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RIVM report 2024-0071
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Synopsis

Energy and nutrient intake in the Netherlands

Results of the Dutch National Food Consumption Survey 2019-2021

The Dutch National Food Consumption Survey (DNFCS) 2019-2021 sheds light on what Dutch people eat and drink, where and how much. This report delves into the intake of energy and nutrients. Comparing data from over 3500 children and adults, with previous surveys conducted in 2007-2010 and 2012-2016, we examine trends across different age-gender groups.

Recent years have shown a positive shift in Dutch diets: on average, there's been a reduction in sugar and salt intake and an increase in fibre consumption compared to the 2012-2016 survey. However, salt intake remains high and fibre intake is still insufficient. Notably, alcohol consumption, particularly among men, has decreased. These trends bode well for health, as less sugar and more fibre intake can aid in preventing overweight and chronic diseases, while low salt intake is important for a healthy blood pressure.
Moreover, there's been an overall increase in vitamin D intake across all age groups. Nevertheless, older adults aged 70-79 often fall short on vitamin D intake. For this age group, it is important to take better note of the recommendation to take vitamin D supplements. Sufficient intake of vitamin D in combination with sufficient calcium reduces the risk of bone fractures.

There are still other nutrients that people consume either too much or too little compared to dietary reference values. Some population groups have low intake of vitamins A, B_2, B_6, B_{11}, C, calcium and iron. This varies by age group and gender. However, a deficiency in a nutrient may not immediately warrant concern. Further investigation, including assessing nutrient levels in the body and prevalence of clinical signs, is necessary to understand these patterns better and take measures if needed. This also applies to vitamins and minerals like magnesium, of which some individuals have high intakes.

The DNFCS data makes it possible for policymakers and professionals to continue their work on healthy and sustainable diets, product innovation, education and research. Results are available on www.wateetnederland.nl.

Keywords: food consumption survey, nutrients, children, adults, time trend, GloboDiet, dietary reference values

Publiekssamenvatting

De inname van energie en voedingsstoffen in Nederland

Resultaten van de Nederlandse voedselconsumptiepeiling 2019-2021

De Nationale Voedselconsumptiepeiling 2019-2021 (VCP) geeft inzicht in wat, waar en wanneer Nederlanders eten en drinken. Dit rapport gaat in op de hoeveelheid energie en voedingsstoffen die mensen binnenkrijgen. De resultaten van ruim 3500 kinderen en volwassenen zijn vergeleken met de eerdere peilingen in 2007-2010 en 2012-2016. Hierbij is onderscheid gemaakt naar verschillende leeftijdsgroepen en geslacht.

Het blijkt dat inwoners van Nederland de laatste jaren gemiddeld minder suiker en zout en meer vezels binnenkrijgen dan bij de vorige peiling in 2012-2016. Wel krijgen mensen nog te veel zout en te weinig vezel binnen. Ook drinken mensen, vooral mannen, minder alcohol. De gevonden ontwikkelingen zijn gunstig voor de gezondheid. Aangezien minder suiker en meer vezel in eten en drinken kan helpen om overgewicht en chronische ziekten te voorkomen. Minder zout is belangrijk voor een goede bloeddruk.

Daarnaast krijgen alle leeftijdsgroepen meer vitamine D binnen. Ouderen in de leeftijd van 70-79 jaar krijgen nog steeds vaak te weinig van deze vitamine binnen. Voor hen is het belangrijk om het advies om vitamine D-supplementen te slikken, beter op te volgen. Genoeg vitamine D in combinatie met voldoende calcium maakt de kans op botbreuken kleiner.

Er zijn nog andere voedingsstoffen die mensen nog veel of weinig binnenkrijgen in vergelijking met de voedingsnormen. Zo krijgen sommige bevolkingsgroepen weinig vitamines A, B_2, B_6, B_{11}, C, calcium en ijzer binnen. Dit verschilt per leeftijdsgroep en geslacht. Als mensen weinig van zo'n voedingstof binnenkrijgen, hoeft dat niet meteen zorgelijk te zijn. Verder onderzoek, bijvoorbeeld naar hoeveel voedingsstoffen in het lichaam zitten en gezondheidsklachten, is wenselijk om hier meer inzicht in te krijgen en zo nodig maatregelen te kunnen nemen. Dit geldt ook voor vitamines en mineralen waar mensen veel van binnenkrijgen, zoals magnesium.

Met gegevens van de VCP kunnen beleidsmakers en professionals werken aan een gezond en duurzaam voedingspatroon, productinnovatie, voorlichting en onderzoek. De resultaten zijn ook gepubliceerd op www.wateetnederland.nl.

Kernwoorden: voedselconsumptiepeiling, voedingsstoffen, kinderen, volwassenen, tijdtrend, GloboDiet, voedingsnormen

Content

Summary

The aim of the Dutch policy on health and diet is to facilitate a healthy lifestyle in the Dutch society. A balanced diet in the population contributes to the prevention of morbidity from conditions such as cardiovascular diseases, cancer, diabetes type 2, and obesity. Moreover, a healthy diet includes a sustainable diet and safe foods with no adverse effects on health due to the presence of microorganisms, residues and contaminants.

The Dutch national food consumption surveys shows what, where and when the Dutch population eats and drinks and compares this to the guidelines set by the Health Council of the Netherlands. This data enables policymakers and health professionals to achieve healthy, sustainable and safe food consumption, food product innovation, and to conduct research on education and nutrition.

This report focuses on the energy and nutrients Dutch people consume. RIVM mapped this out on the basis of the diets of around 3500 children and adults in the period 2019–2021. The survey was partially carried out during the COVID-19 pandemic. Measures taken during this period may have affected diets and lifestyles. RIVM compared the outcomes of this survey with the results from earlier surveys carried out in 2007–2010 and 2012–2016.

Salt and sugar intakes go down, dietary fibre intake goes up

The intake of protein, carbohydrates, trans fatty acids, cis-unsaturated fatty acids, and linoleic acid in the Netherlands met the recommendations. However, high intakes of total fat, saturated fatty acids, and alcohol, and low intakes of dietary fibre were observed. Recent years have shown a positive shift in Dutch diets. The Dutch population's salt and sugar intakes go down and fibre intake goes up. Although these are positive developments, salt intake remains high and fibre intake is still insufficient. These trends bode well for health, as less sugar, more fibre intake and also a beneficial fatty acid pattern can aid in preventing overweight and chronic diseases, while low salt intake is important for a healthy blood pressure.

