinking water (Schroeder and Mitchener, 1971; SCF, 2000), while in swine, reduced conception rates and reduced offspring survival was observed at 10 ppm selenium in feed (Wahlström and Olson, 1959; SCF, 2000). Selenomethionine administered at >77 µmol/kg lead to foetal malformations and reduced foetal growth in hamsters (Ferm et al, 1990; SCF, 2000). Equivalent doses in µg/kg bw were not available for these studies.

86. The SCF and EVM also noted that teratogenic effects have been reported in several animal species including birds, fish, sheep, pigs and hamsters, but have not been reported in studies carried out in macaque monkeys despite evidence of maternal toxicity (Tarantal et al,1991). However, developmental effects from mammalian studies occurred mostly at levels that resulted in maternal toxicity therefore limiting conclusions regarding teratogenicity.

87. Tarantal et al. (1991) found no evidence of teratogenicity in macaque monkeys following prenatal exposure to L-selenomethionine (0, 25, 150, or 300 µg /kg of L-selenomethionine (Se) daily during organogenesis (gestational days 20-50). Dose related maternal toxicity was observed, with adverse effects including anorexia, vomiting and reduced body weight. One growth-retarded foetus was observed on gestational day 131 in a dam exposed to 25 µg/kg bw/day. At 300 µg/kg bw/day, one early embryonic death (gestational day 35) and two foetal deaths (gestational day 68 and gestational day 123) were reported, however, the authors state that pregnancy loss was not significantly different from concurrent or historical controls. Necropsy on gestational day 100 ± 2 found no statistically significant treatment related

findings. A unilateral cortical cataract was identified in one infant exposed to 150 µg/kg bw/day, although this was considered likely to be a spontaneous occurrence.

88. The EVM (2003) review highlighted evidence suggesting that pre-weanling animals may exhibit greater sensitivity to selenium toxicity than adults. Individual study citations for reproductive studies were not provided in the EVM (2003) review.

89. Additionally, the EVM note a prominent data gap in that epidemiological studies are yet to assess reproductive toxicity.

Carcinogenicity and Genotoxicity

90. The EVM describe how selenium compounds used in food and supplements are not carcinogenic, with the exception of selenium sulphide which is carcinogenic in rats and mice. In vivo mutagenicity tests showed variable results, however compounds were mostly negative with an increase in chromosomal aberrations only seen at lethal doses of sodium selenite in hamster bone marrow (EVM, 2003).

Chronic Toxicity

91. Symptoms of chronic selenium toxicity in humans, or ‘chronic selenosis’, include changes to the nails (brittle, thickened, streaks or spots), hair (brittle, alopecia), skin lesions, neurological effects (fatigue, peripheral hypoaesthesia, hyperreflexia) discolouration and decay of the teeth and garlic odour on the breath (EVM, 2003; EFSA, 2023).

92. In animals, chronic exposure has resulted in reduced growth, weight gain, liver changes, anaemia, pancreatic enlargement, and in some domestic animals, neurotoxicity at selenium exposures above 0.03 to 0.4 mg/kg bw (30 to 400µg/kg bw) (SCF, 2000).

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Epidemiology and Human Data

93. This section describes the key human and epidemiological studies identified within previous evaluations that were considered when setting ULs for selenium. Where the same study has been described in more than one evaluation, it is described only once under the earliest evaluation in which it appears, to avoid duplication.

94. In their 2023 evaluation, EFSA state that current literature suggests that there are no obvious sex differences in selenium metabolism, therefore the data presented below, as taken from previous evaluations, includes studies in both male and female subjects.

95. Some full texts were unable to be retrieved (Yang et al, 1989a; Yang and Zhou, 1994) due to their age and a lack of digitisation of the journal (*'Journal of Trace Elements and Electrolytes in Health and Disease'*) therefore studies have been described using the abstract only, or by using text from evaluations that have reviewed these papers.

Key studies identified by the SCF (2000)

Yang et al., 1983

96. Yang et al investigated endemic selenium intoxication in Enshi County, China, which was highly prevalent between 1961 and 1964. Selenium intake in the areas studied was classified as high (with or without endemic selenosis), adequate, or deficient. Morbidity was approximately 49% in 248 inhabitants living in heavily affected villages. Selenium toxicity was suspected because of selenium from coal (average selenium content > 300 µg/g; with one sample exceeding 80,000 µg/g) entering soil by weathering and being taken up by crops, and prolonged drought causing increased consumption of vegetables and maize in place of failed rice crops.

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97. Symptoms of selenosis included skin lesions, mottled teeth, nervous system abnormalities (observed in only one heavily affected village; 18 of 22 inhabitants), and characteristic signs of selenosis such as brittle hair and nails, hair loss, and spots and streaks on nail surfaces.

98. Samples of hair, blood, urine, soil, water, vegetables and cereals were analysed for their selenium concentration using distillation and titration methods (samples from 1966 only) and microfluorometric techniques. Selenium intake was estimated from information collected on dietary habits and by measuring the selenium content of cereal and vegetables

99. Symptoms of selenosis were seen at daily selenium intakes ranging from 3,200 to 6,690 µg, with an average of 4,990 µg. In high selenium areas without occurrence of selenosis, daily selenium intake was estimated to range from 240 to 1,510 µg , with an average of 750 µg. Residents suffering with selenosis recovered once diets were modified. Additionally, a case report was also described, in which a middle-aged hemiplegic female (~40 years) died reportedly due to selenosis, showing motor and sensory abnormalities, however a lack of autopsy and clinical history meant the cause of symptoms could not be determined.

Yang et al 1989a, 1989b

100. A cross sectional study of 349 individuals was conducted in the Enshi County in China, where individuals (male and female) aged 1-71 years, who lived in areas with either ‘low’, ‘medium’, or ‘high’ selenium levels in the soil, were evaluated for clinicial and biochemical signs of selenium toxicity (SCF, 2000; EFSA, 2023). Dose response relationships were determined from studying selenium intake via food and measuring selenium in tissues including whole blood, urine, hair, finger and toe nails (SCF, 2000).

101. The average daily intakes were estimated at 70, 195 and 1,438 µg, and 62, 198, and 1,288 µg for adult male and females respectively, at low,

medium and high selenium soil levels (average body weight: male 55 kg, female 53 kg) (SCF, 2000; EFSA, 2023).

102. Individuals were examined for clinical signs of selenosis (hair or nail loss, nail abnormalities, mottled teeth, skin lesions and changes in peripheral nerves). Where clinical signs of selenosis were present, subjects were classified as ++ or +. At blood selenium concentrations below 1,000 µg/L (~853 µg Se intake/day according to regression equation, figure 1 Yang et al. 1989a), no clinical signs of selenosis were observed. At 1,000 to 2,000 µg/L (grouped as 1,000 – 1,250, 1,250 – 1,500 and 1,500 – 2,000 µg/L), mild toxicity (selenosis +) was prevalent in 10-35% of subjects, increasing to 45% at blood concentrations above 2,000 µg/L. More severe toxicity (selenosis ++) varied between 3 and 7% within the same groups. It was concluded that no dose response relationship was seen (SCF, 2000).

103. Subjects with persistent symptoms had blood levels approximately 1,050 – 1,850 µg/L (913 -1,907 µg Se/day intake). Additional effects observed include abnormal clotting (in 45% of subjects above 1,000 µg/L, and 1 subject <1,000 µg/L), a reduction in plasma selenium to red cell selenium ratio (at concentrations >900 µg/L, or 750 µg Se intake/day), and a decreased concentration of glutathione in blood (at concentrations >850 µg Se intake/day) (SCF, 2000).

104. The authors (Yang et al, 1989b) concluded from their studies that a daily selenium intake of 750 to 850 µg may be a safe level and proposed 400 µg/day as a maximum daily safe intake taking ‘variable factors’ into account. Additionally, Yang et al. (1989b) suggested that the manifestation and severity of selenosis are influenced not only by selenium exposure but also individual susceptibility, as individuals with the highest blood selenium concentrations did not necessarily exhibit the most pronounced signs of toxicity.

Yang and Zhou, 1994

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105. Yang and Zhou conducted a follow up study on 5 adults (aged >30) showing signs of selenosis from the original cross-sectional study by Yang et al, 1989 in the Enshi County in China. Their aim was to reexamine blood selenium levels and clinical signs of selenosis to identify any correlation (Yang and Zhou, 1994; SCF, 2000; EFSA, 2023)

106. Symptoms of selenosis disappeared after subjects changed their diets, with average blood levels of selenium decreasing from 1346 ± 366 to 968 ± 115 µg/L. A regression equation was applied to convert these levels into a corresponding intake of 1270 ± 450 to 819 ± 126 µg Se/day, the latter of which was suggested as the mean NOAEL (rounded to 800 µg Se/day)(Yang and Zhou 1994; SCF,2000; EVM, 2003). A maximum safe dietary intake was set at 400 µg Se/day. This was determined from the lower limit of the 95% confidence interval of 600 µg Se/day however was lowered 'for safety' (Yang and Zhou,1994).

107. In their evaluation, the IOM described limitations of the study, such as a very small number of subjects (n=5) and that Chinese populations may not be representative of the wider population (e.g. may have differences in sensitivity to selenium compared to other populations)(IOM, 2000).

Additional studies considered by the SCF (2000)

108. The SCF considered additional studies by Longnecker et al. (1991), Clark et al. (1996) and Brätter and Negretti de Bräatter (1996) to support the UL of 300 µg/day for adults, but were not used directly in its derivation. These studies were also summarised by EFSA in their 2023 opinion.

109. In a study of 142 adults living in seleniferous areas of South Dakota and Wyoming, Longnecker et al. (1991) reported selenium intakes ranging from 68 to 724 µg/day, with around half of participants exceeding 200 µg/day, and 12 exceeding 400 µg/day, assessed using a 48 h duplicate-plate food collection technique. No clinical signs of selenosis were observed, even at the highest intakes of approximately 720 µg/day, and although alanine

aminotransferase activity positively correlated with intake, it remained within the reference range and was not considered biologically relevant. Similarly, in the Nutritional Prevention of Cancer trial, supplementation with 200 µg/day selenium yeast (total dietary intake approximately 300 µg/day) was not associated with dermatological signs of toxicity (Clark et al., 1996). In a cross-sectional study of 125 lactating women in Venezuela with estimated selenium intakes ranging from 90 to 980 µg/day (estimated from concentrations of selenium in breast milk), Brätter and Negretti de Brätter (1996) also reported no evidence of nail or hair changes. Collectively, the SCF (2000) used these studies to support the absence of toxicity at relatively high intakes but were not used as the basis for setting the UL.

Key studies from EFSA (2023)

110. EFSA describe 5 randomised control trials that provide data on signs and symptoms of selenium toxicity in adults from the monitoring of adverse events. Of these trials, the Selenium and Vitamin E Cancer Prevention Trial (SELECT) by Lippman et al (2009) was chosen from which to set an UL for selenium as described in the ‘previous evaluations’ section of this paper.

Lippman et al, 2009

111. The SELECT trial evaluated the effect of 200 µg/day SeMet supplementation in 8,752 men in the United States, compared with 8,696 men who received a placebo. Participants were men without prior prostate cancer, aged ≥50 years (African American) or ≥55 years (others) and received supplementation for a median of approximately 5.5 years. Mean baseline serum selenium concentrations were 135 µg/L (selenium group) and 138 µg/L (placebo group), suggesting an estimated intake of 130 µg/day which is higher than typical European intake. After 4 years, levels increased to 252 µg/L in the selenium group whilst the placebo group saw only marginal increase to 140 µg/L (EFSA, 2023; Lippman et al, 2009).

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112. The primary endpoint of the study was prostate cancer, however as part of this trial adverse effects known to be associated with the study supplements were recorded and compared between placebo and selenium supplement groups.

113. The side effects included in the final paper were the highest grading of a subjects symptom reported, with effects being reported every 6 months during a study site visit or substitute phone call. Adverse effects assessed included alopecia, dermatitis (grades 1-2 mild to moderate, and 3-4 severe to life threatening), halitosis, nail changes, fatigue (grades 1-2, and 3-4) and nausea (grades 1-2, and 3-4). The National Cancer Institute Common Toxicity Criteria (Version 2) were used for grading of all listed effects except halitosis and dermatitis which were graded based on the study protocol (EFSA, 2023; Lippman et al, 2009).

114. Compared with the placebo group, selenium supplementation was associated with a significantly increased risk of alopecia (RR 1.28; 99% CI1.01, 1.62). A small increase in risk of developing nail changes was observed (selenium group: RR 1.04; 99% CI 0.94, 1.16). Higher risks were also observed in the selenium group for dermatitis, halitosis, fatigue (grades 1-2), and nausea (grades 1-2). However, most estimates were not statistically significant: dermatitis (grades 1-2: RR 1.17; 99% CI 1.00, 1.35; grades 3-4: RR 1.74; 99% CI 0.56, 5.44), halitosis (RR 1.17; 99% CI 0.99, 1.38), fatigue (grades 1-2: RR 1.09; 99% CI 0.95, 1.26), and nausea (grades 1-2: RR 1.19; 99% CI 0.94, 1.52). Less than 5% of individuals were lost to follow up, >2 years before analysis (EFSA,2023; Lippman et al, 2009).

115. EFSA (2023) noted this study showed an increased risk of adverse effects from selenium toxicity, particularly alopecia, at total intakes around 330 µg/day, compared to 130 µg/day.

Additional studies considered by EFSA (2023)

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116. As described in EFSA (2023), four additional RCTs (Algotar et al , 2013b; Winther et al , 2015; Thompson et al , 2016; Fairris et al , 1989) comprising between 69 and 1621 subjects generally did not demonstrate consistent or dose-related evidence of selenium toxicity across intakes ranging from 200–600 µg/day. In the Negative Biopsy Trial (Algotar et al , 2013b) no increase in selenosis endpoints (e.g. brittle hair or nails) were observed at selenium and Se yeast intakes up to 400 µg/day in adult men with increased risk of prostate cancer. Similar findings were reported in the Selenium and Celecoxib trial (Thompson et al. 2016) in the US, where no increased risk of hair or nail effects was identified at 200 µg/day Se yeast in participants with a history of colorectal adenoma. In the Danish Prevention of Cancer by Intervention with Selenium study (Winther et al., 2015), adverse effects such as hair loss and nail changes were reported to occur similarly in selenium (yeast; 100, 200 and 300 µg/day) and placebo groups and showed no dose-response relationship. Additionally, no signs of toxicity were reported in a small psoriasis trial (Fairris et al. 1989) where patients received Se yeast supplements of 600 µg/day (n =22), although, study results were not reported in the publication of this study.

117. EFSA determined that these studies provide limited inconsistent evidence for selenium toxicity, with limitations including small sample sizes, high dropout rates, and incomplete or poorly described adverse event monitoring. While one RCT (SELECT) indicated an increased risk of alopecia and related effects at intakes of approximately 330 µg /day, this finding was not consistently replicated across the other trials. EFSA considered the SELECT trial was the most robust study for setting the UL.

118. In their opinion, EFSA (2023) also considered three cross-sectional studies (Lemire et al, 2012; Chawla et al, 2020; Martens et al, 2015), comprising 41 to 680 participants, that examined selenium toxicity in seleniferous areas of Brazil, India and the United States, in addition to the study by Yang et al. (1989a). In these studies, plasma selenium levels ranged from 50 to 950 µg/L, with median values around 135 to 250 µg/L.

119. In the Brazilian Amazonas study (Lemire et al. 2012), mild nail changes were reported at plasma selenium concentrations ≥ 328 µg/L, although these effects were also observed at lower levels. In the Indian study (Chawla et al.2020), hair and nail abnormalities were reported at median serum selenium concentrations of approximately 250 µg/L compared with around 155 µg/L in unaffected individuals, with increased risks observed above the study population mean of approximately 171 µg/L however, there was considerable overlap in selenium status between affected and unaffected individuals. In children, selenium intakes of approximately 155 µg/day (exceeding age-specific ULs of 60 - 90 µg/day) were not associated with clinical signs of selenosis (Martens et al, 2015).

120. EFSA also describe a case report of a 55-year-old woman experiencing symptoms of selenosis after consumption of 10 to 15 nuts per day for 20 days resulting in a selenium serum concentration of 512 µg/L. Symptoms resolved after consumption of the nuts was ceased.

121. Overall, EFSA concluded that selenium toxicity was being observed at levels below the NOAEL determined by Yang et al 1989a, highlighting the wide variability in the susceptibility of individuals to selenium toxicity.

Additional Literature Search

122. A further search of the literature was conducted for articles published between 1st January 2022 and 1st January 2026, linking selenium to toxic maternal effects. Search terms for the literature search can be found in Annex A. No new studies were identified that directly linked selenium to toxicity in pregnant women or women of childbearing age. However, 6 epidemiological studies were identified that reported associations between selenium status and outcomes including reduced birth weight, increased risk of gestational diabetes mellitus (GDM), and reduced placental weight. These studies are based on observational data and associations, and do not directly provide clear evidence of adverse effects from high dietary or supplementary

selenium intakes. Therefore, the studies are described below to capture the available human evidence for consideration by the Committee as part of the overall weight of evidence.

123. In addition, 3 recent studies in fish species reported developmental, neurological and reproductive effects from selenium exposure. These studies are described briefly as supporting evidence as they provide information on potential developmental and reproductive effects of excess selenium exposure. The study limitations and applicability to humans are outlined when described below.