Findings are in line with previous results

These findings correspond to the outcomes of the 2019–2021 survey on food products, which were published in early 2023. These show that the Dutch population's intake of vegetable products – such as fruit, vegetables, unsalted nuts and legumes – has increased. At the same time, its intake of sugary drinks has decreased. In addition to changing eating and drinking patterns, changes in the composition of products may have affected the outcomes as well. For example, the National Approach to Product Improvement has potentially led to less salt being added. The survey also showed a decrease in alcohol consumption, particularly among men. This corresponds to the decrease shown by the Health Survey.

Health effects

Combined with a lower sugar intake, a higher dietary fibre intake can help prevent overweight and chronic disease. A lower salt intake helps to keep the blood pressure under control. Consequently, the noted developments have considerable positive health effects.

Vitamins and minerals

The intake of vitamin D has increased for people in all age categories compared to the previous survey (2012–2016). However, vitamin D intake is still too low for older adults aged 70–79. It is important that people in this age category adhere more closely to the vitamin D supplement advice. A sufficient intake of both vitamin D and calcium reduces the risk of bone fractures.

Some population groups have low intakes of particular vitamins and minerals, including vitamins A, B_2, B_6, C and folate and minerals calcium and iron. However, this is not necessarily a cause for immediate concern. Follow-up studies, such as nutritional status studies, are recommended to find out more about this. The same is true for high intakes of some other vitamins and/or minerals, such as magnesium.

More information

RIVM carries out the Dutch National Food Consumption Survey on behalf of the Ministry of Health, Welfare and Sport. Information about these surveys are available on the website https://www.wateetnederland.nl.

1 Introduction and objectives

1.1 Monitoring food consumption

The Dutch government's food policy aims to promote healthy and responsible food.[2, 3] It encourages the food industry to produce food that contains less salt, saturated fat and added sugar, and more fibre. Additionally, the focus is to make healthy choices easier. A healthy diet helps to prevent cardiovascular disease, cancer, diabetes type 2, and overweight.[4, 5] Moreover, apart from being healthy, people's diet should also be sustainable, and consist of safe foods that have no adverse health effects caused by the presence of microorganisms, residues and contaminants.

Monitoring food consumption provides the information for the prioritisation, development and evaluation of a nutrition and food policy.[6] Food consumption surveys among the general population provide insights both into the population's consumption of foods and into dietary changes over time. The intake of macro- and micronutrients, the exposure to potentially harmful chemical or microbiological substances, and the environmental impact of the diet can be established by combining data from the surveys with information on foods. Food consumption surveys give insight in energy intake. However, food consumption surveys should not be used to evaluate the energy balance, because energy intake and energy expenditure are measured with insufficient accuracy for this purpose.[7] Furthermore, food consumption surveys provide useful information for nutrition education programmes and for scientific research on nutrition and health. Complementary to food consumption surveys, monitoring dietary habits or biomarkers in specific groups such as infants, pregnant women or immigrants can provide information for nutrition policy development, as can monitoring the consumption of specific rarely eaten foods and complementary research.[8]

Data on food consumption of the general Dutch population and specific groups in that population have been collected periodically since 1987, in the Dutch National Food Consumption Surveys (DNFCSs, see previously published report for a complete overview[9]). Since 2003, the designs and methods used in the dietary monitoring system were revised.[8, 10] The current dietary monitoring system consists of regular food consumption surveys among the general population. The methods used in these surveys are in accordance with the EFSA European guidance for harmonised food consumption data in European Union member states.[11]

Monitoring lifestyle in the Netherlands
The food consumption survey is part of the Lifestyle Monitor. The Lifestyle Monitor[12] collects annual data on lifestyle-related themes including smoking, alcohol and drug use, exercise, and nutrition with the so-called Health Survey.[13] Within the Lifestyle Monitor, additional surveys are conducted to collect more detailed data. The food consumption survey is one of these additional surveys. In general, the food consumption survey provides a more comprehensive overview of

food consumption, but is performed less frequently up to now and among less people than the Health Survey.

1.2 DNFCS 2019-2021

In the two years from June 2019 to July 2021, food consumption data among the general Dutch population was collected in the DNFCS 2019-2021. The main aim of the DNFCS 2019-2021 was to gain insight into the diet of children and adults aged 1-79 living in the Netherlands and to establish:

- the consumption of foods reported per food group;
- the use of dietary supplements;
- the percentage of adults meeting the 2015 Dutch food-based dietary guidelines;
- the intake of energy and nutrients from foods and the percentage of children and adults meeting the recommendations on energy and nutrients;
- the total intake of nutrients from foods and dietary supplements and the percentage of children and adults meeting the recommendations;
- the place and moment of consumption of food and drink, and intake of energy and nutrients;
- the diet by subgroups of the population, for example subgroups based on socio-demographic factors;
- the changes in food consumption and energy and nutrient intake since 2007.

In addition, the DNFCS 2019-2021 dataset is available for food safety assessment, dietary exposure assessment, dietary environmental impact estimation, for public health programmes, and for scientific nutrition research.
The DNFCS 2019-2021 was authorised by the Dutch Ministry of Health, Welfare and Sport (VWS) and coordinated by the Dutch National Institute for Public Health and the Environment (RIVM). Recruitment of participants and data collection was subcontracted to market research agency Kantar (former TNS NIPO; Amsterdam, the Netherlands).

An expert committee (see Appendix A in the previously published report on DNFCS 2019-2021)[9] advised the Ministry of VWS on the scientific aspects of the survey during planning, data collection, data analyses, and result reporting.

1.3 Outline of the report and other publications of DNFCS 2019-2021

In the previously published report on DNFSC 2019-2021[9] a detailed description is given of the background information of DNFCS 2019-2021, on consumption of foods and evaluation with the 2015 Dutch food-based dietary guidelines.

This report describes information on intake and evaluation of energy, macronutrient and micronutrient consumption of children and adults, what the sources of these nutrients are, and when and where they consumed these nutrients. It also describes the methods on data analyses (Chapter 2). The intake of energy and macronutrients (Chapter 3) and micronutrients (Chapter 4) are described, including sources, evaluation of intake against dietary reference values, eating occasions and place of consumption and time trends. Finally, the results are discussed in Chapter 5.

The main results of the food consumption survey are also available on the DNFCS website (https://www.wateetnederland.nl), and in more detailed tables on RIVM StatLine.[14] The website also includes general information on the DNFCS as well as on the conditions and procedures for obtaining the DNFCS databases and several publications. The data will also be included in the EFSA Comprehensive European Food Consumption Database.[15] There is also a newsletter on newly published topics. See https://www.rivm.nl/abonneren/nieuwsbrief-voeding to subscribe to this newsletter.

2 Methods of the Dutch national food consumption survey 2019-2021 on nutrients

2.1 Study population and data collection

The DNFCS 2019-2021 is a cross-sectional study performed on children and adults aged 1-79 living in the Netherlands. Participants were recruited through consumer panels of market research agency Kantar. Pregnant and lactating women and people living in institutions were excluded from participation. Data collection took place from June 2019 to July 2021. For each period of four weeks stratified samples per age-gender (12 subgroups) were drawn. The 12 age-gender groups are: boys and girls aged 1-3 years, 4-11 years, 12-17 years, and men and women aged 18-50 years, 51-64 years, 65-79 years. Due to the design of the study, the participants are a good reflection of the Dutch population in terms of socio-demographic factors such as education (in children the education of the parents), region and degree of urbanisation of the place of residence in the age groups.[9] However, the results are not representative for people with a migration background, and pregnant and lactating women.

A total of 9701 people aged 1-79 were invited for participation, of which 3570 Dutch children and adults (37%) completed two non-consecutive 24-hour dietary recalls. In order to gain insight into habitual food consumption, the aim was to spread the recalls equally over all days of the week and the four seasons, at population level and per age and gender group. The recalls were conducted with an interval of about four weeks and using the computer guided interview program GloboDiet. The method varied slightly by age. For children aged 1-8, parents/caretakers completed a food diary the day before the interviews, in order to cover any consumption out of sight of the parents/caretaker. For children aged 9-15, the interviews were conducted during home visits with the child while having a parent/caretaker present. Participants aged 16-69 were interviewed twice by telephone, unannounced. Participants aged 70-79 were also asked to fill in a food diary prior to the interviews. The completed diary was used as a memory aid for the 24-hour dietary recall. The first 24-hour recall was carried out during a home visit. The second recall was conducted by telephone, unless this was not possible (n=5; these interviews were also conducted at home). Appointments were made for the home visits and recall days with a food diary, while the other interviews were unannounced. Due to COVID-19 restrictions, interviews had to be conducted by telephone instead of during home visits from 13 March 2020 to 25 June 2020 and from 30 September 2020 until the end of the study (17 July 2021).

Participants completed an online general questionnaire prior to the 24-hour dietary recalls. Five different age-specific questionnaires were used, taking into account the stages of life for different age groups (e.g. children aged 1-3, 4-11, and 12-17, and for adults aged 18-64 and 65-79). The questions covered various background factors such as gender, date of birth, education level, native country, family size, plus various life style factors, such as patterns of physical activity, smoking, and alcohol consumption. The questionnaire also covered general dietary characteristics such as special diets and certain eating habits, breakfast use, the consumption frequency of fruit, vegetables, fish, dietary supplements and coffee, meat consumption and the use of salt during food preparation or at the table. The question on the *use of salt* (including table salt and herb mixes with salt, but not including salty seasonings such as soy sauce and stock) made a distinction between salt added to home-cooked meals during preparation and salt added at the table. This was asked in general and for some specific food groups. The general questionnaire also asked participants for their height and body weight, to be reported with an accuracy of 0.1 kg for body weight and 0.1 cm for height.

A detailed description of the study population and data collection of DNFCS 2019-2021 is described in the report 'Diet of the Dutch – Results of the Dutch National Food Consumptions Survey 2019-2021 on food consumption and evaluation with dietary guidelines'.[9]

2.2 Data handling and analyses

Most results were calculated for all 12 age-gender groups separately. However, for the readability of the chapters the results are described for more aggregated age-gender groups (four age-gender groups) or for the whole population. The results for the 12 age-gender groups are shown in the figures and tables. Habitual intake distributions of the nutrient intakes were estimated using SPADE, version SPADE.RIVM.4.1.31. Other statistical analyses were performed using SAS, version 9.4.M7.

In order to produce representative results for the Dutch population different weighting factors were derived. All results were weighted for deviances in the distribution of participants across gender, age group, region, level of education, urbanisation, day of the week and season of data collection. Every respondent was classified into a season based on the day of the first 24-hour dietary recall. For the day of the week, the days were aggregated into weekdays and weekend days. Education level in three categories was based on the information from the general questionnaire. Census data from 2020 were used as reference population to derive the survey weights.[16]

For the analyses on the sources of nutrients and nutrient intake by place and occasion, a weighting factor per person, based on a combination of the two recall days (week or weekend days) per person, was used instead of applying a weighting factor for each recall day.

2.2.1 Evaluation of dietary intake of energy and nutrients against dietary reference values

Values on energy and nutrients

The selection of nutrients of interest was based on the relevance for policy makers, availability of dietary reference intakes, and the quality of the data. Energy and nutrient intakes were calculated using an extended version of the Dutch Food Composition Database (NEVO-online 2021)[17] and the Dutch Supplement Database (NES)[18] dated 1 January 2020. The definitions of the nutrients can be found on the NEVO website.[17] In total, 27,105 different food items and 926 dietary supplement items were reported during the data collection; these were linked to 1,816 NEVO codes and 840 NES codes.

Habitual intake
Per person and measurement day, the nutrient intake from foods, and if relevant from dietary supplements, was calculated. For iodine and sodium, the use of discretionary salt and for iodine also the intake of dietary supplements were taken into account. For several nutrients, the intake was calculated as a percentage of the total energy intake, intake per MJ, or per kg body weight. For protein, the contribution of vegetable protein to total protein intake was also calculated.

The habitual intake (also known as usual intake) of energy and nutrients was estimated from the observed daily intake by correction for the intra-individual (day-to-day) variance using SPADE.[19] The results of the habitual intake distribution were presented as mean, median and 5th, 25th, 75th, 95th percentiles. In addition, 95%-confidence intervals for the means and medians were calculated with SPADE, based on 200 bootstrap iterations.[19] SPADE consists of several modelling options, depending on the frequency of consumption of the underlying dietary components. The SPADE one-part model can be used to calculate the habitual intake from foods that are consumed on a daily basis by almost all participants. The two-part model can be used to estimate the habitutal intake from foods that are consumed episodically. The three-part model can be used to estimate the habitual intake from foods and dietary supplements. And finally the multipart model can be used to estimate the total intake from multiple sources.

The SPADE one-part model was used for energy and all macronutrients (except n-3 fish fatty acids). For dietary fibre, protein and also energy, the intake from dietary supplements were not taken into account as only a few participants indicated to use supplements with these nutrients. For n-3 fish fatty acids, part of the study population did not consume n-3 fish fatty acids therefore the one-part model could not be used. However, this part of the population was too small to use the two-part model. Hence, this data was not suitable for calculating the habitual intake using SPADE. In order to be able to estimate the intake of n-3 fish fatty acids, the 25th, 50th and 75th percentiles and the average were calculated based on the average intake of the two recall days of the participants. The median of this calculation was used to evaluate the intake against the AI.