Epidemiology and Human Data

Reduced placental weight

124. Kinjo et al (2024) examined the association between placental weight and heavy metal exposure using blood samples of 73,005 women who delivered a single live birth from 15 varying geographical areas of Japan from the Japan Environment and Children's Study (JECS; Kawamoto et al., 2014). Women with data missing from key characteristic questions (e.g. age, weeks of pregnancy, sec of infant) and with pregnancy conditions (e.g. foetal growth restriction, hypertensive disorder of pregnancy) were excluded. The study did not exclude pregnancies affected by a range of conditions, including foetal anomalies, second trimester bleeding, collagen disorders, renal, hepatic or cardiac disease, haematological conditions, and cancers.

125. A 2 mL subsample of maternal blood, taken from a 33 mL sample retrieved during the second or third trimester, was used to determine whole blood selenium concentration using an Agilent 7700 Inductively Coupled Plasma Mass Spectrometer (ICP-MS). The authors grouped participants into quartiles (Q1-4) based on selenium levels in whole blood, and used Z scores and multivariable logistic regression analysis to explore the association between blood selenium levels and placental weight.

126. The median selenium concentration detected in maternal blood was 168 ng/g (equivalent to 168 µg/kg), however whole blood concentrations ranged from 83 to 412 ng/g (equivalent to 83 to 412 µg/kg) across the 4 quartiles. The authors conducted multivariable regression analysis for the association between maternal whole blood concentrations of heavy metals and Z score, adjusted for neonate sex and placental weight by gestational age. Multivariable regression analysis showed a significant inverse association between selenium levels and placental weight (Z score; CoEf −0.31, standard error = 0.028, $p < 0.001$). However, a decreased odds ratio from 1 in Q1 (lowest selenium whole blood concentration; 83 to 155 ng/g, equivalent to 83 to 155 µg/kg) to 0.82 in Q4 (highest selenium whole blood concentration; 182 to 412 ng/g, equivalent to 182 to 412 µg/kg) demonstrated reduced odds of low placental weight with increasing selenium exposure. The authors concluded that selenium itself may not be responsible for decreasing placental weight, and that it may involve multiple metals acting on placental weight.

127. Similarly, Grundeken et al (2024) assessed the impact of essential elements on the placenta of 406 Swedish women (aged 20 to 45 years), using samples and data from the Swedish birth cohort “Nutritional impact on Immunological maturation during Childhood in relation to the Environment” which was undertaken between 2015 and 2018. Although the cohort consisted of 655 pregnancies, only 406 were included in the authors’ main analysis as these women had complete data on placental trace element concentrations, placental weight, birth weight, and relevant covariates. A sub sample of 391 women was used to estimate placental accumulation, by comparing placental concentrations with maternal blood erythrocyte fractions.

128. Placentas for analysis were collected at birth, and triangular cross-sectional samples were taken from the cord insert to outer edge of the placenta. One third was used for DNA extraction and the remainder for trace element analysis using ICPMS Agilent 7900. Venous blood samples (6 mL) were collected from women at gestational week 29 and separated into

erythrocyte and plasma fractions, which were diluted in an alkali solution before use. Placental weight (g; weighed with membranes and umbilical cord) and birth weight (g) were measured after birth by midwives and recorded to the nearest gram. Placental efficiency was estimated using the fetoplacental weight ratio. Relative telomere length (TL) and mitochondrial DNA copy number (mtDNAcn) in placental tissue were measured by quantitative polymerase chain reaction (qPCR) in a sub-sample of 285. Associations between individual exposures and outcomes were assessed using linear or spline regression models, while joint effects and interactions were examined using Bayesian kernel machine regression (BKMR). All models were adjusted for sex, maternal smoking, and either maternal age or body mass index (BMI).

129. Median placental selenium concentration was 166 µg/kg. A nonlinear association between selenium and placental weight was observed. Adjusted regression showed an inverse association between selenium levels above 147 µg/kg and placental weight (B: −158g per doubling; 95 % CI: −246, −71), and no association below this level. Other observations included a weak inverse association with gestational age at birth (r_s: −0.11; p = 0.029), and birth weight (rs: −0.17; p = 0.001). Additionally, placental selenium slightly decreased with increasing maternal BMI (r_s: −0.11; p =0.024).

130. In multivariable-adjusted linear regression models, selenium was not associated with TL or mtDNAcn in the placenta.

131. The authors identify that the intake of selenium in women studied was below recommended intakes (~40 µg/day), and that differences in selenium status between women were still associated with differences in placental outcomes. The observed inverse association between higher placental selenium concentrations and placental weight was suggested to potentially indicate a change in selenium transport between the placenta and foetus in late gestation, however the underlying mechanism is uncertain.

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Lower Birth Weight

132. Mehta et al (2023) investigated selenium biomarkers measured in maternal delivery and venous cord (VC) blood , including whole blood (WBSe), serum selenium, SelP, and their association birth weight and infant growth outcomes. Growth outcomes included age-adjusted length, weight, head circumference and weight-for-length z-scores at birth, 1 and 2 years of age. However, to align with the scope of this paper, only the results relating to selenium concentrations and birth weights are considered. Low birth weight was defined as birth weight < 2500 g. Data were obtained from a randomised controlled trial initially undertaken to assess the effects of supplementation with vitamin D3 on pregnant and lactating women in Bangladesh. The original trial included 1298 women with uncomplicated single pregnancies between 17 and 24 weeks of gestation, aged 18 years and above. The authors note that a sub-sample of 1021 was analysed for at least one selenium biomarker, however analytical sample sizes varied across different biomarkers and time points ranging from 435 to 780.

133. Secondary analysis was based on availability of selenium samples (one measurement of selenium and/or selenoproteins at delivery in mothers, or in venous cord blood of neonates) and measured as part of a panel of metals for the primary study. Venous cord blood was collected within 30 minutes of delivery. Whole blood selenium at delivery and venous cord blood were analysed using inductively coupled plasma mass spectrometry. Serum selenium was measured using inductively coupled plasma-dynamic reaction cell mass spectrometry at delivery. Plasma SelP was measured at delivery and in venous cord blood using a selenotest ELISA assay. Maximum selenium levels were reported, with whole blood selenium ranging from approximately 190 to 230 µg/L in delivery and VC blood, and 110 µg/L in serum samples. The authors state that selenium levels were therefore within normal ranges and did not indicate high exposure. Birth weight was measured using a digital scale. Results were analysed using regression analyses.

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134. Delivery and venous cord whole blood selenium were both negatively associated with birth weight, with statistically significant associations (WBSe delivery: adjusted *β* −26.6; 95 % CI –44.3, −8.9; p = 0.003; WBSe VC: adjusted *β* −19.6, 95 % CI –33·0, −6.1; p = 0.005). Serum selenium showed no significant association in adjusted models at birth. In contrast, delivery SeIP levels (adjusted *β*: −37.5, 95 % CI –73·0, −2.0; p = 0.04) and venous cord blood (adjusted *β*: 82.3, 95 % CI 30.0, 134.7; p = 0.002) showed inconsistent associations with birth weight, with maternal concentrations negatively associated with birth weight, and venous cord blood concentrations showing a positive association. A small increase in risk of low birth weight at higher whole blood selenium concentrations was also identified.

135. Overall, findings were observed in a population with selenium concentrations within normal range, and the reported effects were significant but small. This suggests that adverse effects such as lower birth weights, are unlikely to be the result of high selenium intakes. The authors conclude that ‘mechanisms for the associations between birth weight and Se remain unclear’.

136. Álvarez-Silvares et al (2023) acknowledged that the effect of metals, such as selenium, on foetal growth should be investigated highlighting that investigations into the effects of metal exposure on human health have been conflicting, with effects on foetal growth not yet clear. The authors therefore investigated the association of placental metals, including selenium, and neonatal weight in a cohort of 79 low obstetric risk pregnant women aged 19 to 42 years from northwestern Spain.

137. Participants were recruited between October and December, 2017. Women were excluded if they were under 18 years of age, had a twin pregnancy, had a chronic disease diagnosed before pregnancy, experienced preterm labour (<37 weeks), were followed up exclusively at another centre, had antenatal care at the University Hospital of Ourense but gave birth

outside the Ourense healthcare area, or did not consent to participate after reading the consent form.

138. Placental samples (excluding umbilical cord) were collected at delivery. Inductively coupled plasma mass spectrometry was used to determine the levels of trace metals in the placental tissue. Multivariate statistical analyses were performed using linear regressions, including generalised linear models, and generalised additive models (GAM) where linearity was not met. Models were adjusted for body mass index and maternal age at the start of pregnancy, previous birth history, gestational age, and maternal exposure to smoking. Significance was set at $p < 0.05$.

139. Placental selenium ranged from 0.744 to 1.202 µg/g dry weight, with a mean of 0.969µg/g dry weight. The authors reported a significant association between higher placental selenium concentrations and lower neonatal birthweight. However, the GAM suggest a weak negative association, with data points substantially varied and just within significance ($p = 0.049$). This, along with the small sample size (n = 79) limits confidence in the strength of the association. The lack of data on additional placental parameters and dietary and/or supplemental selenium intake limits interpretation of these findings as placental selenium levels represent internal exposures only, and cannot be linked to external intakes. Therefore, consistent with Mehta et al (2023), no clear or plausible mechanism linking selenium exposure to reduced birth weight can be established.

Increased Risk of Gestational Diabetes Mellitus (GDM)

140. Li et al (2025) investigated associations between heavy metals, trace elements and gestational diabetes mellitus (GDM). The authors note that GDM has been associated with adverse pregnancy and birth outcomes, including preterm birth, foetal or neonatal growth abnormalities, spontaneous abortion and maternal morbidity, and aimed to determine whether exposure to

specific metals and trace elements, including selenium, in Black and Hispanic communities were associated with the development of GDM.

141. The study included 1256 pregnant women (average age at delivery of 28 years) from the prospective Boston Birth Cohort, a predominantly Black (58%) and Hispanic (22%) population in the United States. Selenium was measured in venous blood samples, collected within 24 to 72 hours of delivery, and analysed using inductively coupled plasma mass spectrometry.

142. Medical records were used to verify GDM cases, where GDM was defined as at least two of the following plasma glucose values being met in line with American Diabetes Association standards: fasting glucose ≥ 5.3, 1 h ≥ 10.0, 2 h ≥ 8.6, and 3 h ≥ 7.8 mmol/L in response to a 100 g oral glucose load, along with no diagnosis of pregestational diabetes mellitus. Although dietary intake was reported and assessed, intakes of individual elements being measured were not tracked. Poisson regression models with adjustment for covariates were used for determining associations between individual elements and the risk of GDM. Significance was set at $p < 0.05$.

143. Results showed that selenium levels in Hispanic women (geometric mean: 262.31 µg/L) were lower than women of other race and ethnicity. Overall, selenium was not associated with GDM risk in either the adjusted or unadjusted analyses. However, in Hispanic women, modified Poisson regression models found a positive association between selenium concentration and GDM risk (risk ratio: 4.43, 95% CI: 2.25, 8.69) compared to non-Hispanic Black women (RR: 1.18, 95% CI: 0.65, 2.12) ($P_{\text{interaction}} = 0.01$). The authors propose population heterogeneity as an explanation for the null and positive associations seen in Hispanic participants. Additionally, it was suggested that Hispanic populations may be more sensitive to selenium, as blood selenium levels in Hispanic participants were lower than other racial and ethnic groups.

144. A positive association was only observed in Hispanic women and was not observed in the overall study population, suggesting potential differences

between populations in the relationship between selenium and GDM. However, the mechanisms for this are unclear. As selenium concentrations were measured after delivery (24 to 72 hours) and information on individual selenium intake was not available, further research would be required to determine whether findings reflect differences in exposure, selenium metabolism, susceptibility, or other variables.

145. Overall, the available additional human data provides limited evidence for the direct toxicity of excess selenium in the maternal diet. Although several studies reported associations between selenium biomarkers and outcomes such as reduced placental weight, lower birth weight, and gestational diabetes mellitus, the findings were inconsistent and no clear mechanisms of toxicity have been established. These studies have a number of limitations, including lack of data on dietary and supplemental selenium intakes and potential for confounding e.g. interactions with other trace elements and metals.It should also be noted that although outcomes such as reduced placental weight or small differences in birth weight were reported, this does not necessarily represent adverse toxic effects.

Animal Data

146. In zebrafish embryos, exposure to selenium concentrations of 0.125 to 1 μM resulted in concentration related increases in mortality and decreased hatchability. At 1 μM, severe deformities were observed in the 50% of embryos that survived. Larvae exposed to 0.5 μM showed impaired locomotor activity and reduced responsiveness to stimuli, suggesting effects on neural development (Zhao et al, 2022). In a separate zebrafish study, exposure to 12.5–100 μg Se/L selenite for 120 days reduced spawning capacity and gonadosomatic index (GSI), delayed oocyte maturation and increased apoptosis in both oocytes and offspring suggesting reproductive toxicity following maternal exposure (Cheng et al, 2023).

147. Similarly, Covington et al (2025) reported reduced survival and an increased incidence of developmental abnormalities in Yellowstone cutthroat

trout offspring following maternal selenium exposure. Maternal whole-body selenium concentrations ranged from 2.6 to 25.7 mg/kg dry weight (dw), corresponding to embryo concentrations of 3.4–47.6 mg/kg dw, with effects (survival and abnormality endpoints) observed at egg selenium concentrations of approximately 35 mg/kg dw.

148. Although these findings demonstrate that excessive selenium exposure may lead to adverse developmental and reproductive effects in fish, these species are known to be sensitive to selenium toxicity,with effects often associated with bioaccumulation and maternal transfer to eggs (Uddin et al, 2024). Therefore the relevance of the findings in these studies and their applicability to humans is limited.

Exposure Assessment

Dietary

149. Selenium is found in a variety of foods (Mazmanyan and Gasparyan, 2024; EFSA, 2014, 2023; NHS, 2020; SACN, 2013) such as nuts and seeds, offal, fish and crustaceans, milk and dairy products, meat and meat products, grains and vegetables and legumes. Annex B, Table B1 provides a summary of the selenium content in these specific foods.

150. In EFSA's intake assessment of selenium in European populations, the main food groups contributing to selenium intake were found to be milk and dairy products, meat and meat products, and grain-based products and fish and fish products (EFSA, 2014).

151. To determine chronic exposure to selenium from the diet a nutrient assessment was conducted utilising the UK Nutrient Databank (NDB) NDB and NDNS years 1-11 data. The NDB contains extensive information on the nutrient content of foods, including selenium, and can be used with the NDNS food consumption data to estimate dietary exposure to specific nutrients. Mean and 97.5th percentile estimates have been provided on a chronic basis, using a population-based exposure assessment approach for women of

childbearing ages (16-49 years). This assessment used food groups based on those established for the 2014 Total Diet Study (TDS) for metals and other elements, including selenium.

152. The exposure estimates for women of childbearing age to selenium from the diet are presented in Table 2 for each food group and all food groups combined (referred to as “All” in Table 2). It should be noted, that where food groups are combined, this does not amount to the sum of exposures for all food groups but is the provision of statistical outputs from the distribution of exposure of consumers to selenium across all food groups.

153. Based on consumption of all food groups, the mean dietary exposure to selenium for women of childbearing age is 42 µg/person/day and 0.63 µg/kg bw/day. The high level (97.5th percentile) dietary exposure to selenium for women of childbearing age is 89 µg/person/day and 1.3 µg/kg bw/day.

154. Information on the commodities included within each food group can be found in Annex C, Table C1.

Table 2: Mean and 97.5th percentile (P97.5) chronic exposure to selenium from the diet for women of childbearing age (16-49 years) (NDNS years 1-11).

Food groups	**Number of consumers exposed to selenium from the food group**	**Mean (µg/ person/ day*)**	**P97.5 (µg/ person/ day*)**	**Mean (µg/ kg bw/day*)**	**P97.5 (µg/ kg bw/day*)**
Bread	2432	4.1	11	0.060	0.17
Misc Cereals	2508	6.9	20	0.10	0.30
Carcasse meat	1728	2.8	13	0.040	0.20
Offal	93	0.26	3.7	0.0039	0.055
Meat products	1750	2.5	11	0.036	0.16
Poultry	2004	5.9	21	0.088	0.33
Fish and seafood	1322	8.3	47	0.13	0.67
Fats and oils	454	0.019	0.18	0.00028	0.0025
Eggs	1393	4.3	21	0.063	0.32
Sugars and confectionary	1476	0.31	1.7	0.0047	0.027
Green vegetables	1410	0.22	1.2	0.0033	0.018

Potatoes	677	0.23	2.0	0.0035	0.028
Other vegetables	1977	1.2	6.7	0.017	0.11
Canned vegetables	1059	0.61	3.5	0.0091	0.056
Fresh fruit	512	0.074	0.75	0.0011	0.011
Fruit products	657	0.11	1.1	0.0018	0.016
Non-alcoholic beverages	1278	0.20	1.3	0.0030	0.020
Milk	1639	0.79	3.7	0.012	0.055
Dairy products	2089	1.6	6.1	0.024	0.093
Nuts and seeds	727	0.58	5.5	0.0090	0.085
Alcoholic beverages#	2	0.00091	0	0.000010	0
Meat alternatives	201	0.13	1.7	0.0019	0.027
Snacks	1255	0.15	1.2	0.0022	0.017
Desserts	824	0.29	2.3	0.0043	0.033
Condiments	2280	0.51	2.1	0.0076	0.031
****All**	**2556**	**42**	**89**	**0.63**	**1.3**

*Rounded to 2 significant figures.

** This is not a sum of all the individual groups.

There are very few consumers exposed to selenium from the alcoholic beverage food group as the large majority of the products within the group do not contain selenium. For this reason, it is possible for the 97.5th percentile to be 0.

Supplements

155. The exposure assessment for supplements assumes that a woman of childbearing age (16-49 years) would consume only one type of supplement and would follow the instructions on either the packaging or the website for the dosage (exposure assessment is based on the highest reported dosage).