The habitual intake of most micronutrients was calculated via SPADE using a three-part model. In this model, the intake from both foods and dietary supplements were taken into account. This model uses an appropriate one- or two-part model (for folate). Data from the additional questionnaire on the frequencies of use of dietary supplements in winter and the rest of the year was used in combination with data from the 24-hour dietary recall. With these models, the intake from exclusively foods (this is the consumption of foods and drinks, excluding dietary supplements) as well as the total intake could be assessed.
For vitamin K_1, phosphorus and potassium the intake was based on the intake from exclusively foods using the one part-model. For vitamin K_1, information on type of vitamin K in supplements was usually lacking. For

phosphorus and potassium, the intake from dietary supplements was not taken into account as only a few participants indicated to use these supplements. The SPADE two-part model was used to calculate the habitual haem iron intake distribution. A relatively high proportion of participants did not have an intake of this nutrient. In this model, the distribution of probability of consumption was modelled separately from the distribution of consumption amounts, before combining the two distributions.
The habitual intake of ethanol, iodine and sodium was modelled using the SPADE multi-part model, in order to estimate the intake from different food sources. For ethanol, additional data from the lifestyle questionnaire on the use of alcoholic beverages were used to identify the non-users. For sodium, intake from foods and discretionary used salt at home was combined (dietary supplements were not taken into account). For iodine, intake from iodine naturally present in foods, industrially added iodised salt to foods, discretionary added iodised salt, and dietary supplements were aggregated. See for more details appendix I. The approach is based on that of Verkaik-Kloosterman[20] and Van Rossum.[21]

In this report, the differences by age are described by comparing the habitual nutrient intake by adults to the intake by children. Whether the same conclusions could be drawn for the habitual nutrient by men compared to boys and by women compared to girls is also examined.

Dietary reference values
To evaluate the diet, the habitual intake distributions of nutrients were compared to the Dutch dietary reference intake set by the Health Council[22, 23], see Chapters 3 and 4 for the specific reference values used. In this evaluation, habitual intakes of age-gender groups were compared to the corresponding dietary references values for each age-gender group. To determine the proportion of the Dutch population that may be potentially at risk of adverse health effects due to excessive intake of a nutrient, the habitual intake distributions were compared to the tolerable upper intake level (UL) for nutrients as set by the Health Council of the Netherlands or EFSA.[24, 25, 5] For an overview of the references of the dietary references values used in Chapters 3 and 4, see Appendix A.

Evaluation methods
The approach to evaluate the diet differed according to the type of dietary reference value used, as recommended by the US Institute of Medicine (IOM).[26] See text box 2.1 for an explanation of these different types. The evaluation of the intake was performed qualitatively or quantitatively depending on the type of dietary reference value:

- When an estimated average requirement (EAR) of a nutrient was available, the habitual intake was evaluated using the EAR cut-point approach. The proportion of subjects with an intake below the EAR was calculated to indicate the prevalence of inadequacy in the population. If this percentage was less than 10%, intake was considered adequate and indicated with ‘adequate intakes’. The EAR cut-point approach is inappropriate for the energy intake as this depends on a person’s physical activity. Due to menstrual losses in premenopausal women, not all assumptions for the EAR

Text box 2.1

Dietary reference intakes for nutrients and their relation to the probability of health effects following the definitions of the Health Council.[1]

Dietary Reference Intakes (DRI): refers to a set of reference values for nutrients for use in dietary evaluation.

Estimated Average Requirement (EAR): the intake level at which 50% of the apparently healthy people would have enough for their own requirements, but the other 50% would not (given a normal distribution of requirement). Average requirements are always well substantiated. (in Dutch: 'Gemiddelde behoefte'). Also indicated in international literature with AR.

Population reference intake (PRI): level that is considered adequate for virtually all apparently healthy people in a population group in question. By definition, this reference value is only established if there is sufficient data from scientific research to be able to estimate an average requirement. Accordingly, this also involves relatively strong substantiation. In theory, the population reference intake is the intake level that is adequate for exactly 97.5% of the group concerned. However, because of uncertainties in the studies on which the average requirements and population reference intakes are based, it is better to express this as 'virtually' all apparently healthy people in the population group in question (also in Dutch: 'Aanbevolen dagelijkse hoeveelheid' or in English Recommended Daily Allowance).

Adequate Intake (AI): a level of (nutrient) intake that can be assumed to meet the needs of virtually everyone in the population group in question. This type of dietary reference value is established if neither the average requirement nor – as a result – the population reference intake can be determined.

Tolerable Upper Intake Level (UL): the highest average daily nutrient intake level likely to pose no risk of adverse health effects to almost all individuals in the general population. The tolerable upper intake level is not the ideal intake level, as raising intake above the population reference intake or adequate intake, is not expected to produce any further health gains. Moreover, intakes in excess of the tolerable upper intake level are potentially unhealthy. (in Dutch: 'Aanvaardbare bovengrens van inneming').

cut-point approach could be met for iron. Therefore, adapted beaton's Full Probability Approach[27, 28] was applied to women aged 18-45; see the results section for more details.

- If an adequate intake (AI) was available, the intake was evaluated qualitatively. A group with the confidence interval of the median intake at or above the AI can generally be assumed to have low prevalence of inadequate intakes. In this study, this is indicated with 'seems adequate'. If the 95%-confidence interval (95%-CI) of the median was lower than the AI, the adequacy of the diet could not be evaluated and this was indicated with ‘no statement’. This approach was also used for so-called guideline (fibre) and PRI (carbohydrates).

- If a tolerable upper intake level (UL) of a nutrient was available, the proportion of the population above the UL was calculated. This proportion represents the part of the population potentially at risk of adverse effects due to excess intake, which does not mean that adverse health effects actually occur. For the proportions presented, the modelling uncertainty is shown as a 95%-confidence interval. If the proportion was larger than 2.5%, the intake was considered high (‘high intakes’). If the proportion was lower, intakes were considered as ‘tolerable intakes’.[1]

A comparison of intake data based on 24-hour dietary recall data with dietary reference values can never irrefutably determine whether the intake is adequate/tolerable or not. It can only indicate the probability of inadequate or high intakes. Therefore, in order to find out whether an intake of a particular nutrient is adequate or tolerable, biochemical measurements for instance are needed as additional evidence.

2.2.2 Sources of nutrients

In order to gain insight into the main sources of nutrients, the contribution of each food group to the total energy and nutrient intake on each of the two recall days was calculated for each participant. The GloboDiet classification of food groups was used. Dietary supplements were also considered to be one of the sources. Subsequently, the mean contribution of the food groups and the supplements for each person was calculated over the two recall days. Finally, the group mean contribution was calculated by averaging all individual percentage contributions.