156. An internet search was performed to collect information on commercially available selenium supplements on sale in the UK only. Details of the supplements identified from online research are presented in Annex E, Table E1. Multi-ingredient dietary supplements (MIDS) aimed at women and pregnant women (including pre-conception and post-partum) that are not specifically selenium supplements but contain selenium have been included.

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157. The selenium contents in the supplements that were considered in this assessment are summarised in Annex D, Table D1. These contained between 16.5 and 600 µg of selenium per daily dose. MIDS products generally contained lower concentrations of selenium than the selenium only supplements and therefore lower daily doses, especially those aimed at pregnant or breastfeeding women, or those looking to conceive.

158. Based on the range of recommended daily doses (16.5 - 600 µg of selenium), an exposure assessment has been performed using the average bodyweight of women of childbearing age from the NDNS (70.3kg) (years 1-11). These exposure estimates, from supplements, are presented in Table D2, Annex D. The range of exposure estimates from supplements alone are 0.23 to 8.5 µg/kg bw/day. These values have been rounded to 2 significant figures.

Combined Exposure Scenarios

159. It is possible that women of childbearing age may take a supplement containing selenium at varying dosages alongside their dietary intake of selenium. The scenarios included in this section aim to estimate exposure to selenium from the diet and from supplements for a range of consumers, including average and high-level consumers. These scenarios are as follows:

- Scenario 1: Mean consumer range – combines the range of exposure estimates for selenium intake from supplements with the mean dietary exposure estimate for selenium (‘All’ in Table 2), for women of childbearing age on a per day and per kg bodyweight per basis.
- Scenario 2: High-level consumer – combines the high-level exposure estimate for selenium intake from supplements (highest recommended daily dose) with the high-level dietary exposure estimate (97.5th percentile) for selenium (‘All’ in Table 2), for women of childbearing age on a per day and per kg bodyweight per basis.

160. The exposure estimates for these scenarios are presented in Table 3.

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Table 3: Exposure estimates for scenarios 1 and 2 (combining exposure estimates to selenium from the diet with exposure estimates from supplements)

Scenario	**Exposure estimates µg/ person/ day***	**Exposure estimates µg/ kg bw/day***
Scenario 1: average consumer range (range of supplementation and average diet)	59 – 640	0.86 – 9.1
Scenario 2: high-level consumer (highest supplementation and diet)	690	9.8

*Rounded to 2 significant figures.

Routes Other Than Food

161. Additional exposures to selenium from drinking water, soil and air were considered.

162. EFSA state that selenium is predominantly present in water as inorganic compounds mainly as selenate. As per the Directive (EU) 2020/2184, the parametric value for selenium in drinking water is 20 µg/L in the EU which can be increased to 30 µg/L in areas where geological conditions could lead to high selenium levels. The maximum legal parameters for selenium in the UK are 10 µg/L as defined in The Water Supply (Water Quality) Regulations 2016. Common estimates for drinking water consumption are that an adult may consume approximately 2L per day, meaning exposure could be up to an additional 0.28ug/kg bw/day (WHO, 2011)

163. Regarding exposure from air, information from a review on the toxicity of elemental selenium and selenium substances after pulmonary exposure; and environmental and occupational air concentrations, suggests that exposure to selenium from air is very low (2-400 ng/day) (Hadrup et al, 2025).

164. Selenium levels in soil from the UK Soil Observatory (UKSO) are reported as 0.92 to 1.46 mg/kg (90th percentile) (UKSO, 2026); this is also low.

165. Overall, exposure from supplements and the diet are the main sources of selenium. As water contributes a lesser amount and exposure from air and soil is negligible, their contribution to overall selenium exposure in women of childbearing age has not been considered further in this assessment.

Uncertainties

166. The following are uncertainties of the exposure assessment.

167. Some assumptions have been made where supplement dosage recommendations are varied. In cases where the dosage is given as a range (e.g. 1-3 capsules per day), the highest possible amount has been assumed to be consumed (e.g. 3 capsules per day). Also, where there is a discrepancy between the packaging image and website instructions, the highest dosage has been assumed e.g. if the website suggests a serving of 2 capsules a day, but the packaging suggests 3, then the highest suggestion has been used.

168. For many supplements listed the warnings provided on the website/ packaging recommend that pregnant or breastfeeding women consult a doctor before taking them, however, there is no guarantee that all of them do.

169. For the dietary intake assessment for selenium, a population-based assessment was performed. Within this dietary intake assessment, there were values of 0 for the 97.5th percentile estimates for “Alcoholic beverages”. This is possible because the large majority of alcoholic drinks do not contain selenium and so there are very few consumers exposed to selenium from this food group.

170. The “Alcoholic beverages” food group has been included in the assessment as the exposure assessment uses women of childbearing ages as a proxy and this consumption may differ to those who are pregnant or trying to conceive.

171. The NDNS does not include pregnant or breastfeeding women and so the nutrient assessment has been performed for women aged 16-49 (women of childbearing age). The diet of this population group may not be fully representative of the maternal diet.

172. In NDNS there is a reported 30% energy intake underestimation. There are many possible reasons for this, resulting from both misreporting and the survey design. However, exposure assessments at the 97.5th percentile are undertaken to ensure that high consumers are accounted for in the assessment, including those who may have mis-reported their energy intake.

173. The following uncertainties are applicable to studies identified from the evidence base including the additional literature search, post EFSA 2023.

174. There are limited human toxicology data in the target population (pregnant women). Much of the available evidence is derived from studies involving men, children or adults above childbearing age. This limits the applicability of findings to pregnant women and women of childbearing age.

175. Many studies have relatively small study populations. This may reduce statistical power and increase uncertainty in associations reported.

176. Studies investigating health effects of selenium in pregnant women or women of childbearing age often assess internal exposure through biomarkers (e.g. blood, serum or placental selenium concentrations) and don’t always report or measure selenium intakes from food or supplements. This limits the ability to evaluate the relationship between external exposure, internal dose, and any observed adverse effects.

177. There is potential confounding from co-exposure to other metals. Co-exposure to different metals is difficult to control, therefore it is difficult to isolate the specific contribution of selenium to the outcomes observed.

178. The mechanism(s) of toxicity for selenium are not fully understood and can vary according to the chemical form of selenium ingested. This increases uncertainty in interpretations of toxicological findings and associations.

179. Some studies rely on self-reporting of symptoms, which may be subject to reporting bias which may affect reliability of the findings.

180. Individual susceptibility to selenium toxicity may vary due to differences in genetics, nutritional status and selenium metabolism. Therefore, some individuals may experience adverse effects at lower selenium exposures than those identified in the available studies.

Risk Characterisation

181. For the purpose of this risk characterisation, a conservative approach has been taken, and exposures have been compared with the lowest UL as set by EFSA (2023) of 255 µg Se/day for adults ≥18 years, including pregnant and lactating women. This UL covers selenium intake from all dietary sources, including forms authorised for addition to foods and use in food supplements. The UL was derived from a LOAEL of 330 µg Se/day (130 µg/day from background diet plus supplemental intake of 200 µg/day) from the SELECT trial (Lippman et al, 2009), with the critical endpoint selected as alopecia.

182. Estimated exposures from food are 42 and 89 µg/person/day at the mean and the 97.5th percentile, respectively (Table 2). These exposures are below the UL of 255 µg Se/day established by EFSA and are therefore not considered to be a concern for pregnant women, women of childbearing age, or foetal development.

183. Combined exposures from food and supplementation range from 59 to 640 µg/ person/ day for the average consumer (scenario 1), and up to 690 µg/ person/ day for the high consumer (scenario 2) (Table 3). While some average consumers may have exposures that remain below the UL, exposures at the upper end of the average consumer range exceed the UL by

approximately 2.5-fold. Combined exposures for high consumers (scenario 2) exceed the UL by approximately 2.7-fold.

184. Overall, there are no estimated exceedances of the UL from dietary exposure alone. Estimated exceedances of the UL arise from combined exposures to selenium from food and supplements, driven by high levels of supplementation. Therefore, pregnant women and women of childbearing age who regularly consume high dose selenium supplementation may be at increased risk of adverse effects associated with excess selenium intake (selenosis). However, there is no current UK NHS recommendation for pregnant women to take selenium supplementation during pregnancy, therefore the proportion of pregnant women consuming high dose selenium supplements is uncertain.

Discussion

185. Selenium is an essential trace element required for the synthesis of selenoproteins that are involved in antioxidant defence, thyroid hormone metabolism, and selenium transport (EVM, 2003; Labunskyy et al., 2014), functions that are important during pregnancy for maternal and foetal health.

186. There is a narrow margin between adequate intake and excessive exposure with high exposures resulting in adverse effects, including selenosis, characterised by changes in hair (alopecia; hair loss, brittleness) and nails (dry, thickened, brittle, discoloured), garlic-like breath, skin lesions and neurological effects (EVM, 2003; CRN, 2025; IOM, 2000; Hubalewska-Dydejczyk et al, 2020; SCF, 2000).

187. The mechanisms underlying selenium toxicity are not fully established and may differ depending on the form of selenium compound involved (SCF, 2000; EVM, 2003). Proposed mechanisms include oxidative stress, depletion of glutathione, inhibition of protein synthesis, impaired methylation pathways, and substitution of sulphur by selenium in proteins (SCF, 2000; EVM, 2003; EFSA, 2023). EFSA (2023) considered oxidative stress to be the most likely

mechanism of toxicity, where excess selenium metabolites generated after saturation of selenium pathways result in formation of reactive oxygen species, leading to cell damage and cell death.

188. Direct evidence of selenium induced toxicity in pregnant women remains limited. No studies identified in the additional literature search directly linked excessive selenium exposure from the diet and supplements with toxicity in pregnant women or women of childbearing age. Although several observational studies reported associations between selenium status and outcomes such as reduced birth weight, reduced placental weight and gestational diabetes mellitus, these studies do not establish causality and do not provide clear evidence that adverse outcomes were attributable to excessive selenium intakes from food or supplements. Such studies were impacted by confounding variables, small study populations, potential reporting bias and limited reporting of selenium intakes from the diet.

189. Studies in fish species indicate that excessive selenium exposure can adversely affect reproduction and development. However, the relevance of these findings to humans is uncertain. Fish species are known to be highly sensitive to selenium toxicity because of bioaccumulation and maternal transfer of selenium to eggs, limiting the direct applicability of these findings to human pregnancy. Although these studies support the biological plausibility of developmental toxicity following excessive selenium exposure, they provide limited evidence for risks in humans.

190. Human evidence informing selenium toxicity thresholds is also subject to limitations. EFSA (2023) noted that many intervention studies were characterised by small sample sizes, high dropout rates and incomplete adverse event reporting. These limitations result in uncertainty when determining the selenium intake at which adverse effects may occur.

191. EFSA (2023) reviewed the NOAEL of 850 µg Se/day derived from Yang et al (1989b), which had previously been used by the SCF (2000) in

establishing health-based guidance values. EFSA concluded that evidence of selenium toxicity had been reported at intake levels below this level, indicating that the NOAEL may not adequately reflect current knowledge regarding selenium toxicity. However, the Panel also considered that studies published since Yang et al (1989b) were not suitable for deriving a new NOAEL. EFSA therefore established an UL of 255 µg Se/day for adults, including pregnant and lactating women, using a LOAEL of 330 µg Se/day from the SELECT trial based on alopecia, an early and recognised symptom of selenosis. While the SELECT trial reported increased incidences of alopecia and related effects at selenium intakes of approximately 330 µg/day, these findings were not consistently observed across other studies. Nevertheless, EFSA considered the SELECT trial to represent the most robust dataset available for deriving the UL. An uncertainty factor of 1.3 was applied to account for the use of a LOAEL rather than a NOAEL and the limited data available in women. The Panel considered the UL applicable to pregnant women as available evidence did not indicate sex-specific differences in susceptibility to selenium toxicity. Additionally, the EFSA review highlighted how there may be considerable inter-individual variability in susceptibility to selenium toxicity.

192. Estimated selenium exposures from food alone are 42 and 89 µg/person/day at the mean and 97.5th percentile, respectively, and are therefore well below the EFSA UL of 255 µg/day. These exposure estimates do not indicate a concern for pregnant women, women of childbearing age or foetal development. In contrast, combined exposures from food and supplements range from 59 to 640 µg/person/day for average consumers and up to 690 µg/person/day for high consumers. Exposures at the upper end of these ranges exceed the UL by approximately 2.5 to 2.7-fold, indicating that the potential for excessive exposure comes primarily from supplementation rather than dietary intake. Therefore, women who regularly consume high-dose selenium supplements may be at increased risk of adverse effects associated with excess selenium intake. However, there is currently no UK NHS recommendation for routine selenium supplementation during pregnancy, and the proportion of pregnant women consuming high dose

selenium supplements is unknown. It would therefore be prudent for pregnant women to consult an appropriately qualified health professional before consuming these supplements.

Conclusion

193. Dietary selenium exposures in women of childbearing age are well below the EFSA UL of 255 µg/day and therefore unlikely to be of concern for maternal health.

194. Combined exposures from food and high dose supplements may exceed the UL by up to 2.7-fold, suggesting that supplementation rather than dietary intakes of selenium are of concern.

195. Overall, direct evidence of selenium toxicity in pregnant women is limited however despite the lack of sex specific data for women, EFSA (2023) suggest from their review of the literature that there are no sex differences in susceptibility to selenium toxicity.

196. The available evidence supports the conclusion that adverse effects are more likely to occur from high dose selenium supplementation rather than from habitual dietary intake. Should pregnant women wish to consume selenium supplements during pregnancy, they should consult an appropriately qualified health professional.

Questions on which the views of the Committee are sought

i. Does the Committee have any comments on the discussion paper?
ii. Does the Committee agree on the use of the more conservative EFSA 2023 UL of 255 µg/person/day, or should the previous EVM UL of 400 µg /person/day be used for risk characterisation?
iii. Does the Committee agree with contents and structure of the discussion paper?

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iv. Does the Committee have any other comments

Secretariat

August 2026

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List of Abbreviations and Technical terms

ADI	Acceptable Daily Intake
ADME	Absorption, Distribution, Metabolism and Excretion
AI	Adequate Intake
ATSDR	Agency for Toxic Substances and Disease Registry
apoER2	Apolipoprotein E Receptor 2
BKMR	Bayesian Kernel Machine Regression
CI	Confidence Interval
COT	Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment
CRN	Council for Responsible Nutrition
DMSe	Dimethylselenide
DRI	Dietary Reference Intake
EFSA	European Food Safety Authority
EVM	Expert Group on Vitamins and Minerals
FAO	Food and Agriculture Organization of the United Nations
FSA	Food Standards Agency
GAM	Generalised Additive Model
GDM	Gestational Diabetes Mellitus
GPx	Glutathione Peroxidase
GPx1	Glutathione Peroxidase 1
GPx3	Glutathione Peroxidase 3
GSI	Gonadosomatic Index
HBGV	Health-Based Guidance Value
ICP-MS	Inductively Coupled Plasma Mass Spectrometry
IOM	Institute of Medicine
INMT	Indolethylamine N-Methyltransferase
LOAEL	Lowest Observed Adverse Effect Level
MeSeCys	Se-Methyl-Selenocysteine
MIDS	Multi-Ingredient Dietary Supplements
mtDNAcn	Mitochondrial DNA Copy Number

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NDB	Nutrient Databank
NDA Panel	Panel on Nutrition, Novel Foods and Food Allergens
NDNS	National Diet and Nutrition Survey
NHS	National Health Service
NHMRC	National Health and Medical Research Council
NOAEL	No Observed Adverse Effect Level
NRV	Nutrient Reference Value
PCR	Polymerase Chain Reaction
P97.5	97.5th Percentile
RCT	Randomised Controlled Trial
RNI	Reference Nutrient Intake
RR	Relative Risk
SACN	Scientific Advisory Committee on Nutrition
SCF	Scientific Committee on Food
Se	Selenium
SeCys	Selenocysteine
SelP	Selenoprotein P
SeMet	Selenomethionine
TMSe	Trimethylselenonium Ion
TDS	Total Diet Study
TL	Telomere Length
WBSe	Whole Blood Selenium
UKSO	UK Soil Observatory
UL	Tolerable Upper Intake Level
VC	Venous Cord
WHO	World Health Organization
UK	United Kingdom

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This is a paper for discussion. This does not represent the views of the Committee and should not be cited.

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Annex A to TOX/2026/31

Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment

Discussion paper on the effects of excess Selenium on maternal health

Literature Search

1. The literature search parameters included papers published between 1st January 2022 and 1st January 2026 and filtered for English language.

2. Generic searches across Google and Pubmed were made to research the toxicokinetics/toxicodynamics of Selenium and to gather general background information from regulatory bodies such as the European Food Safety Authority, Committee on Toxicity etc.

3. The following search terms were input into PubMed, and the relevant papers identified as well as references therein were cited in this paper:

Selenium and Toxicity
- Women
- Pregnancy
- Gestation
- Acute toxicity
- Chronic toxicity
- Reproductive toxicity
- Maternal
- Postnatal
- Lactation
- Fetus or Foetus
- Genotoxic

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Metabolites

Carcinogenicity

Selenosis

Placenta

Conception

Preconception

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Annex B to TOX/2026/31

Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment

Annex B: Discussion paper on the effects of excess Selenium on maternal health

Selenium Content in Foods

1. This annex provides a summary of the selenium content in the specific foods within the following food groups: nuts and seeds, offal, fish and crustaceans, milk and dairy products, meat and meat products, grains and vegetables and legumes. The selenium content is expressed in µg/100 g. UK sources of information on occurrence values have been used where possible. This table is for information only as the exposure assessment is based on a nutrient assessment for the maternal diet using National Diet and Nutrition Survey (NDNS) food consumption data.