2.2.3 Nutrient intake by place and occasion

The consumption of food and drinks and thus also the nutrient intake was recorded by place, consumption occasion, and time. The different categories for place of consumption were aggregated into the following four categories: at home (includes own home and at home with family/friends), in a restaurant (includes fast-food, bar/café, self-service restaurant and catering at school/work), at school/work (also includes day-care centre), and outside and traveling (includes on the street and in the car, boat, plane, train). Food consumed out of home includes food brought from home.

The different food consumption occasions were classified as the three main meals (breakfast, lunch and dinner) and between main meals (includes before breakfast, during morning, during afternoon and evening/at night). The main meal categories were defined based on the time of day, so both lunch (meal around midday) and dinner (evening meal) could consist of a cold or warm meal.

[1] This is not similar to ‘tolerable daily intake’ (TDI), which is used in the field of food safety. The TDI is an estimate of the amount of a substance in food or drinking water which is not added deliberately (e.g. contaminants) and which can be consumed over a lifetime without presenting an appreciable risk to health (source EFSA: TDI | EFSA (europa.eu)).

The averages of the individual contributions of nutrient intake were calculated at various food consumption occasions and places of consumption to the total nutrient intake.

2.2.4 *Subgroups of the population*

The habitual intake was analysed for several subgroups of the population: gender, age-gender groups, education level, classes of body weight, region and urbanisation.

The age of the respondent was defined as the age at the first 24-hour dietary recall day and categorised into 12 age-gender groups (boys and girls aged 1-3 years, 4-11 years, 12-17 years, and men and women aged 18-50 years, 51-64 years, 65-79 years) as well as in 4 age-gender groups (boys, girls, men and women). The region classes were based on the Nielsen CBS division: northern, eastern, southern, and western regions (including the three largest cities Amsterdam, Rotterdam and The Hague). The degree of urbanisation was divided into extremely urbanised (2500 or more addresses/km^2), strongly (1500-2500 addresses/km^2), moderately (1000-1500 addresses/km^2), hardly (500-1000 area addresses/km^2), and not urbanised (fewer than 500 addresses/km^2). The education level concerned the participants' highest completed education level or, in case of participants aged under 18, that of the highest educated parent or caretaker was used. Education level was categorised into low (primary education, lower vocational education, advanced elementary education), middle (intermediate vocational education, higher secondary education) and high (higher vocational education and university). Weight classes was based on the body mass index (BMI) and categorised into 'underweight and normal weight versus 'overweight and obese'. See our previous report for more details.[9] Information on the nutrient intake by these subgroups can be found on RIVM StatLine.[14]

In this report, mean intake and evaluation of the habitual intake of nutrients were described for gender, and age-gender groups. Only differences in means larger than 10% and statistically significant (non-overlapping 95%-confidence intervals) were considered to be relevant.

Furthermore, for nutrients for which we identified high intakes, low intakes, or no statement in one or more of the four age-gender groups, differences in the mean habitual intake by education level were evaluated. Only differences were considered statistically significant if 95%-confidence intervals of the habitual intakes by education level did not overlap and were considered relevant if the difference in means was larger than 10%.

The age-gender groups for which a difference in education level was found, evaluation of the percentages below an EAR or above a UL are presented in this report. If 95%-confidence intervals of these percentages did not overlap, differences were statistically significant. For those nutrients with an AI, non-overlapping confidence intervals of the medians were considered statistically significant.

2.2.5 *Comparison with previous surveys*

To investigate the change in the habitual intakes of nutrients in the last decade, the mean consumption with its 95%-confidence intervals of macro- and micronutrients in DNFCS 2019-2021 and in DNFCS 2007-2010 and DNFCS 2012-2016 were compared with each other. For these analyses, the data of 7-69 year-olds were used. With no overlap in the confidence intervals and an average decrease or increase of more than 6% between DNFCS 2007-2010 and DNFCS 2012-2016, and between DNFCS 2012-2016 and DNFCS 2019-2021, or 12% between DNFCS 2007-2010 and DNFCS 2019-2021 (about 1% per year), the difference was considered to be relevant and statistically significant. This arbitrary difference of about 1% per year was determined with the expert committee in 2018. These habitual intake distributions were calculated with SPADE. These data were also weighted for socio-demographic characteristics, season, and day of the week. Period-specific reference values were used in these comparison analyses.

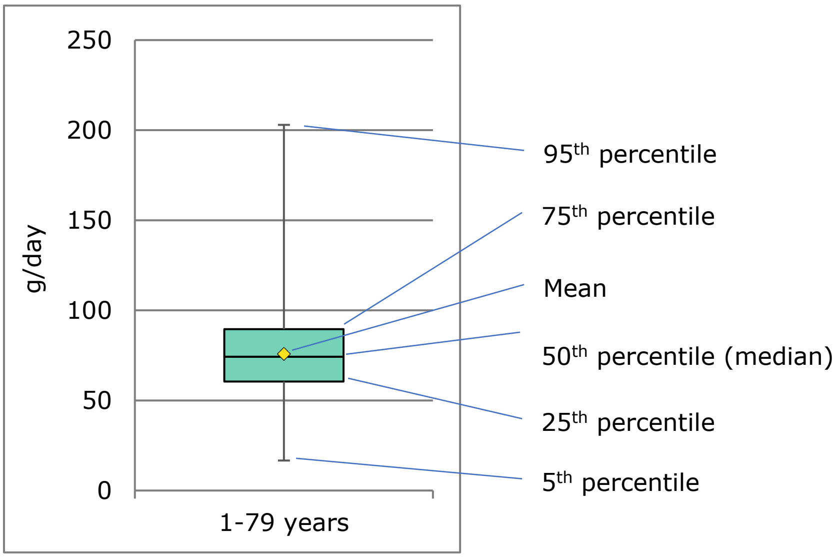
3 Energy and macronutrients

3.1 Introduction

Habitual intake distributions of energy and macronutrients from exclusively foods (this is the consumption of foods and drinks, excluding dietary supplements), are presented in this chapter. Habitual intake distributions were compared with dietary reference values (see section 2.2.1 and Appendix A). For n-3 fish fatty acids the used method differed, as also the intake by supplements was taken into account and the intake distrubution was based on the average intake of the two recall days of the participants.

Furthermore, we present the sources of energy and the macronutrients, as well as the occasions on which food is consumed, and where (see section 3.6). The differences in intake by education level is described in section 3.7. The last sections makes a comparison with the findings from the DNFCS of 2007-2010 and 2012-2016.

This chapter presents the results of the habitual intakes mainly in figures like the example below. More results are presented in the tables and online tables (see Appendix F). The online tables include results for subgroups which are not shown in this report.