2. Additionally, EFSA (2023) describe occurrence values for selenium in particular foods. Brazil nuts (*Bertholletia excelsa*) from samples collected across Brazil and the Amazon Basin have been reported to contain between 5 and 72 µg/g of selenium (mean ,dry weight), with up to 400 µg/nut, indicating large variability depending on region (Pacheco and Scussel, 2007; Cardoso et al., 2017). There may be high seed-to-seed variation in selenium content within commercially available batches of Brazil nuts (Lima et al., 2019). Selenium concentrations in offal's (e.g. mean content in kidney) from pig, lamb, and beef are reported to range from 1 - 3 µg/g. In fish and crustaceans, mean selenium concentrations have been reported to be between 1 - 3 µg/g in tuna, and 1 - 2 µg/g in shrimps, crabs, prawns (Anses, 2020; Public Health England, 2021; Finnish Institute for Health and Welfare, 2022).

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Table B1: Summary of reported selenium concentrations in foods identified as the main dietary sources of selenium.

Food	**Reported selenium content (µg /100g)*#**	**Reference**
Brazil nuts^	254	Brazil nuts, kernel only – nutrition
Pistachios	6	Pistachio nuts, kernel only, roasted and salted – nutrition
Cashews	29	Cashew nuts, kernel only, plain – nutrition
Peanuts	4	Peanuts, roasted and salted – nutrition
Chia seeds **	55	USDA ARS Nutrients - Seeds, chia seeds, dried
Flaxseeds **	25	USDA ARS Nutrients - Seeds, Flaxseed
Mustard seeds	'Significant'	Mustard seeds – nutrition Where a nutrient is present in significant quantities, but there is no reliable information on the amount, the value is represented as "Significant".
Sesame seeds	'Significant'	Sesame seeds – nutrition Where a nutrient is present in significant quantities, but there is no reliable information on the amount, the value is represented as "Significant".
Sunflower seeds	51	Sunflower seeds, toasted – nutrition
Beef liver	50	Liver, ox, stewed – nutrition
Pig liver	50	Liver, pig, stewed – nutrition
Lamb liver	42	Liver, lamb, raw – nutrition
Chicken liver	'Significant'	Liver, chicken, raw – nutrition Where a nutrient is present in significant quantities, but there is no reliable information on the amount, the value is represented as "Significant".
Kidney, pig	270	Kidney, pig, fried – nutrition
Kidney, lamb	209	Kidney, lamb, fried in corn oil – nutrition
Kidney, Beef	210	Kidney, ox, stewed – nutrition
Tuna, fresh	93	Tuna, flesh only, raw – nutrition
Tuna, canned	87	Tuna, canned in sunflower oil, drained - nutrition
Salmon, farmed	20	Salmon, farmed, flesh only, baked – nutrition
Salmon, wild	32	Salmon, wild, baked - nutrition
Salmon, canned	38	Salmon, red, canned in brine, skinless and boneless, drained - nutrition

Cod, fresh	44	Cod, flesh only, baked – nutrition
Cod, salted	52	Cod, dried, salted, boiled - nutrition
Sardines, fresh	65	Sardines, flesh only, grilled – nutrition
Sardines, canned	49	Sardines, canned in olive oil, drained - nutrition
Prawns	41	Prawns, king, grilled from raw – nutrition
Oysters	23	Oysters, raw – nutrition
Halibut	'Significant'	Halibut, flesh only, grilled – nutrition Where a nutrient is present in significant quantities, but there is no reliable information on the amount, the value is represented as "Significant".
Crab	225	Crab, brown meat, purchased cooked – nutrition
Lobster	54	Lobster, boiled – nutrition
Mackerel	60	Mackerel, flesh only, grilled – nutrition
Caviar	'Significant'	Caviare, bottled in brine, drained - nutrition Where a nutrient is present in significant quantities, but there is no reliable information on the amount, the value is represented as "Significant".
Eggs whole, chicken, cooked. Eggs, chicken, yolk, cooked. Eggs whole, duck, raw. Eggs whole, quail, raw.	27 64 'Significant' 'Significant'	Eggs, chicken, whole, fried, without fat – nutrition Eggs, chicken, yolk, boiled – nutrition Eggs, duck, whole, raw - nutrition Eggs, quail, whole, raw - nutrition Where a nutrient is present in significant quantities, but there is no reliable information on the amount, the value is represented as "Significant".
Cottage cheese	4	Cheese, cottage, plain – nutrition
Parmesan	12	Cheese, Parmesan, fresh – nutrition
Yogurt	3	Yogurt, Greek style, plain - nutrition
Beef	12	Beef, fore-rib/rib-roast, microwaved, lean - nutrition
Turkey	17-18	Turkey, whole, roasted, meat and skin - nutrition Turkey, drumsticks, roasted, meat and skin - nutrition Turkey, breast, fillet, grilled, meat only - nutrition
Chicken	15	Chicken, whole, roasted, meat and skin - nutrition Chicken, drumsticks, casseroled, meat and skin - nutrition Chicken, breast, grilled, meat and skin – nutrition

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Pork Ham	20 14	Pork, spare rib chops, braised, lean – nutrition Ham, gammon rashers, grilled - nutrition
Brown rice	10	Rice, brown, wholegrain, raw – nutrition
Wholemeal bread	7	Bread, wholemeal, average – nutrition
Wholewheat pasta	15	Pasta, wholewheat, spaghetti, dried, raw - nutrition
Wheatgerm	18	Wheatgerm – nutrition
Barley	1	Barley, pearl, raw - nutrition
Oats	3	Porridge oats, unfortified - nutrition
Mushrooms	24	Mushrooms, white, fried in corn oil – nutrition
Spinach	10 3	Spinach, dried – nutrition Spinach, baby, raw – nutrition
Lentils, red Lentils, green and brown	34 105	Lentils, red, split, dried, raw – nutrition Lentils, green and brown, whole, dried, raw - nutrition
Red kidney beans	16	Beans, red kidney, dried, raw – nutrition
Tofu	‘Significant’	Tofu, soya bean, steamed – nutrition
Marrowfat peas	‘Significant’	Peas, marrowfat, canned, re-heated, drained – nutrition

^ High variability dependent on region of production (Pacheco and Scussel, 2007; Cardoso et al., 2017).

*Where nutridex contained data for more than one type of food i.e. salted and unsalted peanuts, the food with the highest selenium content was listed in this table.

** Where data for foods such as chia seeds are not available in UK based nutridex, US sources have been used.

Rounded to the nearest whole number.

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Annex C to TOX/2026/31

Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment

Annex C: Discussion paper on the effects of excess Selenium on maternal health

Food group information

1. The table in this section defines the foods included in each food group used for the exposure assessment as descriptors in order to provide more insight into the groups. It does not provide all of the individual food codes and recipes included in the dataset.

2. Bottled water and tap water were not included in the assessment in section 3.2.

3. These are based on the food groups from the 2014 TDS but have been updated to meet the requirements of the exposure assessment team at the FSA. (Total diet study: metals and other elements | Food Standards Agency)

Table C1: TDS Food group commodities.

Food group	Descriptor	Commodities included
1	Bread	White sliced bread; white unsliced bread; brown bread; wholemeal and granary bread; other bread
2	Miscellaneous cereals	Flour; buns, cakes and pastries; savoury biscuits; sweet biscuits; chocolate biscuits; breakfast cereals; rice; other cereal products; pizza; pasta
3	Carcasse meat	Beef; lamb; pork; including joints and other cuts of raw and cooked meats
4	Offal	Lambs liver; pigs liver; other liver; kidney; other offal (excluding kidney and liver)
5	Meat products	Corned meat; other canned or cooked meats; other sausages; ready to eat meat products; meat-based ready meals; meat-based takeaways; other meat products; burgers; homemade meat-based meals
6	Poultry	Chicken (raw); other poultry (raw); cooked poultry; poultry products including meals, ready meals, takeaways

7	Fish and seafood	White fish; fatty fish; shellfish; canned salmon; other canned/ bottled fish; fish-based ready meals and fish products; takeaway fish-based meals
8	Fats and oils	Fat spreads or blended spreads; reduced fat spreads or blended spreads; low/ light fat spreads or blended spreads; vegetable oils; lard; other fats
9	Eggs	Eggs; egg products
10	Sugars and confectionary	Sugar; jam and fruit curds; marmalade; syrup, honey, treacle, maple syrup; jelly; chocolate confectionary; sugar confectionary
11	Green vegetables	Cabbage; sprouts; lettuce and leafy salads; peas; green beans; other fresh green vegetables
12	Potatoes	Fresh potatoes; potato products
13	Other vegetables	Onions, leeks; carrots; turnip, swedes; other fresh vegetables; mushrooms; tomatoes; other vegetables; dried pulses; herbs, spices; vegetable-based ready meals; dried soups
14	Canned vegetables	Canned, carton or jarred soups; canned or jarred tomatoes; canned or jarred peas; canned or jarred beans; other canned or jarred vegetables
15	Fresh fruit	Oranges; other citrus fruits; apples; pears; stone fruit; bananas; grapes; other fresh fruit
16	Fruit products	Dried fruit; fruit juices and vegetables juices; canned peaches, pears, pineapples; other canned or frozen fruit
17	Non-alcoholic beverages	Tea; takeaway tea; instant coffee; ground coffee; branded food drinks; cocoa, drinking chocolate; concentrated soft drinks; ready to drink soft drinks; alternatives to milk; carbonated soft drinks
18	Milk	Whole (full fat) milk (cows); skimmed/ semi-skimmed milks (cows); condensed or evaporated milk; instant milk; milk from other animals (e.g. goat)
19	Dairy products	Natural cheese; processed cheese butter; ice cream; yoghurt; other milk products; cream; canned milk puddings; drinks made with milk
20	Nuts and seeds	Ground nuts including peanut butter; tree nuts; coconut; seeds (e.g. sunflower)
21	Alcoholic beverages	Beer; cider; wine; alcopops and cocktails; spirits
22	Meat alternatives	Vegetarian meat alternatives including bean burgers, Quorn products, nut roasts, soya products and other meat alternatives.
23	Snacks	Potato crisps and potato-based snacks; other snacks (not potato-based) including maize-based snacks, popcorn, pork scratchings, pretzels
24	Desserts	Desserts (unfrozen); desserts (frozen including ice cream)

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25	Condiments	Meat or yeast extracts; spreads, dressings; pickles, sauces including powdered
26	Tap water	Tap water only
27	Bottled water	Still or carbonated water, flavour water without sugar

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Annex D to TOX/2026/31

Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment

Annex D: Discussion paper on the effects of excess Selenium on maternal health

Selenium Supplement Contents and Supplement Exposures

1. This annex provides two tables. Table D1 presents a summary of the selenium contents in supplements that were considered in the exposure assessment. Table D2 presents the exposure assessment, performed using the average bodyweight of women of childbearing age from the NDNS (70.3kg) (years 1-11).

Table D1: Dosage information for some selenium supplements (selenium only and MIDS), as sold by UK online retailers at the time of the assessment.

Supplement name*	**Supplement type**	**Maximum recommended daily serving**	**Selenium concentration per unit (capsule/ tablet/ scoop etc) (µg)**	**Selenium concentration from a daily serving (maximum serving size**) (µg)**
Grape Tree Selenium 200mg 240 Tablets	Tablet – Selenium only	1 tablet	200	200
Selenium Supplements | 200mcg (40mg L-Selenomethionine)	Tablet– Selenium only	1 tablet	200	200
Liquid Selenium Supplement – BodyBio UK	Liquid– Selenium only	1.25 ml	300	300
Selenium 200mcg Tablets - YrHealth	Tablet– Selenium only	1 tablet	200	200

BioCare Selenium vegetable capsules	Capsule– Selenium only	1 capsule	100	100
Ionic Selenium Supplement 100ml	Liquid– Selenium only	10 drops	57.5	57.5
Eidon Ionic Minerals, Selenium, Liquid Concentrate	Liquid– Selenium only	30 drops	260	260
Viridian Selenium Vegicaps	Capsule – selenium only	3 Capsules	200	600
Ultra Selenium tablets, Vitabiotics	Tablet-MIDS	1 tablet	165	165
Selenium 200mcg & ACE RDA Tablets	Tablet-MIDS	2 tablets	200	400
Biotin Hair Growth Vitamins 12,000mcg D-Biotin Tablets Enriched with Zinc & Selenium	Tablet-MIDS	2 tablets	30	60
Boots Selenium with Vitamins A, C and E	Tablet-MIDS	1 tablet	100	100
ThyroAid - Thyroid Support Supplement	Capsule-MIDS	2 capsules	100	200
Selenium + Vitamins A, C and E	Tablet-MIDS	1 tablet	100	100
Lamberts Selenium 200µg plus Vitamins A + C + E (100)	Tablet-MIDS	1 tablet	200	200
Wild Nutrition Food Grown Daily Multi Nutrient for Women	Capsules - MIDS	2 capsules	50	100
Holland & Barrett Conception & Pregnancy Support	Tablets - MIDS	1 tablet	27.5	27.5
Bassetts Vitamins Pregnancy + Omega 3 DHA Multivitamins &	Pastilles - MIDS	1 pastille	16.5	16.5

Multiminerals Strawberry & Orange 30 Pastilles				
Inessa advanced multivitamin	Tablets - MIDS	1 tablet	55	55
Cytoplan women's wholefood multivitamin capsules	Capsules - MIDS	2 capsules	75	150
Seven Seas Omega-3 and Multivitamins	Tablets - MIDS	1 tablet	75	75
Boots a-z Vitamins and minerals	Tablets - MIDS	1 tablet	55	55
Nutravita multivitamins	Tablets - MIDS	1 tablet	55	55
Swallow multivitamin	Tablets - MIDS	2 tablets	27.5	55
Holland and Barrett Ultra woman	Caplets - MIDS	1 caplet	100	100
WeightWorld Multivitamin and Mineral	Tablets - MIDS	1 tablet	55	55
Vitabiotics Pregnacare 60 Vegan Gummies	Gummy - MIDS	2 gummies	15	30
Neu Mum Daily Pregnancy Multivitamin	Capsule - MIDS	1 capsule	30	30
Vitabiotics Pregnacare Conception Tablets	Tablet - MIDS	1 tablet	50	50
Vitabiotics Pregnacare Max	Tablet - MIDS	2 tablets	27.5	55
Vitabiotics Pregnacare Breastfeeding Tablets	Tablet - MIDS	2 tablets	15	30
PROCEIVE® Women Advanced Fertility Supplement	Capsule - MIDS	2 capsules	100	200
Sainsbury's Pregnancy Plus Essential Vitamins	Tablet - MIDS	2 tablets	37.5	75

Free Soul Women's Multivitamins with collagen	Tablet - MIDS	2 tablets	27.5	55
Free soul Hair Skin & Nails Gummies	Gummy - MIDS	2 gummies	27.5	55
Proceive Pregnancy Supplement Trimester 1	Capsule - MIDS	2 capsules	100	200
Vitabiotics Pregnacare Him & Her Conception	Tablet - MIDS	1 tablet	50	50
Vitabiotics Pregnacare Original	Tablet - MIDS	1 tablet	30	30
Vitabiotics Pregnacare Liquid Pregnancy Vitamins	Liquid - MIDS	10ml (2 tsp)	15	30
Vitabiotics Wellwoman Multivitamin Gummies for Women	Gummy - MIDS	3 gummies	18.3	55
Vitabiotics Wellwoman Original Multivitamin for Women	Capsules - MIDS	1 capsule	100	100
Vitabiotics Wellwoman Plus	Tablets - MIDS	1 tablet	110	110
Vitabiotics Wellwoman Max	Tablet-MIDS	1 tablet	100	100
Centrum women	Tablet-MIDS	1 tablet	30	30

* Some supplement names specify different units (mg) or concentrations, this is an error by the manufacturer/retailer or relates to other nutrients. All concentrations are expressed in µg. Information on this has been added to the additional information column of E1.

** Maximum serving assumes the maximum amount recommended on the packaging or website of the supplement. E.g. if recommended to take 1-2 capsules per day, this table assumes 2 capsules would be taken. Another

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example is if the website suggests a serving of 2 capsules a day, but the packaging suggests 3, then the highest suggestion has been used.

Table D2: Exposure estimates for women of childbearing age (16-49 years) to selenium from some supplements (Selenium only and MIDS), as sold in UK online retailers at the time of the assessment.

Supplement name	**Supplement type**	**Selenium concentration in a daily serving (maximum serving size^) (µg)**	**Exposure to Selenium (maximum daily serving) (µg/ kg bw/day) ***
Grape Tree Selenium 200mg 240 Tablets	Tablet – Selenium only	200	2.8
Selenium Supplements | 200mcg (40mg L-Selenomethionine)	Tablet– Selenium only	200	2.8
Liquid Selenium Supplement – BodyBio UK	Liquid– Selenium only	300	4.3
Selenium 200mcg Tablets - YrHealth	Tablet– Selenium only	200	2.8
BioCare Selenium vegetable capsules	Capsule– Selenium only	100	1.4
Ionic Selenium Supplement 100ml	Liquid– Selenium only	57.5	0.82
Eidon Ionic Minerals, Selenium, Liquid Concentrate	Liquid– Selenium only	260	3.7
Viridian Selenium Vegicaps	Capsule – selenium only	600	8.5
Ultra Selenium tablets, Vitabiotics	Tablet-MIDS	165	2.3
Selenium 200mcg & ACE RDA Tablets	Tablet-MIDS	400	5.7
Biotin Hair Growth Vitamins 12,000mcg D-Biotin Tablets Enriched with Zinc & Selenium	Tablet-MIDS	60	0.85
Boots Selenium with Vitamins A, C and E	Tablet-MIDS	100	1.4

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Supplement name	Supplement type	Selenium concentration in a daily serving (maximum serving size^) (µg)	Exposure to Selenium (maximum daily serving) (µg/ kg bw/day) *
ThyroAid - Thyroid Support Supplement	Capsule-MIDS	200	2.8
Selenium + Vitamins A, C and E	Tablet-MIDS	100	1.4
Lamberts Selenium 200µg plus Vitamins A + C + E (100)	Tablet-MIDS	200	2.8
Wild Nutrition Food Grown Daily Multi Nutrient for Women	Capsules - MIDS	100	1.4
Holland & Barrett Conception & Pregnancy Support	Tablets - MIDS	27.5	0.39
Bassetts Vitamins Pregnancy + Omega 3 DHA Multivitamins & Multiminerals Strawberry & Orange 30 Pastilles	Pastilles - MIDS	16.5	0.23
Inessa advanced multivitamin	Tablets - MIDS	55	0.78
Cytoplan women's wholefood multivitamin capsules	Capsules - MIDS	150	2.1
Seven Seas Omega-3 and Multivitamins	Tablets - MIDS	75	1.1
Boots a-z Vitamins and minerals	Tablets - MIDS	55	0.78
Nutravita multivitamins	Tablets - MIDS	55	0.78
Swallow multivitamin	Tablets - MIDS	55	0.78
Holland and Barrett Ultra woman	Caplets - MIDS	100	1.4
WeightWorld Multivitamin and Mineral	Tablets - MIDS	55	0.78
Vitabiotics Pregnacare 60 Vegan Gummies	Gummy - MIDS	30	0.43
Neu Mum Daily Pregnancy Multivitamin	Capsule - MIDS	30	0.43
Vitabiotics Pregnacare Conception Tablets	Tablet - MIDS	50	0.71
Vitabiotics Pregnacare Max	Tablet - MIDS	55	0.78

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Supplement name	**Supplement type**	**Selenium concentration in a daily serving (maximum serving size^) (µg)**	**Exposure to Selenium (maximum daily serving) (µg/ kg bw/day) ***
Vitabiotics Pregnacare Breastfeeding Tablets	Tablet - MIDS	30	0.43
PROCEIVE® Women Advanced Fertility Supplement	Capsule - MIDS	200	2.8
Sainsbury's Pregnancy Plus Essential Vitamins	Tablet - MIDS	75	1.1
Free Soul Women's Multivitamins with collagen	Tablet - MIDS	55	0.78
Free soul Hair Skin & Nails Gummies	Gummy - MIDS	55	0.78
Proceive Pregnancy Supplement Trimester 1	Capsule - MIDS	200	2.8
Vitabiotics Pregnacare Him & Her Conception	Tablet - MIDS	50	0.71
Vitabiotics Pregnacare Original	Tablet - MIDS	30	0.43
Vitabiotics Pregnacare Liquid Pregnancy Vitamins	Liquid - MIDS	30	0.43
Vitabiotics Wellwoman Multivitamin Gummies for Women	Gummy - MIDS	55	0.78
Vitabiotics Wellwoman Original Multivitamin for Women	Capsules - MIDS	100	1.4
Vitabiotics Wellwoman Plus	Tablets - MIDS	110	1.6
Vitabiotics Wellwoman Max	Tablet-MIDS	100	1.4
Centrum women	Tablet-MIDS	30	0.43

* Some supplement names specify different units (mg) or concentrations, this is an error by the manufacturer/retailer or relates to other nutrients. All concentrations are expressed in µg. Information on this has been added to the additional information column of Table E1.

^ Maximum serving assumes the maximum amount recommended on the packaging or website of the supplement. E.g. if recommended to take 1-2 capsules per day, this table assumes 2 capsules would be taken. Another

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example is if the website suggests a serving of 2 capsules a day but the packaging suggests 3, then the highest suggestion has been used.

* Rounded to 2 significant figures.

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Annex E to TOX/2026/31

Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment

Annex E: Discussion paper on the effects of excess Selenium on maternal health

Complete Supplement Search

1. The Exposure Assessment Team (EAT) have conducted an internet search using the search term '*Selenium supplements UK'* to perform a market analysis of the commercially available selenium supplements on sale in the UK only. EAT have summarised this information into tables in this section. MIDS aimed at women and pregnant women (including pre-conception and post-partum) that are not specifically selenium supplements but contain selenium have been included. It is important to note that EAT have only provided quantitative information for the concentration of selenium in the tables in this section. Any other ingredients may be noted qualitatively but no further information on their concentration has been provided or used within the exposure assessment.

2. The context of the COT paper is the maternal diet and so selenium supplements and MIDS products intended for use by pregnant or breastfeeding women have been considered, as well as those intended for the general population. This includes products which recommend that pregnant or breastfeeding women consult a doctor before use. However, any products which actively advise against use by pregnant or breastfeeding women have been excluded.

3. Table E1 provides a full list of selenium supplements (selenium only and MIDS) with source information. Where the Selenium content was provided on the packaging and/ or website, calculations have been performed

to provide the maximum recommended daily serving in µg per person per day. Depending on information on the product label, the maximum daily serving was calculated based on the assumption that the supplement is consumed at the maximum recommended daily intake.

4. It should be noted that some supplement names specify different units (mg) or concentrations that may differ to the units (µg) or concentrations given for the dosage in Table D1 and Table E1. This is an error by the manufacturer/retailer or relates to other nutrients. All concentrations are expressed in µg. This is noted in the footnotes of both tables and where issues are noted with this, information has been added to the additional information column of Table E1.

Table E1: Full list of selenium supplements (selenium only supplements and MIDS)

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
Grape Tree Selenium 200mg	Grape Tree Selenium 200mg 240 Tablets | Vitamins & Supplements | Grape Tree	Tablets - Selenium only	Take 1 tablet daily	200 µg daily (200 µg per tablet)	Bulking Agents (Dicalcium Phosphate DC, Microcrystalline Cellulose), L-Selenomethionine 0.5% (Dicalcium Phosphate), Anti-Caking Agent (Magnesium Stearate, Silicon Dioxide), Glazing Agents (Poldextrose, Hydroxypropyl Methylcellulose, Maltodextrin, Calcium Carbonate (Mineral), Guar Gum, Medium Chain Triglycerides).	Made in a facility that handles milk, egg and soya. While every care is taken to ensure that our product information is correct, food products and recipes are constantly being reformulated meaning that ingredients, allergens, dietary and nutritional content may change from time to time. Given this fact you should always read the product label and not rely solely on the information provided on web listings. Suitable for Vegetarians and Vegans. Free From: artificial flavours, colours or sweetener. The product name on the website states and product description 200 mg however the

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
						packaging and nutritional information states that the selenium content is 200 µg.
Selenium Supplements | 200mcg (40mg L-Selenomethionine)	Selenium Supplements | 200mcg (40mg L-Selenomethionine) | 365 Selenium Tablets | 1 a Day | 8mm Tablet | Vegan & Non-GMO | Magnesium Stearate Free : Amazon.co.uk: Health & Personal Care	Tablets - Selenium only	Take 1 tablet daily, preferably with a meal or as directed by your healthcare practitioner.	200 µg daily (200 µg per tablet)	Selenium (as L-Selenomethionine), Bulking Agents: Microcrystalline Cellulose and Dicalcium Phosphate, Anti-Caking Agent: Silicon Dioxide.	Do not exceed the recommended daily dose. Food supplements must not be used as a substitute for a varied and balanced diet and a healthy lifestyle. If you are pregnant, breastfeeding, taking any medications or are under medical supervision, please consult a healthcare professional before use. Discontinue use if any adverse reactions occur. Not intended for use by persons under the age of 18.
Liquid Selenium Supplement – BodyBio UK	Liquid Selenium Supplement | Liquid Minerals | BodyBio – BodyBio UK	Liquid – Selenium only	As a mineral supplement, add 25 drops (1.25 mL) in water or juice daily, or more as directed by a licensed Healthcare. 47	300 µg daily (300 µg per 1.25 mL)	Ionic Sea Minerals Concentrate 350 mg Other Ingredients: Purified water, non-GMO citric acid, potassium benzoate. Sodium selenate	Shake well. Do not refrigerate.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
			servings per container (59 mL)			
Selenium 200mcg Tablets - YrHealth	Selenium 200mcg Tablets - 180 Vegan Society Registered Pills, for Thyroid and Immune Health, Hair, Skin and Nails - 6 Month Supply Tablets Not Capsules - Made in The UK by YrHealth : Amazon.co.uk: Health & Personal Care	Tablets - Selenium only	Take 1 Tablet per day or as directed by your Healthcare Practitioner with food and water	200 µg daily (200 µg per tablet)	L-Selenomethionine (Dicalcium Phosphate), Bulking Agents (Dicalcium Phosphate, Microcrystalline Cellulose), Anti-Caking Agents (Magnesium Stearate, Silicon Dioxide), Glazing Agents (HydroxyPropylMethyl-Cellulose, Glycerin, Carnauba Wax).	Do not exceed the recommended amount. Not intended for use by persons under the age of 18 • Food supplements should not be used as a substitute for a varied and balanced diet and healthy lifestyle • Always consult your Healthcare Practitioner before taking food supplements • If you are pregnant, planning to become pregnant, breastfeeding, taking any prescription medication or have a medical condition consult your Healthcare Practitioner before taking this product • In the event of an adverse reaction discontinue use and contact your Healthcare Practitioner immediately.
BioCare Selenium vegetable capsules	Selenium Supplement Capsules | BioCare	Capsules - Selenium only	1 capsule taken daily with food, or as professionally directed.	100 µg daily (100 µg per capsule)	Bulking Agent (Cellulose), Capsule Shell (Hydroxypropyl Methylcellulose), L-Selenomethionine Anti-	If you are under medical supervision, please consult a doctor before use. This product should

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Caking Agents (Silicon Dioxide & Magnesium Stearate).	not be used as a substitute for a varied diet and healthy lifestyle. Do not exceed the stated recommended daily intake. Do not purchase if the seal is broken. Keep out of reach of children. Store in a cool, dry place.
Ionic Selenium Supplement 100ml	Ionic Selenium | Metabolics	Liquid – selenium only	Recommended dose 10 drops per day in water with food. 181 servings per 100 ml so a 10 drop serving equates to 0.55 ml.	57.5 µg daily (57.5 µg per serving of 10 drops)	Ingredients: Purified water, sodium selenate	Do not exceed the recommended dose, Consumer within 3 months of opening. Warning: If pregnant or breast feeding consult your healthcare practitioner before using. This product should not be used as a substitute for a varied diet. Storage: Store in a refrigerator out of reach of children.
Eidon Ionic Minerals, Selenium, Liquid Concentrate	Eidon Ionic Minerals, Selenium, Liquid Concentrate, 2 oz (60 ml)	Liquid – selenium only	30 drops / 2 ml (2 dropper squeezes) per day in water.	260 µg daily (260 µg per 2 ml)	Selenium (as sodium selenate) Other ingredients: De-ionized water.	Store at room temperature, tightly closed. Keep out of reach of children. Do not freeze.
Viridian Selenium Vegicaps	Viridian Selenium - 30 x 200mcg Vegicaps	Capsules – selenium only	As a food supplement, take one to three vegicaps daily with food, or as directed by	600 µg daily (200 µg per capsule)	Selenium (methionine), Viridian bilberry extract, alfalfa, spirulina blend, Vegetable cellulose capsule	None listed

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
			your healthcare professional.			
Ultra Selenium tablets, Vitabiotics	Ultra Selenium Tablets | Selenium Supplement | Vitabiotics®	Tablets – MIDS	One tablet per day with your main meal Swallow with water or a cold drink.	165 µg daily (165 µg per tablet)	Bulking Agents: Microcrystalline Cellulose &Dibasic Calcium Phosphate, Vitamin C (Ascorbic Acid),Maltodextrin, Vitamin E (D Alpha Tocopheryl Acid Succinate)(from Soya), Tablet Coating (Hydroxypropylmethylcellulose,hydroxypropylcellulose, Medium Chain Triglyceride, Colours[Calcium Carbonate, Iron Oxides]), Anti-Caking Agents:[Calcium Carbonate, Iron Oxides]), Anti-Caking Agents:Silicon Dioxide, Magnesium Stearate & Purified Talc,Polyvinylpyrrolidone, Polyvinylpolypyrrolidone, Acai DryExtract (Acai), Sodium Selenate.	Not to be chewed. Do not exceed the recommended intake. A regular intake is recommended. Food supplements must not replace a varied and balanced diet and a healthy lifestyle. As with other food supplements, consult your doctor or pharmacist before using if you are under medical supervision, pregnant, breast-feeding, have epilepsy, suffer from food allergies, or are allergic to any of the ingredients. Made in a site that may handle nuts. Not suitable for children.
Selenium 200mcg & ACE RDA Tablets	Selenium 200mcg & ACE RDA Tablets – Supplemented	Tablets – MIDS	Take one to two tablets daily. Take as a food supplement or as directed by a healthcare	400 µg daily (200 µg per tablet)	Vitamin A (as Beta-Carotene) 800mcg, Vitamin C 60mg, Vitamin E 10mg, Selenium 200mcg Other Ingredients: Dicalcium Phosphate,	If you are taking any prescribed medication or have any medical conditions always consult your doctor or pharmacist before taking vitamins or

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Microcrystalline Cellulose, Magnesium Stearate. Sodium Selenate	supplements. Keep out of sight and reach of young children. Do not exceed stated recommended intake. Food supplements must not be, and are not intended to be used as a substitute for a varied and balanced diet and a healthy lifestyle. Store in a cool, dry place. If you experience an adverse reaction, stop taking the supplement and seek medical advice. This product is not intended to diagnose, treat, cure, or prevent any disease. The packaging states 1 tablet per day but the website instructions state 1 to 2 so the highest was chosen/
Biotin Hair Growth Vitamins 12,000mcg D-Biotin Tablets Enriched with Zinc & Selenium	Biotin Hair Growth Vitamins 12,000mcg D-Biotin Tablets Enriched with Zinc & Selenium	Tablets – MIDS	Take 2 tablets per day with water and food. Do not exceed stated dosage.	60 µg daily (30 µg per tablet)	Bulking agent (microcrystalline cellulose) Zinc citrate, D-Biotin, Anti-caking agent (magnesium stearate) sodium selenite	Do not exceed stated dose. If you are pregnant, breastfeeding, taking prescription medication or under medical supervision it is advisable to consult a GP prior to

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
						taking any supplements. This product is not intended to treat, cure or prevent any disease. Discontinue use and consult a GP if adverse reactions occur. Not suitable for persons under the age of 18. Keep out of reach of children at all times. Do not use if seal is broken. Food supplements should not be used as a substitute for a balanced diet and healthy lifestyle. This product is not intended to treat, cure or prevent any disease. The value in the name of the product (12,000 mcg) is in relation to Biotin content and not selenium.
Boots Selenium with Vitamins A, C and E	Boots Selenium with Vitamins A, C and E 60 Tablets (2 month supply) - Boots	Tablets – MIDS	Take 1 tablet a day with plenty of liquid. Do not exceed the daily dose.	100 µg daily (100 µg per tablet)	Calcium Carbonate, Ascorbic Acid, Maltodextrin, Vitamin E Acetate, Modified Maize Starch, Silicon Dioxide, Hydroxypropylmethylcellulose, Stearic Acid, Magnesium Stearate,), Vitamin A Acetate,	Food supplements are intended to supplement the diet and should not be substituted for a varied diet or healthy lifestyle. Before taking this product please

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Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Talc, , Antioxidants (Tocopherol, Tartaric Acid), Sodium Selenite.	consult your doctor or pharmacist if you are taking any medication or are pregnant, breastfeeding or trying to become pregnant. Not suitable for children under 12. Keep out of the sight and reach of children. Store in a cool dry place away from children. Do not use is seal is broken.
ThyroAid - Thyroid Support Supplement	ThyroAid #1 Thyroid Support Supplement | Premium Thyroid Formula & Energy Support with Kelp, Iodine, Ashwagandha, Selenium, B12, Copper & More | 60 Capsules (Non-GMO) : Amazon.co.uk: Health & Personal Care	Capsules - MIDS	Take 2 capsules daily preferably with meals or as directed by health care professional.	200 µg daily (100µg per capsule)	Vitamin B-12, Iodine (from Kelp), Magnesium, Zinc, Selenium, Copper, Manganese, Molybdenum, L-Tyrosine, Schisandra powder, Ashwagandha, Bladderwrack, Cayenne pepper, Kelp, Rice flour, gelatin, vegetable magnesium stearate, silicon dioxide, chlorophyll.	Caution: Food supplements should not be used as a substitute for a varied diet. Do not exceed recommended dose. Pregnant or nursing mothers, children under 18 and individuals with a known medical condition should consult a physician before using this or any food supplement. This product is manufactured and packaged in a facility which may also process milk, soy, wheat, egg,