Example. The so-called boxplot figure shows the 5th, 25th, 50th (median), 75th,95th percentiles and the mean habitual intake. The dietary reference value is indicated by the orange line.

3.2 Key findings

- The intake of carbohydrates, proteins, unsaturated fatty acids, trans fatty acids and linoleic acid in the Netherlands met the recommendations.
- The intake of dietary fibre was below the dietary reference value for all age groups, except for 1-3 year-olds.

- The amount of total fats, the amount of saturated fatty acids (both as part of the total energy intake) and the amount of alcohol was high for parts of the population.
- There are beneficial changes compared to the previous survey in 2012-2016: the intake of sugars (mono- and disaccharides) decreased, the alcohol intake decreased (particularly by men) and the intake of dietary fibre increased. Based on other studies, we know that an increase in dietary fibre intake, a decrease of sugar intake and a beneficial fatty acid pattern can be important to prevent obesity and chronic diseases.

3.3 Intake of energy and macronutrients

3.3.1 Energy

The average habitual energy intake was 8.4 MJ/day and the median intake was 8.2 MJ/day (see Figure 3.1 and Table 3.1.) In the online tables the intake of energy expressed as kcal is shown (see Appendix F). Boys had a higher intake of energy than girls (7.9 and 6.7 MJ/day, respectively), and men had a higher intake than women (9.9 and 7.6 MJ/day, respectively). Adults had a higher intake of energy than children (8.7 and 7.3 MJ/day, respectively). This was seen in both boys/men and girls/women.

The majority of the energy is provided by carbohydrates (approximately 43 En%), fat provides approximately 37 En% and protein approximately 16 En%. The remaining 4 En% is provided by fibre and alcohol (see section 3.3.5 to 3.3.7).

On average, the most important sources of energy were 'Bread, cereals, rice, pasta' (23%), 'Dairy (incl. substitutes)' (16%) and 'Meat (incl. substitutes)' (11%). Other food groups contributed less than 10% (see section 3.5).

To evaluate the energy intake, the energy requirements should be taken into account. However, these are not available in this survey. Energy balance in an individual depends on the dietary energy intake and energy requirements. Due to this correlation, it is not possible to evaluate the adequacy of energy intake without information on individual energy requirements. However, body weight indicates the energy balance during a life time. Looking at body weight is therefore a way to evaluate the energy intake. In our previous report on DNFCS 2019-2021[9], body weight of Dutch children and adults is reported. It was shown that a considerable part of the population was overweight or obese, indicating that at least in a period of life there was a surplus of energy. The prevalence increased with age.

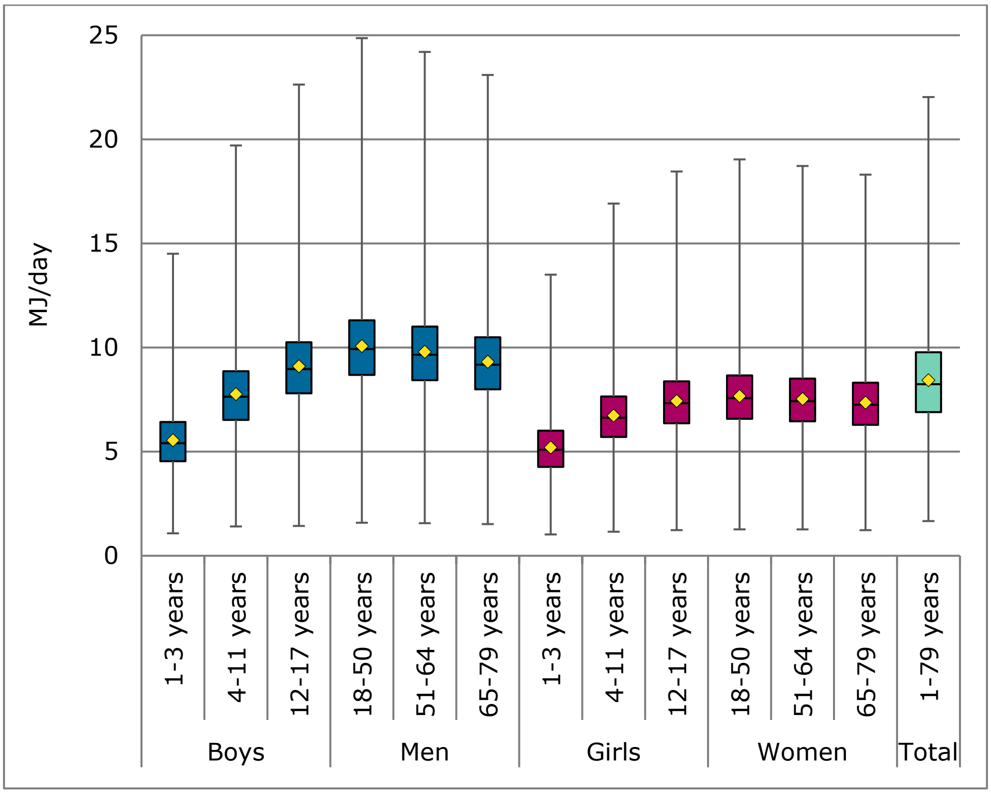


Figure 3.1 Habitual intake distribution of energy (MJ/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics and season (n=3570).

Table 3.1 Habitual intake distribution of energy (MJ/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	8.4 (8.3-8.5)	5.2	6.9	8.2 (8.1-8.3)	9.8	12.3
1-17	Children	1823	7.3 (7.2-7.4)	4.3	5.9	7.2 (7.1-7.2)	8.5	10.8
18-79	Adults	1747	8.7 (8.6-8.8)	5.6	7.2	8.5 (8.4-8.6)	10.0	12.5
1-17	Boys	895	7.9 (7.7-8.0)	4.5	6.4	7.8 (7.6-8.0)	9.3	11.5
1-17	Girls	928	6.7 (6.6-6.8)	4.2	5.6	6.7 (6.5-6.8)	7.8	9.5
18-79	Men	880	9.9 (9.7-10.1)	6.9	8.5	9.7 (9.5-9.9)	11.1	13.3
18-79	Women	867	7.6 (7.4-7.7)	5.2	6.5	7.5 (7.3-7.6)	8.6	10.3
1-3	Boys	353	5.5 (5.5-5.7)	3.5	4.5	5.4 (5.3-5.6)	6.4	8.1
1-3	Girls	350	5.2 (5.1-5.3)	3.2	4.3	5.1 (5.0-5.2)	6.0	7.5
4-11	Boys	270	7.8 (7.5-7.9)	5.1	6.5	7.6 (7.4-7.8)	8.9	10.8
4-11	Girls	278	6.7 (6.6-6.9)	4.6	5.7	6.6 (6.5-6.8)	7.6	9.3
12-17	Boys	272	9.1 (8.9-9.3)	6.4	7.8	9.0 (8.8-9.2)	10.3	12.4
12-17	Girls	300	7.4 (7.3-7.6)	5.1	6.4	7.3 (7.1-7.4)	8.4	10.1
18-50	Men	318	10.1 (9.9-10.4)	7.1	8.7	9.9 (9.7-10.2)	11.3	13.5
18-50	Women	284	7.7 (7.4-7.9)	5.3	6.6	7.6 (7.3-7.8)	8.7	10.4
51-64	Men	251	9.8 (9.6-10.0)	6.9	8.4	9.7 (9.5-9.9)	11.0	13.2
51-64	Women	287	7.5 (7.4-7.7)	5.2	6.5	7.4 (7.3-7.5)	8.5	10.2
65-79	Men	311	9.3 (9.1-9.5)	6.5	8.0	9.2 (8.9-9.3)	10.5	12.6
65-79	Women	296	7.4 (7.1-7.6)	5.1	6.3	7.3 (7.0-7.5)	8.3	10.0