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
						peanuts, tree nuts, fish and crustacean shellfish.
Selenium + Vitamins A, C and E	Selenium + Vitamins A, C and E Woods Health Supplements And Vitamins	Tablet - MIDS	Take 1 tablet daily with food.	100 µg daily (100 µg per tablet)	Dicalcium Phosphate, Ascorbic Acid, Starch, DL-Alpha Tocopherol Acetate, Cross-linked Carboxymethyl Cellulose, Polyvinyl Pyrrolidone, Coating (Hydroxypropyl Methyl Cellulose, Calcium Carbonate, Polydextrose, Talc, Maltodextrin, Medium Chain Triglyceride, Colour: Iron Oxide Yellow), Retinyl Acetate, Silicon Dioxide, Magnesium Stearate, Sodium Selenate.	Food supplements must not replace a varied diet. If you are taking prescribed medication, or have any medical conditions, please consult your doctor before taking food supplements. This product contains Vitamin A. Do not take if you are pregnant or likely to become pregnant except on the advice of a doctor or antenatal clinic. Do not exceed the recommended intake. Store below 25°C in a dry place, out of sight and reach of children.
Lamberts Selenium 200µg plus Vitamins A + C + E	Lamberts Selenium 200µg plus Vitamins A + C + E (100)	Tablets – MIDS	1 tablet daily	200 µg daily (200 µg per tablet)	Vitamin A 450µg, Vitamin E 30mg, Vitamin C 90mg and Selenium (as Seleno L-Methionine) 200µg. Tableted with: DiCalcium Phosphate, Cellulose, Crosslinked Cellulose Gum, Silicon Dioxide, Stearic Acid, Magnesium Stearate.	Suitable for vegetarians.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
Wild Nutrition Food Grown Daily Multi Nutrient for Women	Food-Grown Women's Daily Multi Nutrient | Multivitamins For Women	Capsules – MIDS	Take 2 capsules per day, morning or night; they can be taken with or without food. We advise leaving a minimum 2-hour interval after taking any medication before taking your supplements. Store in a cool, dry place away from direct sunlight.	100 µg daily (50 µg per capsule)	Lithothamnium Calcareum (Red algae) powder (providing Calcium), Nutrientenhanced Yeast (providing Selenium, Inositol, Boron, Iron, GTF Chromium, Niacin, Manganese, Riboflavin, Vitamin B6, CoEnzyme Q10, Choline, Biotin, Folic acid [as naturally occuring Folate], Thiamin, Molybdenum, Iodine, Vitamin K1, Vitamin B12 and Vitamin D3), Nutrient-enhanced Lactobacillus Bulgaricus (providing Zinc, Copper and Pantothenic acid), Vegetable cellulose (capsule shell), Purified Seawater (providing Magnesium), Citrus pulp (providing Vitamin C and Bioflavonoids), Carrot concentrate (providing Betacarotene), Betaine Hydrochloride, Turmeric powder, Cordyceps Sinensis powder, Nutrient-enhanced Yellow Pea (Pisum sativum) preparation (providing	CAUTIONARY ADVICE: If you are pregnant, breastfeeding, taking medication or under medical supervision, consult your doctor before taking any food supplement. We advise taking your supplements a minimum of 2 hours after taking any medication. Do not exceed the recommended intake. Keep out of sight and reach of children.Do not take if seal broken. Food supplements are not to be used as a substitute for a varied, balanced diet and healthy lifestyle.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Vitamin E) and Alpha Lipoic acid.	
Holland & Barrett Conception & Pregnancy Support	Conception & Pregnancy Support - 30 Tablets | Holland & Barrett	Tablets – MIDS	Take 1 tablet per day, preferably with a meal. Do not exceed stated dose.	27.5 µg daily (27.5 µg per tablet)	Calcium Carbonate, Bulking Agents (Microcrystalline Cellulose, Dicalcium Phosphate), Magnesium Oxide, Vitamin C (L-Ascorbic Acid), Ferrous Fumarate, Choline Bitartrate, Zinc Citrate, Glazing Agents (Hydroxypropyl Methyl Cellulose, Hydroxypropyl Cellulose), Anti-Caking Agents (Magnesium Salts of Fatty Acids, Silicon Dioxide), Beta-Carotene, Niacin (Nicotinamide), Pantothenic Acid (D-Pantothenate, Calcium), Vitamin B6 (Pyridoxine Hydrochloride), L-Selenomethionine, Vitamin E (D-Alpha-Tocopheryl Acid Succinate), Ginger Root Extract (Zingiber officinale), Vitamin D3 (Cholecalciferol), Vitamin B1 (Thiamin Mononitrate), Cupric Sulphate, Vitamin K1 (Phytomenadione), Vitamin B2 (Riboflavin), Humectant	Food supplements must not be used as a substitute for a varied and balanced diet and a healthy lifestyle. If you are taking any medications or under medical supervision, please consult a doctor or healthcare professional before use. Discontinue use and consult a doctor if adverse reactions occur. Keep out of sight and reach of children. Do not use if seal under cap is broken or missing.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					(Glycerol), Folic Acid (Calcium-L-Methylfolate), Potassium Iodide, Biotin (D-Biotin), Vitamin B12 (Cyanocobalamin).	
Bassetts Vitamins Pregnancy + Omega 3 DHA Multivitamins & Multiminerals Strawberry & Orange 30 Pastilles	Bassetts Vitamins Pregnancy + Omega 3 DHA Multivitamins & Multiminerals Strawberry & Orange 30 Pastilles | H&B	Pastilles – MIDS	Take one pastille daily; do not exceed the suggested daily intake. This one-a-day pastille provides the stated levels of folic acid, Vitamin D and Omega-3 DHA to help support maternal nutritional needs throughout pregnancy.	16.5 µg daily (16.5 µg per pastille)	Sweeteners (Maltitol syrup, Sorbitol, Sucralose), Gelatine (Bovine), L-ascorbic acid, Oil from the micro-algae Schizochytrium sp., Colours (Anthocyanins, Carotenes), Zinc Citrate, Acid (Malic acid), Strawberry flavouring, Dexpanthenol, Orange flavouring, Emulsifier (SOYA lecithin), Glazing agent (Carnauba wax), Ferrous citrate, Nicotinamide, Riboflavin 5-phosphate sodium, Pyridoxine hydrochloride, Pteroylmonoglutamic acid, Thiamin hydrochloride, Cupric citrate, d-Biotin, Potassium iodate, Phylloquinone, Sodium selenite, Cholecalciferol, Cyanocobalamin. Contains naturally occurring sugars.	Contains Maltitol and Sorbitol which are polyols – excessive consumption may cause a laxative effect. Contains Iron which, if taken in excess, may be harmful to very young children. Food supplements should not be used as a substitute for a balanced, varied diet and healthy lifestyle. Not suitable for children under the age of 12. KEEP OUT OF THE REACH OF CHILDREN.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
Inessa advanced multivitamin	Inessa Advanced Multivitamin	Tablets - MIDS	Reach your daily nutrition goals with the world's most comprehensive one-a-day multivitamin	55 µg daily (55 µg per tablet)	Plant fibre (Microcrystalline Cellulose), Vitamin C (Ascorbic Acid), Dicalcium Phosphate Dihydrate, Vitamin B1 (Thiamine HCl), Zinc Citrate, Vitamin K2, Co Enzyme Q10, Vitamin B5 (Calcium-D-Pantothenate), Vitamin B2 (Riboflavin), Vitamin B3 (Nicotinamide), Lutein, Inositol, Vitamin D3 (Cholecalciferol), Stearic Acid, Coating (Hydroxy Propyl Methyl Cellulose [plant fibre], Glycerol), Vitamin E (D-alpha Tocopherol Succinate), Vitamin B6 (Pyridoxal 5' Phosphate), Beta-Carotene (Dunliella Salina), L-Methionine, Silicon Dioxide, Manganese Citrate, Boron (Di-Sodium Tetraborate), Vitamin A (Retinyl Acetate), Riboflavin 5 Phosphate, Chromium Polynicotinate, 5-Methyltetrahyrdrofolate, Methylcobalamine, D-Biotin, Potassium Iodide, Sodium Molybdate.	Not provided

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
Cytoplan women's wholefood multivitamin capsules	Women's Wholefood Multi | Award-Winning Multivitamin Capsules	Capsules - MIDS	Take 1 capsule twice daily with food (morning and early afternoon), or as directed by a practitioner.	150 µg daily (75 µg per capsule)	Broccoli powder *(brassica oleracea)*, calcium ascorbate (providing vitamin C), magnesium (from citrate), chromium (from yeast), vitamin B5 (as calcium D-pantothenate), iron (as ferrous citrate), vitamin E (as d-alpha tocopherol succinate), spirulina powder *(arthrospira platensis)*, carrot powder *(daucus carota)*, zinc (from citrate), selenium (as selenomethionine), kelp extract *(laminaria japonica)* providing iodine, vitamin B1 (as thiamin hcl), vitamin B2 (as riboflavin), vitamin B3 (as nicotinamide), vegan D3 (cholecalciferol) preparation (mct oil, arabic gum, maltodextrin, ascorbic acid, d-alpha tocopherol, beta carotene *(daucus carota)*, vitamin B6 (as P5P), acai berry *(euterpe oleracea)*, acerola cherry extract *(malpighia emarginata)*, copper (as glycinate), vitamin K2 (MK-7), boron (as sodium	Do not exceed the recommended daily intake. This product should not be used as a substitute for a varied balance diet and lifestyle. There is uncertainty regarding the content of selenium. It is unclear from the website if the level is 100 or 150 µg per two capsules (one serving). Therefore, the highest was chosen.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					borate), manganese (as citrate), folic acid (as L-5-methyltetrahtdrofolate calcium), vitamin B12 (as methylcobalamin), molybdenum (as sodium molybdate), biotin, plant cellulose (capsule shell).	
Seven Seas Omega-3 and Multivitamins	Omega-3 & Multivitamins Woman Duo Pack | Seven Seas | H&B	Tablets - MIDS	Adults (18+): Take one Vitamin and Mineral tablet (pink blister) and one Omega-3 Fish Oil capsule (red blister) a day with a glass of cold water; take during or immediately after a meal.	75 µg daily (75 µg per tablet)	Capsule: Fish Oil; Beef Gelatin; Humectant: Glycerol; Antioxidant: Tocopherol Tablet: Calcium carbonate; Bulking agent: Microcrystalline Cellulose; Magnesium oxide; L-ascorbic acid; Ferrous fumarate; Maltodextrin; Nicotinamide; Modified starch; DL-alpha-tocopheryl acetate; Riboflavin; Bulking agents: Dicalcium phosphate, Cross-linked sodium carboxymethylcellulose; Thiamine mononitrate; Zinc oxide; Calcium D-pantothenate; Glazing agents: Hydroxypropyl methyl cellulose, Talc; Pyridoxine hydrochloride; Anti-caking agents: Silicon dioxide,	Do not exceed the recommended daily dose. Food supplements are not intended as a substitute for a varied and balanced diet and a healthy lifestyle. Contains iron, which, if taken in excess, may be harmful to very young children. Keep out of sight and reach of young children. If you are pregnant, intending to become pregnant, breastfeeding or postmenopausal, have any concerns or questions, are taking any other food supplements or medication, including warfarin or other blood thinning medicines, or

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Magnesium salts of fatty acids, Fatty acids; Carrier: Acacia gum; Sugar; Starch; Glucose syrup; Manganese sulphate; Copper sulphate; Retinyl acetate; Pteroylmonoglutamic acid; D-biotin; Chromium chloride; Potassium iodide; Sodium selenite; Phytomenadione; Cyanocobalamin; Cholecalciferol	have an existing health condition, please talk to your healthcare professional before taking this product.
Boots a-z Vitamins and minerals	Boots A-Z 180 Tablets (6 month supply) - Boots	Tablets - MIDS	Take 1 tablet a day with plenty of liquid. Do not exceed the daily dose.	55 µg daily (55 µg per tablet)	Calcium Carbonate, Magnesium Oxide, Ascorbic Acid, Cellulose, Maltodextrin, Ferrous Fumarate, Dicalcium Phosphate, Vitamin E Acetate, Nicotinamide, Hydroxypropylmethylcellulose, Zinc Oxide, Cross-linked Sodium Carboxymethylcellulose, Silicon Dioxide, Magnesium Stearate, Calcium Pantothenate, Manganese Sulphate, Copper Sulphate, Pyridoxine Hydrochloride, Thiamine Mononitrate, Riboflavin, Vitamin A Acetate, Antioxidants (DL Alpha	Suitable for Adults and children aged 12 years and over. Food Supplements are intended to supplement the diet and should not be regarded as a substitute for a balanced and varied diet or a healthy lifestyle. Keep out of sight and reach of children. In case of overdose seek medical attention. Before taking this product, please consult your doctor or pharmacist if you are taking any medication, or

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Tocopherol, Tartaric Acid, Sodium Ascorbate), Folic Acid, Potassium Iodide, Chromium Chloride, Sodium Molybdate, Sodium Selenite, Talc, Vitamin K1, Biotin, Vitamin D3 (Cholecalciferol), Methylcobalamin.	are taking warfarin or other blood thinning medications, have any medical condition, have diabetes, or are pregnant, trying to become pregnant or breastfeeding.
Nutravita multivitamins	Multivitamin Minerals - Vegan & Vegetarian Multivitamins - Nutravita | Nutravita	Tablets -MIDS	Take one tablet a day with a full glass of water preferably with breakfast.	55 µg daily (55 µg per tablet)	Bulking Agents (Dicalcium Phosphate, Microcrystalline Cellulose), Magnesium Oxide, Calcium Carbonate (Maltodextrin), Vitamin C (Ascorbic Acid) (HydroxyPropylMethyl Cellulose), Potassium Chloride, Ferrous Fumarate, Vitamin E Acetate (Modified Food Starch, Silicon Dioxide), Vitamin B3 (Nicotinamide), Zinc Oxide, Glazing Agents (HydroxyPropyl MethylCellulose, Glycerin, Carnauba Wax) Vitamin A (Retinyl Palmitate) (Maltodextrin, Arabix Gum, Corn Starch, Vegetable Oil, Tocopherol), Anti-Caking Agents (Magnesium Stearate, Silicon Dioxide),	Food supplements must not be used as a substitute for a varied and balanced diet and a healthy lifestyle. If you are pregnant, breastfeeding, taking any medications or under medical supervision, please consult a doctor or healthcare professional before use.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Vitamin B5 (D-Calcium Pantothenate), Manganese Sulphate, Sodium Selenite (Microcrystalline Cellulose), Copper Sulphate, Vitamin B12 (Cyanocobalamin) (Maltodextrin), Vitamin B6 (Pyridoxine Hydrochloride), Vitamin K1 (Maltodextrin), Vitamin B2 (Riboflavin), Vitamin B1 (Thiamine Hydrochloride), Chromium Picolinate, Folic Acid, Potassium Iodide, Sodium Molybdate, Vitamin D (Cholecalciferol) (Maltodextrin, Sugar, Ascorbyl Palmitate), Biotin	
Swallow multivitamin	Daily Multivitamin Tablets for Women and Men - High Dose – The Swallow Co	Tablets - MIDS	Take 2 tablets a day, with a drink or food. Ideally, take one in the morning and one in the evening. Do not exceed the stated dose.	55 µg daily (27.5 µg per tablet)	Magnesium Bisglycinate, Dicalcium Phosphate, Vitamin-C (PureWay-C®), Iron (Ferrous Bisglycinate), Coenzyme Q10 (Ubiquinone), Glazing Agent (HydroxyPropylMethylCellulose, Glycerol), Zinc Citrate, Rice Extract Blend, Nicotinamide, Vitamin E (D-Alpha Tocopheryl Succinate), Bulking Agent	If you are pregnant, breastfeeding, taking medication or due for surgery it is advisable to consult a GP prior to taking any supplements. Not intended for use by persons under the age of 18 years old.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					(Microcrystalline Cellulose), Thiamine Hydrochloride, Manganese Bisglycinate, L-Selenomethionine, Retinol Acetate, Calcium Pantothenate, Lutein Ester, Copper Gluconate, Vitamin K2 MK7, Vitamin B6 (Pyridoxal 5-Phosphate), Vitamin D3 (from Algae), Riboflavin 5-Phosphate Sodium (R5P), Chromium Picolinate, L-5-Methyletetrahydrofolate MTHF, Potassium Iodide, D-Biotin, Methylcobalamin (methylated Vitamin B12).	
Holland and Barrett Ultra woman	Holland & Barrett Ultra Woman Tablets 3 Months Supply Bundle | H&B	Caplets - MIDS	Take one caplet daily, preferably with a meal. Do not exceed stated dose.	100 µg daily (100 µg per caplet)	Calcium Carbonate, Bulking Agent (Microcrystalline Cellulose), Magnesium Oxide, Potassium Chloride, Vitamin C (as Ascorbic Acid), Dicalcium Phosphate, Iron Fumarate, Citrus Sinensis Extract, Glazing Agents (Hydroxypropylmethyl Cellulose, Glycerine, Hydroxypropyl Cellulose), Vitamin E (as d-Alpha Tocopheryl Acid Succinate),	Food supplements must not be used as a substitute for a varied and balanced diet and a healthy lifestyle. If you are pregnant, breastfeeding, taking any medications or under medical supervision, please consult a doctor or healthcare professional before use.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Emulsifiers (Cross-linked Sodium Carboxymethylcellulose, Sodium Carboxymethylcellulose), Beta-Carotene, Anti-Caking Agents (Magnesium Stearate, Silicon Dioxide), Manganese Gluconate, Pantothenic Acid (as d-Calcium Pantothenate), Niacin (as Nicotinamide), Copper Gluconate, Zinc Oxide, Vitamin D3 (as Cholecalciferol), Vitamin B6 (as Pyridoxine Hydrochloride), Vitamin B12 (as Cyanocobalamin), Pomegranate Extract, Vitamin B1 (as Thiamin Mononitrate), Vitamin B2 (as Riboflavin), Chromium Picolinate, Grapeseed Extract, Cranberry Extract, Flaxseed Powder, Sodium Borate, Bilberry Fruit Extract, Vitamin K1 (as Phylloquinone), Folic Acid (as Pteroylmonoglutamic Acid), Sodium Selenite, Potassium	

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Iodide, Sodium Molybdate, Biotin (as d-Biotin), Lycopene, Lutein, Zeaxanthin, Coenzyme Q10 (as Ubiquinine).	
WeightWorld Multivitamin and Mineral	Multivitamin and Mineral Tablets | 400 Tablets | WeightWorld	Tablets - MIDS	Take 1 tablet daily with a full glass of water, preferably with a main meal. You can take the tablet during the day, at noon or at night, whatever you prefer. For optimal results, it is recommended that you take the tablet at approximately the same time every day.	55 µg daily (55 µg per tablet)	Vitamin C (as L-Ascorbic acid), Magnesium (as magnesium oxide), potassium (as Potassium Chloride), Vitamin E (as DL-Alpha Tocopherol Acetate), Vitamin B3 (as Nicotinamide), Iron (as Ferrous Fumarate), Zinc (as Zinc Citrate), Calcium (as Calcium Carbonate), Vitamin B5 (as Pantothenic Acid), Manganese (as Manganese Citrate), Vitamin B2 (as Riboflavin), Vitamin B6 (as Pyridoxine Hydrochloride), Vitamin B1 (as Thiamin Mononitrate), Copper (as Copper Gluconate), Vitamin A (as Retinyl Acetate), Selenium (as L-Selenomethionine), Sodium (as Sodium Chloride), Vitamin B9 (as Folic Acid), Iodine (as Potassium Iodide),	Do not exceed the recommended daily dose. Food supplements must not be used as a substitute for a varied and balanced diet and a healthy lifestyle. If you are pregnant, breastfeeding, taking any medications or are under medical supervision, please consult a healthcare professional before use. Discontinue use if any adverse reactions occur. Not intended for use by persons under the age of 18.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Vitamin B12 (as Cyanocobalamin), Vitamin B7 (as D-Biotin), Chromium (as Chromium Chloride), Boron (as Boric Acid), Cholin (as Cholin Bitartrate), Molybdenum (as Sodium Molybdate), Vitamin D3 (as Cholecalciferol), Vitamin K2 MK7 (as Menoquinone)	
Vitabiotics Pregnacare 60 Vegan Gummies	Pregnacare® Gummies | Pregnancy Gummies | Vitabiotics	Gummies – MIDS	Chew 2 gummies per day with your main meal.	30 µg daily (per two gummies) (15 µg per gummy)	Wheat Glucose Syrup, Sugar, Vitamin and Mineral Blend (Calcium Phosphate, Vitamin C [Ascorbic Acid], Zinc Citrate, Ferric Pyrophosphate, Niacin [as Nicotinamide], Pantothenic Acid [as Calcium Salt], Vitamin D3 [Cholecalciferol (Vegan)], Vitamin B6 [as Pyridoxine HCl], Vitamin B1 [as Thiamin HCL], Riboflavin, Vitamin K1, Vitamin B12 [as Cyanocobalamin], Folic Acid, Biotin, Potassium Iodide, Sodium Selenite), Natural Strawberry Flavouring, Gelling Agent: Fruit Pectin, Acidity Regulators: Potassium Citrate and Citric	Do not exceed the recommended intake. Food Supplements are intended to supplement the diet and should not be regarded as a substitute for a balanced and varied diet or a healthy lifestyle. While every care has been taken to ensure this information is as accurate as possible, recipes and nutrition content may occasionally change. As a result, we recommend that you always read the label carefully before consuming any product. The Nutrient Reference

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Acid, Natural Source Colour (Black Carrot Juice Concentrate), Mixed Tocopherols, Coating: Vegetable Oil (Coconut Oil, Rape Seed Oil) and Glazing Agent (Carnauba Wax), Vitamin E (as D-Alpha Tocopheryl Acetate), Betacarotene.	Value (NRV) or Reference Intake (RI) as a percentage, helps to show the contribution that a product or portion size can make towards daily intakes. This information is provided as a guide and is not individual advice. As with other food supplements, consult your doctor or pharmacist before using if you are under medical supervision, have epilepsy, a thyroid condition, haemochromatosis, suffer from food allergies, or are allergic to any of the ingredients. As Pregnacare® contains vitamin K, if you are taking anticoagulants (blood thinners) do not take Pregnacare® except on the advice of a doctor. This product contains iron, which if taken in

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
						excess, may be harmful to very young children.
Neu Mum Daily Pregnancy Multivitamin	Neu Mum Daily Pregnancy Multivitamin. Food Supplement | H&B	Capsule – MIDS	Take one capsule daily	30 µg daily (30 µg per capsule)	Capsule Shell (Gelatin, Glycerin, Water), Omega FISH Oil, Magnesium Oxide, Ferrous Sulphate, Vitamin C (Ascorbic Acid), (Ascorbic Acid), Choline Bitartrate, Niacin (as Inositol Hexanicotinate), SOYA Bean Oil/Glycine SOYA, Zinc Oxide, Vitamin B6 (as Pyridoxine Hydrochloride), Natural Beta Carotene, Vitamin B5 (as Calcium D Pantothenate), Vitamin E (D-Alpha Tocopheryl Acid Succinate) (from SOYA), Vitamin B1 (as Thiamin Mononitrate), Vitamin B2 (as Riboflavin), Vitamin D3 (Cholecalciferol-Carriers; Acacia, Sucrose, Corn Starch, Medium Chain Triglycerides, Antioxidant; DL-Alpha tocopherol), Copper Sulphate, Vitamin K1, Folic Acid (as Pteroylmonoglutamic Acid), D Biotin, Potassium Iodide,	Do not exceed the recommended daily intake. Food supplements should not be used as a substitute for a balanced diet and a healthy lifestyle. Not suitable for children. As with other food supplements, consult your doctor or pharmacist before using if you are under medical supervision, have epilepsy, a thyroid condition, haemochromatosis, suffer from food allergies or are allergic to any of the ingredients. This product contains Vitamin K. Those taking anticoagulants (blood thinners) should not take this product except on the advice of a doctor.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Sodium Selenate, Vitamin B12 (as Cyanocobalamin).	
Vitabiotics Pregnacare Conception Tablets	Pregnacare® Conception Tablets By Vitabiotics	Tablet – MIDS	Take one tablet per day with or immediately after your main meal. Swallow with a full glass of water or a cold drink; Pregnacare Conception should only be taken on a full stomach.	50 µg daily (50 µg per tablet)	Maltodextrin, Vitamin C (Ascorbic Acid [Carrier: Glyceryl Tristearate]), Bulking Agent: Microcrystalline Cellulose, Magnesium Oxide, L-Arginine (as HCl), Inositol, N-Acetyl Cysteine, Tablet Coating (Hydroxypropylmethylcellulose, Hydroxypropylcellulose, Caprylic/Capric Triglyceride, Natural Source Colours [, Iron Oxides], Glycerine), Ferrous Fumarate, Zinc Sulphate, Anti-Caking Agents: Silicon Dioxide, Stearic Acid, Magnesium Stearate, Vitamin B12 (as Cyanocobalamin [Carriers: Trisodium Citrate, Citric Acid, Maltodextrin]), Niacin (as Nicotinamide), Betacarotene (Betacarotene Prep., Modified Starch, Corn Starch, Glucose Syrup, Antioxidants: DL-Alpha Tocopherol, Sodium Ascorbate), Vitamin B6 (as HCl), Thiamin (Vitamin	Food supplements must not replace a varied and balanced diet and a healthy lifestyle. As with other food supplements, consult your doctor or pharmacist before using if you are under medical supervision, have epilepsy, a thyroid condition, haemochromatosis, suffer from food allergies, or are allergic to any of the ingredients. This product contains iron, which if taken in excess, may be harmful to very young children.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					B1 as Mononitrate), Pantothenic Acid (as Calcium Salt), Vitamin D3 (Cholecalciferol [Carriers: Acacia, Sucrose, Corn Starch, Medium Chain Triglycerides, Antioxidant: DL-Alpha Tocopherol]), Riboflavin (Vitamin B2), Hydroxypropylmethylcellulose, Vitamin E Natural Source (as D-Alpha Tocopheryl Acid Succinate) (from Soya), Copper Sulphate, Folic Acid (as Pteroylmonoglutamic Acid), Potassium Iodide, Biotin, Sodium Selenate.	
Vitabiotics Pregnacare Max	Pregnacare® Max | Pregnancy Vitamins | By Vitabiotics	Tablet – MIDS	Take two Pregnacare Max tablets plus one Omega-3 capsule daily with your main meal; swallow each with a cold drink - do not chew. Only take on a full stomach. Do not exceed the recommended intake. Start at any point during pregnancy.	55 µg daily (27.5 µg per tablet)	Tablet Ingredients: Calcium Carbonate, Magnesium Oxide, Maltodextrin, Bulking Agent: Microcrystalline Cellulose, L-Arginine, Vitamin C (Ascorbic Acid), Tablet Coating (Hydroxypropylmethylcellulose, Colours: [Calcium Carbonate, Iron Oxide Yellow & Copper Chlorophyllin (Natural Source)], Polydextrose, Medium Chain	As with other supplemtents, seek professional advice before using if you are under medical supervision or suffer from food allergies. Do not take if you are allergic to soya products, fish or fish products.Contains high purity fish oil. As Pregnacare contains vitamin K, if you are

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Triglycerides, Glycerin), Inositol, Anti-Caking Agents: Silicon Dioxide, Stearic Acid & Magnesium Stearate, N-Acetyl Cysteine, Ferrous Fumarate, Zinc Sulphate, Niacin (as Nicotinamide), Vitamin B6 (Pyridoxine HCl), Vitamin B12 (Cyanocobalamin), Betacarotene (Antioxidant: DL-Alpha Tocopherol), Thiamin (Vitamin B1 as Mononitrate), Pantothenic Acid (as Calcium Salt), Vitamin E (D-Alpha Tocopheryl Acid Succinate (from Soya), Vitamin D3 (Cholecalciferol, Antioxidant: DL-Alpha Tocopherol), Copper Sulphate, Riboflavin, Vitamin K (Vitamin K1), Manganese Sulphate, Folic Acid (as Pteroylmonoglutamic Acid & Calcium-L-Methylfolate), Potassium Iodide, Biotin, Sodium Selenate. Capsule Ingredients: Omega-3 Fish Oil (Docosahexaenoic Acid	taking oral anticoagulants (e.g. Warfarin) do not take Prenacare except on the advice of a doctor. Vitamin K is known to specifically interact with the action of aspirin or heparin. Allergy Advice: For allergens, see ingredients in bold on base of carton. Made in a site that may handle nuts.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Concentrate)(from Fish), Capsule Shell: Pharmaceutical Grade Gelatin (Halal Bovine Source), Glycerin & Natural Flavour Lemon Oil.	
Vitabiotics Pregnacare Breastfeeding Tablets	Pregnacare® Breastfeeding | Postnatal Vitamins | Vitabiotics	Tablet – MIDS	Take two Pregnacare Breast-feeding tablets per day, plus one Omega-3 capsule per day. Swallow each with a glass of water or a cold drink with your main meal; do not chew or exceed the recommended intake, take on a full stomach, and start any time after childbirth, using for as long as required during and after breast-feeding.	30 µg daily (15 µg per tablet)	Postnatal Micronutnents Tablet: Calcium Carbonate (Carrier: Maltodextnn), Bulking Agents: Maltodextrin & Microcrystalline Cellulose. Magnesium Oxide. Tablet Coating (Hydroxypropylmethylcellulose. Hydroxypropylcellulose. Capnc/Caprilic Triglycerides, Natural Source Colours [Iron Oxides], Glycerin). Vitamin C (Ascorbic Acid [Carrier. Glyceryl TristearateD, Anti-Caking Agents: Silicon Dioxide. Steanc Acid & Magnesium Stearate. Ferrous Fumarate, Zinc Sulphate. Vitamin E (D-Alpha Tocopheryl Acid Succinate) (from Soya), Crosslinked Cellulose Gum. Niacin (as Nicotinamide). Vitamin B6 (Pyridoxine NCI).	This product contains vitamin K and Omega-3. Those taking anticoagulants (blood thinners) should not take this product except on the advice of a doctor. If you are breastfeeding a premature baby speak to your doctor or neonatal health professional for advice before using this product. Food supplements must not replace a varied and balanced diet and a healthy lifestyle. As with other food supplements, consult your doctor or pharmacist before using if you are under medical supervision, pregnant, breast-feeding, have epilepsy, a thyroid

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Betacarotene (Carriers: Starch, Water. Antioxidant: DL-Alpha Tocopherol). Thiamin (Vitamin 131 as Mononitrate), Pantothenic Acid (as Calcium Salt), Vitamin B12 (Cyanocobalamin [Carriers: Trisodlum Citrate. Citric Acid. MaltodextrinD. Vitamin D3 (Cholecalciferol [Carriers; Acacia. Sucrose. Corn Starch. Medium Chain Triglycendes. Antioxidant: DL-Alpha Tocopheron), Riboflavin, Copper Sulphate. Vitamin K (Vitamin K1 [Carriers; Acacia. Sucrose]), Folic Acid (as Pteroylmonoglutamic Acid). Potassium Iodide, Biotin, Sodium Selenate • Omega 3 Capsule: Omega-3 Fish Oil (Docosahexaenoic Acid Concentrate) (from Fish). Capsule Shell; Pharmaceutical Grade Gelatin. Glycerin & Natural Flavour Lemon Oil.	condition, haemochromatosis, suffer from food allergies, or are allergic to any of the ingredients. Not suitable for children.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
PROCEIVE® Women Advanced Fertility Supplement	Proceive® Women	Capsules – MIDS	Take two capsules once per day. Best taken in the morning on a full stomach. Store in a cool dry place out of sight and reach of young children.	200 µg daily (100 µg per capsule)	L-Arginine, Calcium Carbonate, Capsule Shell: Hydroxypropyl Methylcellulose, DL-α-Tocopheryl Acetate (Vitamin E), Ascorbic Acid (Vitamin C), N-Acetyl L-Carnitine HCL, L-Cysteine, Sodium Selenite, Magnesium Oxide, Thiamine Mononitrate (Vitamin B1), Calcium D-Pantothenate (Vitamin B5), L-Citrulline, Riboflavin (Vitamin B2), Nicotinamide (Vitamin B3), Zinc Oxide, Beta Carotene, Ubiquinone (Coenzyme Q10), Pyridoxine HCl (Vitamin B6), Iron Citrate (Iron), Sodium Borate (Boron), Cholecalciferol (Vitamin D3 Vegan), Cupric Sulphate, Methylcobalamin (Vitamin B12), Chromium Picolinate, Calcium L-Methylfolate (Folic acid), Phylloquinone (Vitamin K1), Biotin, Potassium Iodide (Iodine), Sodium Molybdate (Molybdenum), Anti Caking Agent: Magnesium Stearate,	This product contains vitamin K and Omega-3. Those taking anticoagulants (blood thinners) should not take this product except on the advice of a doctor. If you are breastfeeding a premature baby speak to your doctor or neonatal health professional for advice before using this product. Food supplements must not replace a varied and balanced diet and a healthy lifestyle. As with other food supplements, consult your doctor or pharmacist before using if you are under medical supervision, pregnant, breast-feeding, have epilepsy, a thyroid condition, haemochromatosis, suffer from food allergies, or are allergic to any of the ingredients. Not suitable for children.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Anti Caking Agent: Silicon Dioxide.	
Sainsbury's Pregnancy Plus Essential Vitamins	Sainsbury's Pregnancy Plus Essential Vitamins x30 | Sainsbury's	Tablet – MIDS	Take two tablets a day	75 µg daily (37.5 µg per tablet)	Calcium Carbonate, Cellulose, Magnesium Oxide, Maltodextrin, Ascorbic Acid, Hydroxypropyl Methyl Cellulose, Dicalcium Phosphate, Ferrous Fumarate, Vitamin E Acetate, Nicotinamide, Silicon Dioxide, Zinc Oxide, Calcium Pantothenate, Pyridoxine Hydrochloride, Cross-linked Sodium Carboxymethylcellulose, Magnesium Stearate, Stearic Acid, Talc, Colour (Iron Oxide), Thiamine Mononitrate, Beta-carotene, Copper Sulphate, Riboflavin, Folic Acid, Potassium Iodide, Sodium Selenite, Vitamin K1, Biotin, Vitamin D3, Cyanocobalamin.	
Free Soul Women's Multivitamins with collagen	Multivitamins with Collagen – Free Soul	Tablets – MIDS	Take two tablets daily with a glass of water.	55 µg daily (27.5 µg per tablet)	Ingredients: Bulking Agent (Microcrystalline Cellulose), Calcium Carbonate, Dicalcium Phosphate, Fish Collagen Type I Peptides, Potassium Chloride,	Food supplements should not be used as a substitute for a varied diet, do not exceed the stated recommended daily dose. If you are

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Magnesium Oxide, Vitamin C (L-Ascorbic Acid), Potassium Bisglycinate, Ferrous Sulphate, Lubricant (Magnesium Stearate), Clear Coating, Anti-Caking Agent (Silicon Dioxide), Vitamin B3 (Nicotinamide), Vitamin E (D-Alpha Tocopheryl Succinate), Zinc Oxide, Hyaluronic Acid, Vitamin A (Retinyl Acetate), Vitamin B5 (D-Calcium Pantothenate), Manganese Sulphate, Sodium Selenite, Vitamin B12 (Cyanocobalamin), Vitamin D3 (Cholecalciferol), Vitamin B6 (Pyridoxine Hydrochloride), Vitamin K1 (Phytomenadione), Vitamin B1 (Thiamine Hydrochloride), Vitamin B2 (Riboavin), Chromium Picolinate, Folic Acid (Pteroylmonoglutamic Acid), Potassium Iodide, Sodium Molybdate Dihydrate, D-Biotin.	pregnant, breastfeeding, under 18, or taking prescription medications, please consult your doctor before use. Keep out of reach of children.
Free soul Hair Skin & Nails Gummies	Hair, Skin & Nails Gummies – Free Soul	Gummies	2 gummies	55 µg daily (27.5 µg per gummy)	Glucose Syrup, Sucrose, Water, Vitamin C (L-Ascorbic Acid), Gelling Agent (Pectin),	