3.3.2 *Protein*

In Figure 3.2 and Table 3.2, the distribution of the habitual intake of protein in gram per kg body weight from exclusively foods is presented. The protein intake in absolute amounts (g/day) and relative to energy intake (En%) are presented in Tables 3.3 and 3.4. The intake of animal protein, vegetable protein and the contribution of vegetable protein to the total protein intake are presented in Tables 3.5 to 3.7. Since there were only a few users of protein supplements, protein intake from foods and supplements could not be calculated.

The average total protein intake was 76 g/day (median intake was 74 g/day) and the average contribution of protein to energy intake was 15.5 En% (median intake was 15.3 En%). Boys had a higher intake of protein than girls (65 and 56 g/day, respectively) and men had a higher intake than women (90 and 69 g/day, respectively). When the protein intake is expressed in gram per kg body weight, the intake by boys was about equal to the intake by girls (2.04 and 1.89 g/kg/day, respectively). The intake differed significantly, but this diference was not relevant (<10%). The intake by men was higher than the intake by women (1.10 and 0.98 g/kg/day, respectively). The contribution of protein to total energy intake was about equal for both genders.
Adults had a higher total protein intake than children (80 and 61 g/day, respectively). This was seen in both boys/men and girls/women. Also, the contribution of protein to total energy intake was higher by adults than by children (15.8 and 14.2 En%, respectively). This was especially seen in girls/women. The average intake of protein per kg body weight was higher for children than for adults (1.97 and 1.04 g/kg/day, respectively). This was seen in both boys/men and girls/women.

Dietary protein has an animal or vegetable origin. In all age groups, the mean habitual intake was higher for animal than for vegetable protein. The total average habitual animal protein intake was 45 g/day and for vegetable protein this was 31 g/day. Thus at the total population level, the proportion of vegetable protein is 41% (the total amount of vegetable protein divided by the total amount of protein for all persons). Table 3.7 shows the average contribution of vegetable protein to the total protein intake. This was assessed for each person by calculating the proportion of vegetable protein to the total protein of that person and taking the mean of all the proportions. This contribution is of more relevance from the public health point of view. The average contribution of vegetable protein to the total protein intake was 43% with an interquartile range of 35% to 49%. The contribution was about equal for boys and for girls (45% and 47%, respectively) and also for men and for women (both 42%). The contribution of vegetable protein to the total protein intake by children was higher than the contribution by adults (46% and 42%, respectively). This was especially seen in girls/women.

On average, the most important sources of protein were 'Meat (incl. substitutes)' (26%), 'Dairy (incl. substitutes)' (24%) and 'Bread, cereals, rice, pasta' (23%). Other food groups contributed 5% or less (see section 3.5).

Protein intake was evaluated using the EAR established by the Health Council.[29] This EAR was expressed in grams of protein per kilogram bodyweight per day (g/kg bw/day). In this study, evaluation of the protein intake per kilogram body weight was based on the actual body weight of the participants. For children, men, and women aged 65-79, adequate intakes were observed. Low intakes were observed for women aged 18-64, as about 12% had an intake below the EAR. This evaluation is complicated by the fact that the EAR was determined for persons with a healthy weight,[30] while a substantial subgroup in our population was overweight or obese. Their actual protein requirement will be lower than the currently used protein requirement, assuming that the extra kilograms compared to a healthy weight will be partly fat tissue. In 2023, the Health Council stated that calculation of the protein requirements based on the actual weight overestimates the actual requirements.[30] Based on evaluation of the protein intake using participants' healthy weight (calculated from the participants' height and a BMI of 22), less than 10% for each age-gender group had an intake below the EAR.[31] This indicates that the habitual total protein intake was considered adequate for all age-gender groups.

Thus, we assume that the total intake of proteins in the Netherlands probably met the health recommendations. The proportion of animal protein was about 60%. The Dutch government has set a target of 50% by 2030[32], and The Council for the Environment and Infrastructure recommended that the proportion of animal protein should be reduced to no more than 40% by 2030.[33] In the current survey less than 25% of the population met the target of a maximum 50% animal protein, and about 5% of the population met the target of 40%.