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Apple Juice Concentrate, Acids (Citric Acid, Lactic Acid), Blueberry Juice Concentrate, Zinc, Selenium, Acidity Regulator (Sodium Citrate), Flavours (Natural Blueberry Flavouring, Natural Strawberry Flavouring), Vitamin E, Colour (Anthocyanins), Glazing Agents (Vegetable Oil (Coconut, Canola Oil), Carnauba Wax), Sequestrant (Sodium Hex-ametaphosphate), Vitamin B12 (Cyanocobalamin), Vitamin A (Retiny) Palmitate), Vitamin B6, Vitamin D3 (Cholecalciferol), Biotin.	
Proceive Pregnancy Supplement Trimester 1	Proceive Pregnancy Supplement Trimester 1 Capsules 60s - Boots	Capsules – MIDS	Take two capsules once per day.	200 µg daily (100 µg per capsule)	Calcium Carbonate, Magnesium Oxide, L-Arginine, Ascorbic Acid (Vitamin C), N-Acetyl L-Carnitine HCL, L-Cysteine, Sodium Selenite, L-Glutamine, DL-α-Tocopheryl Acetate (Vitamin E), Nicotinamide (Vitamin B3), Zinc Oxide, Calcium D-Pantothenate (Vitamin B5),	Not suitable for children under 18 years. Do not exceed the stated dose. Contains iron. Do not use if the foil is broken. Store in a cool dry place out of sight and reach of young children. Seek medical advice if you are under medical supervision or suffer from food allergies.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Ubiquinone (Coenzyme Q10), Iron, Beta Carotene, Thiamine Mononitrate (Vitamin B1), Pyridoxine HCl (Vitamin B6), Riboflavin (Vitamin B2), Sodium Borate (Boron), Cholecalciferol (Vitamin D3), Methylcobalamin (Vitamin B12), Manganese Sulphate, Cupric Sulphate, Chromium (Picolinate), Calcium L-Methylfolate (Folic Acid), Phylloquinone (Vitamin K1), Sodium Molybdate (Molybdenum), Biotin, Potassium Iodide (Iodine). Capsule Shell: Hydroxypropyl Methylcellulose. Anti Caking Agents: Magnesium Stearate, Silica.	A healthy lifestyle and a varied and balanced diet are important. Food supplements should not be used as a substitute for a varied diet. Proceive® is manufactured in an environment that also handles milk, soya, cereals containing gluten, fish and sulphites.
Vitabiotics Pregnacare Him & Her Conception	Pregnacare® Him & Her Conception Tablets | By Vitabiotics	Tablet - MIDS	Women: one tablet per day, with your main meal (pink blister). Swallow with water or a cold drink.	50 µg daily (50 µg per tablet)	Maltodextrin, Bulking Agent: Microcrystalline Cellulose, Vitamin C (Ascorbic Acid), Magnesium Oxide, L-Carnitine Tartrate, Inositol, Vitamin E (D-Alpha Tocopheryl Acid Succinate) (from Soya), Maca Extract, Zinc Sulphate, Tablet Coating	Not to be chewed. Do not exceed recommended intake. To be taken only on a full stomach. Not suitable for children. Pregnacare® Conception is a nutrient based, scientifically researched

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					(Hydroxypropylmethylcellulose, Glycerin, Colours [Iron Oxides]), Crosslinked Cellulose Gum, Pine Bark Extract, Anti-Caking Agents: Stearic Acid, Magnesium Stearate & Silicon Dioxide, Thiamine (Vitamin B1 as Mononitrate), Niacin (as Nicotinamide), Ferrous Fumarate, Citrus Bioflavonoids, Pantothenic Acid (as Calcium Salt), Vitamin B6 (Pyridoxine HCl), L-Arginine, Vitamin A (as Acetate, Antioxidants: DL-Alpha Tocopherol), Vitamin D3 (Cholecalciferol, Antioxidant: DL-Alpha Tocopherol), Siberian Ginseng Extract, Riboflavin, Octacosanol (Rice Bran), Copper Sulphate, L-Glutathione, Coenzyme Q10, Manganese Sulphate, Lycopene Extract, Folic Acid (as Pteroylmonoglutamic Acid), Sodium Selenate, Chromium Trichloride, Biotin,	formula without any drugs or hormones. It contains no ingredients known to cause irregularity in the monthly cycle. Some women have reported a delay in their monthly cycle while using this product. If you experience a delay or change in your monthly cycle, this may not necessarily mean you are pregnant and it is advised to take a pregnancy test and speak to your doctor or health professional.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Vitamin B12 (Cyanocobalamin).	
Vitabiotics Pregnacare Original	Pregnacare® Original | Pregnancy Supplement | Vitabiotics	Tablets - MIDS	Take one tablet per day with your main meal. Swallow with water or cold drink with main meal (to be taken with full stomach).	30 µg daily (30 µg per tablet)	Maltodextrin, Magnesium Oxide, Bulking Agent: Microcrystalline Cellulose, Vitamin C (Ascorbic Acid), Ferrous Fumarate, Zinc Sulphate, Tablet Coating (Hydroxypropylmethylcellulose, Polydextrose, Medium Chain Triglycerides, Glycerin, Talc, Colours [Calcium Carbonate, Iron Oxides]), Anti-Caking Agents: Silicon Dioxide, Stearic Acid & Magnesium Stearate, Niacin (as Nicotinamide), Vitamin B6 (Pyridoxine HCl), Betacarotene, Pantothenic Acid (as Calcium Salt), Vitamin B12 (Cyanocobalamin), Vitamin E (D-Alpha Tocopheryl Acid Succinate) (from Soya), Vitamin D3 (Cholecalciferol), Thiamin (Vitamin B1 as Mononitrate), Riboflavin, Copper Sulphate, Vitamin K (Vitamin K1), Folic Acid (as Pteroylmonoglutamic Acid),	Not to be chewed. Do not exceed recommended intake. You can take Pregnacare during all stages of your pregnancy. This comprehensive formula replaces other Pregnacare multivitamins. There is no need to take an additional multivitamin.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Potassium Iodide, Biotin, Sodium Selenate.	
Vitabiotics Pregnacare Liquid Pregnancy Vitamins	Pregnacare® Liquid | Pregnancy Vitamins | Vitabiotics	Liquid - MIDS	Two 5ml teaspoonsful per day. One teaspoonful = approx. 5ml 5ml spoon included Pregnacare Liquid should not be taken on an empty stomach. Ideally taken with a main meal.	30 µg daily (15 µg per teaspoon / 5ml)	Purified Water, Raw Cane Sugar, Sweetener: Maltitol Syrup, Magnesium Gluconate, Glycerin, Vitamin C (Ascorbic Acid), Ferrous Sulphate, Betacarotene (Vegetable Glycerin, Polysorbate 80, Vegetable Oil, Rosemary Extract, Antioxidant: Mixed Tocopherols), Zinc Gluconate, Acidity Regulators: Citric Acid & Sodium Hydroxide, Stabiliser: Xanthan Gum, Niacin (as Nicotinamide), Vitamin B6 (Pyridoxine HCl), Natural Flavouring: Orange Oil, Preservative: Potassium Sorbate, Pantothenic Acid (D-Panthenol), Vitamin E (DL-Alpha Tocopheryl Acetate), Thiamin (Vitamin B1 as Hydrochloride), Copper Sulphate, Riboflavin, Folic Acid (as Pteroylmonoglutamic Acid), Potassium Iodide, D-Biotin,	Pregnacare liquid should not be taken on an empty stomach. Ideally taken with a main meal. Do not exceed the recommended intake. Excessive consumption may produce laxative effects. You can take Pregnacare during all stages of your pregnancy. This comprehensive formula replaces other Pregnacare multivitamins. There is no need to take an additional multivitamin.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Vitamin K, Sodium Selenate, Antioxidant: Butylated Hydroxyanisole, Vitamin D3 (Cholecalciferol), Vitamin B12 (Cyanocobalamin).	
Vitabiotics Wellwoman Multivitamin Gummies for Women	Wellwoman® Multi - Vitamin Gummies For Women	Gummies - MIDS	Chew 3 gummies per day with your main meal	55 µg daily (18.3 µg per 3 gummies)	Wheat Glucose Syrup, Sugar, Fructooligosaccharides, Gelling Agent: Fruit Pectin, Vitamin and Nutrient Blend (Citrus Bioflavonoids, Niacin [as Nicotinamide], Ferric Pyrophosphate, Sodium Selenite, Zinc Citrate, Pantothenic Acid, Potassium Iodide, Vitamin D3 [Cholecalciferol (Vegan)], Vitamin B6 [as Pyridoxine HCl], Vitamin B1 [as Thiamin HCl], Riboflavin, Vitamin B12 [as Cyanocobalamin], Vitamin K [as Vitamin K1], Copper Citrate, Folic Acid, Chromium Picolinate, Biotin), Acidity Regulators: Citric Acid & Sodium Citrate, Vitamin C [Ascorbic Acid], Black Carrot Juice Concentrate, Vitamin E [as D-Alpha Tocopheryl Acetate], Starflower Oil,	Do not exceed the recommended intake. This comprehensive formula replaces other Wellwoman multivitamins. There is no need to take an additional multivitamin. Not suitable for children. As this product contains vitamin K, if you are taking anticoagulants (blood thinners) do not take these gummies except on the advice of a doctor. Not to be taken on an empty stomach. This product contains iron, which if taken in excess, may be harmful to very young children. Food supplements must not replace a varied and

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Evening Primrose Oil, Blueberry Flavouring, Strawberry Flavouring, Antioxidant: Mixed Tocopherols, Coating: Vegetable Oils (Coconut Oil, Rape Seed Oil), Glazing Agent (Carnauba Wax) and Antioxidant (Alpha Tocopherol), Betacarotene.	balanced diet and a healthy lifestyle. As with other food supplements, consult your doctor or pharmacist before using if you are under medical supervision, pregnant, breast-feeding, have epilepsy, a thyroid condition, haemochromatosis, suffer from food allergies, or are allergic to any of the ingredients.
Vitabiotics Wellwoman Original Multivitamin for Women	Wellwoman Original | Multivitamin For Women | Vitabiotics®	Capsules - MIDS	One capsule per day with your main meal. Not to be chewed. Swallow with water/cold drink.	100 µg daily (100 µg per capsule)	Capsule Shell (Pharmaceutical Grade Gelatin [Halal Bovine Source], Glycerin, Colour [Iron Oxides], Orange Flavour), Soya Bean Oil (from Soya), Magnesium Oxide, Evening Primrose Oil, Starflower Oil, Vitamin C (Ascorbic Acid), Vitamin E (DL-Alpha Tocopheryl Acetate), Niacin (as Nicotinamide), Ferrous Fumarate, Zinc Sulphate, Para Amino Benzoic Acid, Lecithin (from Soya), Citrus	Do not exceed the recommended intake. To be taken on a full stomach. This comprehensive formula replaces other Wellwoman® multivitamins. There is no need to take an additional multivitamin. As with other food supplements, consult your doctor or pharmacist before using if you are under medical supervision, pregnant, breast-feeding, have

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Bioflavonoids, Thiamin (Vitamin B1 as Mononitrate), Flavouring: Natural Orange Oil, Vitamin B6 (as HCl), Pantothenic Acid (Calcium Salt), Manganese Sulphate, Betacarotene (Antioxidant: DL-Alpha Tocopherol), Riboflavin (Vitamin B2), Copper Sulphate, Thickener: Beeswax, Vitamin D3 (Cholecalciferol [Antioxidant: DL-Alpha Tocopherol]), Folic Acid (as Pteroylmonoglutamic Acid), Chromium Trichloride, Selenium (Sodium Selenite), Vitamin K, Biotin, Vitamin B12 (as Cyanocobalamin).	epilepsy, haemochromatosis, suffer from food allergies, or are allergic to any of the ingredients. Not suitable for children.
Vitabiotics Wellwoman Plus	Wellwoman® Plus Omega 3-6-9 By Vitabiotics	Tablets - MIDS	One tablet (purple blister) plus one capsule (aqua blister) per day with your main meal. Not to be chewed. Swallow with water/cold drink.	110 µg daily (110 µg per tablet)	Bulking Agents: Dibasic Calcium Phosphate & Microcrystalline Cellulose, Magnesium Oxide, Vitamin C (Ascorbic Acid), Tablet Coating: (Hydroxypropylmethylcellulose, Glycerin, Colours: Calcium Carbonate & Copper Chlorophyllin [Natural Source]), Vitamin E (D-Alpha	Do not exceed the recommended intake. To be taken on a full stomach. This comprehensive formula replaces other Wellwoman® multivitamins. There is no need to take an additional multivitamin.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Tocopheryl Acid Succinate) (from Soya), Ferrous Fumarate, Zinc Sulphate, Niacin (Nicotinamide), Hydroxypropylcellulose, Para Amino Benzoic Acid, Vitamin B12 (Cyanocobalamin), Citrus Bioflavonoids, Anti-Caking Agents: Stearic Acid, Silicon Dioxide & Magnesium Stearate, Thiamin (Vitamin B1 as Mononitrate), Vitamin B6 (Pyridoxine HCl), Betacarotene, Vitamin D3 (Cholecalciferol), Pantothenic Acid (as Calcium Salt), Polyvinylpyrrolidone, Riboflavin, Manganese Sulphate, Copper Sulphate, Vitamin K1 (Phytomenadione), Folic Acid (as Pteroylmonoglutamic Acid), Sodium Selenate, Chromium Trichloride, Biotin.	As with other food supplements, consult your doctor or pharmacist before using if you are under medical supervision, pregnant, breast-feeding, have epilepsy, haemochromatosis, suffer from food allergies, or are allergic to any of the ingredients. Not suitable for children.
Vitabiotics Wellwoman Max	Wellwoman® Max | Supplement For Women | By Vitabiotics	Tablets - MIDS	Take with your main meal: one max tablet (purple blister), plus one omega 3-6-9 capsule (green blister),	100 µg daily (100 µg per tablet)	Bulking Agents: Microcrystalline Cellulose, Starch (Pregelatinised Maize Starch) & Potato Starch, Magnesium Oxide, Vitamin C (Ascorbic Acid), Tablet	Not to be chewed. Do not exceed the recommended intake. To be taken on a full stomach. This comprehensive formula

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
			plus one calcium tablet (blue blister). Swallow each with water or a cold drink.		Coating (Hydroxypropylmethylcellulose, Polydextrose, Talc, Medium Chain Triglyceride, Colours [Iron Oxides & Calcium Carbonate]), L-Carnitine Tartrate, Niacin (as Nicotinamide), Ferrous Fumarate, Zinc Sulphate, L-Methionine, N-Acetyl Cysteine, Vitamin E (D Alpha Tocopheryl Acid Succinate) (from Soya), Anti-Caking Agents: Magnesium Stearate, Stearic Acid, Silicon Dioxide & Purified Talc, Polyvinylpolypyrrolidone, Guarana Extract, Thiamin (Vitamin B1 as Mononitrate), Citrus Bioflavonoids, Ethyl Cellulose, Vitamin B6 (Pyridoxine HCl), Betacarotene, Pantothenic Acid (as Calcium Salt), Vitamin D3 (Cholecalciferol), Manganese Sulphate, Vitamin B12 (Cyanocobalamin), Riboflavin, Green Tea Extract, Copper Sulphate,	replaces other Wellwoman multivitamins. There is no need to take an additional multivitamin. As with other food supplements, consult your doctor or pharmacist before using if you are under medical supervision, pregnant, breast-feeding, have epilepsy, haemochromatosis, suffer from food allergies, or are allergic to any of the ingredients. Not suitable for children.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Vitamin K1 (Phytomenadione), Coenzyme Q10, Folic Acid (as Pteroylmonoglutamic Acid), Chromium Trichloride, Sodium Selenate, Potassium Iodide, Biotin.	
Centrum women	Centrum Women (60 Tablets) | H&B	Tablets - MIDS	Take one tablet a day with water, preferably with food.	30 µg daily (30 µg per tablet)	Dicalcium phosphate; Calcium carbonate; Magnesium oxide; Bulking agents: E 460, E 464, E 1200; L-ascorbic acid; Anticaking agents: E 468, E 551, E 553b, E 470b; Ferrous fumarate; DL-alpha tocopheryl acetate; Nicotinamide; Calcium D-pantothenate; Zinc oxide; Pyridoxine hydrochloride; Riboflavin; Thiamine mononitrate; Vegetable oil (Coconut, Palm kernel); Beta-carotene; Cupric sulphate; Retinyl acetate; Pteroylmonoglutamic acid; Chromium III chloride; Sodium molybdate; Potassium iodide; Sodium selenate; D-biotin; Phylloquinone;	Food Supplements are intended to supplement the diet and should not be regarded as a substitute for a balanced and varied diet or a healthy lifestyle.

This is a paper for discussion. This does not represent the views of the Committee and should not be cited.

Supplement name*	Website/retailer**	Supplement type	Recommendations for use	Dosage information	Composition	Additional information and warnings
					Cholecalciferol; Cyanocobalamin; Colours: E 120, E 133.	

* Some supplement names specify different units (mg) or concentrations, this is an error by the manufacturer/retailer or relates to other nutrients. All concentrations are expressed in µg. Information on this has been added to the additional information column.

** Information taken from retailer websites was correct on the date of checking, it is possible that manufacturers/ retailers may change this information. PDF documentation of websites has been stored in EAT file.