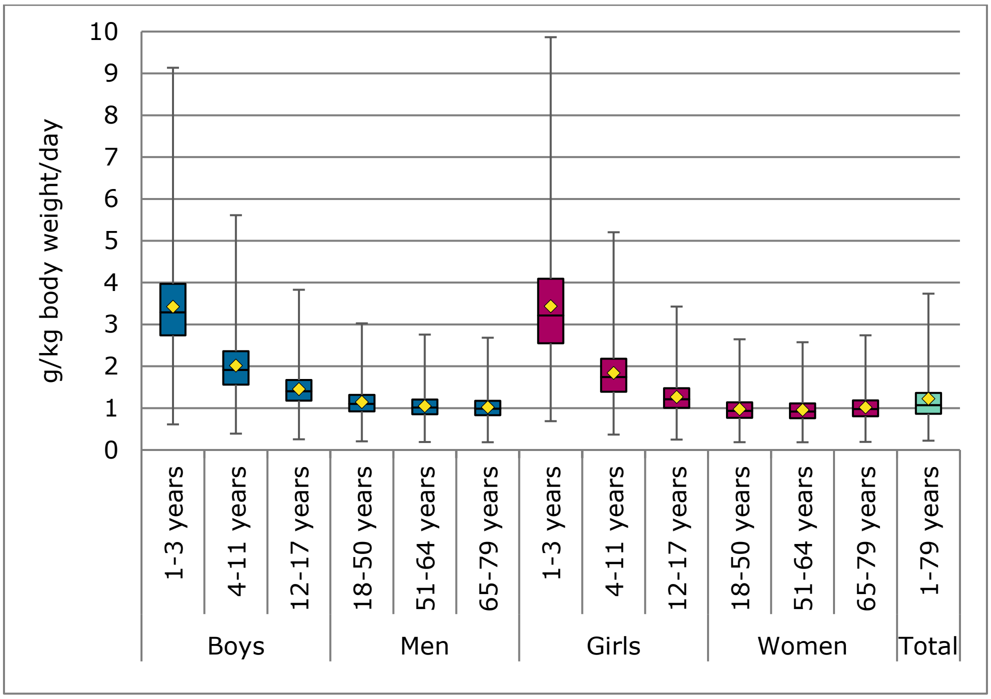


Figure 3.2 Habitual intake distribution of protein (g/kg body weight/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 3.2 Habitual intake distribution of protein (g/kg body weight/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR[a]	% (95%-CI) <EAR	Evaluation EAR
1-79	Total	3570	1.23 (1.21-1.24)	0.64	0.86	1.07 (1.05-1.09)	1.36	2.37			
1-17	Children	1823	1.97 (1.94-2.01)	0.93	1.30	1.70 (1.67-1.76)	2.34	3.92			
18-79	Adults	1747	1.04 (1.02-1.05)	0.62	0.82	1.00 (0.98-1.01)	1.21	1.58			
1-17	Boys	895	2.04 (2.00-2.10)	1.03	1.39	1.79 (1.74-1.88)	2.44	3.90			
1-17	Girls	928	1.89 (1.85-1.94)	0.86	1.22	1.61 (1.56-1.65)	2.24	3.95			
18-79	Men	880	1.10 (1.06-1.12)	0.69	0.89	1.06 (1.03-1.08)	1.26	1.64			
18-79	Women	867	0.98 (0.95-1.00)	0.58	0.77	0.94 (0.91-0.96)	1.14	1.51			
1-3	Boys	353	3.42 (3.28-3.54)	2.13	2.74	3.29 (3.14-3.42)	3.97	5.16	0.73-0.95	0.0 (0.0-0.0)	Adequate intakes
1-3	Girls	350	3.44 (3.32-3.54)	1.86	2.55	3.21 (3.12-3.31)	4.09	5.77	0.73-0.95	0.0 (0.0-0.0)	Adequate intakes
4-11	Boys	270	2.02 (1.96-2.09)	1.17	1.56	1.91 (1.85-2.00)	2.36	3.25	0.69-0.75	0.0 (0.0-0.1)	Adequate intakes
4-11	Girls	278	1.84 (1.79-1.90)	1.02	1.39	1.74 (1.69-1.80)	2.18	3.02	0.69-0.75	0.5 (0.2-0.6)	Adequate intakes
12-17	Boys	272	1.45 (1.41-1.54)	0.92	1.18	1.41 (1.36-1.49)	1.67	2.16	0.70-0.74	0.5 (0.1-0.7)	Adequate intakes
12-17	Girls	300	1.27 (1.24-1.30)	0.76	1.01	1.21 (1.19-1.25)	1.48	1.95	0.67-0.72	2.4 (1.6-3.3)	Adequate intakes
18-50	Men	318	1.14 (1.10-1.17)	0.72	0.92	1.10 (1.06-1.13)	1.32	1.71	0.66	2.5 (1.7-3.6)	Adequate intakes
18-50	Women	284	0.98 (0.94-1.01)	0.58	0.77	0.94 (0.90-0.97)	1.14	1.51	0.66	11.5 (8.5-14.9)	Low intakes[b]

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR[a]	% (95%-CI) <EAR	Evaluation EAR
51-64	Men	251	1.05 (1.01-1.07)	0.66	0.85	1.02 (0.98-1.04)	1.21	1.55	0.66	4.8 (3.6-6.4)	Adequate intakes
51-64	Women	287	0.96 (0.93-0.98)	0.57	0.76	0.92 (0.89-0.94)	1.11	1.46	0.66	12.2 (10.0-15.0)	Low intakes[b]
65-79	Men	311	1.02 (0.99-1.05)	0.65	0.83	0.99 (0.95-1.02)	1.18	1.51	0.66	5.9 (4.1-7.9)	Adequate intakes
65-79	Women	296	1.02 (0.98-1.05)	0.61	0.81	0.98 (0.94-1.01)	1.19	1.56	0.66	8.4 (6.3-10.5)	Adequate intakes

[a] EAR is shown as highest and lowest value of the range applicable to the age group.
[b] When the evaluation is based on the healthy weight in stead of the reported weight the evaluation is 'Adequate intakes'.

Table 3.3 Habitual intake distribution of protein (g/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	76 (75-77)	44	60	74 (73-75)	90	113
1-17	Children	1823	61 (59-62)	35	48	59 (58-60)	71	92
18-79	Adults	1747	80 (79-80)	49	65	78 (77-78)	93	116
1-17	Boys	895	65 (65-67)	37	52	64 (64-66)	78	98
1-17	Girls	928	56 (54-56)	34	46	55 (53-55)	65	81
18-79	Men	880	90 (88-92)	62	77	89 (87-90)	102	123
18-79	Women	867	69 (68-70)	45	58	68 (67-69)	80	98
1-3	Boys	353	46 (46-51)	28	37	45 (45-50)	54	68
1-3	Girls	350	49 (45-51)	29	40	48 (44-50)	57	72
4-11	Boys	270	63 (63-65)	40	52	62 (61-64)	73	91
4-11	Girls	278	55 (53-56)	35	45	54 (51-56)	64	80
12-17	Boys	272	77 (74-77)	51	65	76 (73-76)	87	107
12-17	Girls	300	60 (58-60)	39	50	59 (57-59)	69	85
18-50	Men	318	91 (87-92)	63	78	90 (85-90)	103	125
18-50	Women	284	67 (64-67)	43	56	66 (63-66)	77	94
51-64	Men	251	91 (90-93)	63	77	90 (89-92)	103	124
51-64	Women	287	72 (71-73)	47	60	70 (70-72)	82	100
65-79	Men	311	86 (88-91)	58	73	85 (87-90)	98	118
65-79	Women	296	74 (75-76)	49	62	73 (73-75)	85	103

Table 3.4 Habitual intake distribution of protein (En%) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	15.5 (15.3-15.6)	11.5	13.6	15.3 (15.1-15.4)	17.1	20.1
1-17	Children	1823	14.2 (14.1-14.3)	10.7	12.6	14.0 (13.9-14.2)	15.6	18.2
18-79	Adults	1747	15.8 (15.6-16.0)	11.8	13.9	15.6 (15.4-15.7)	17.4	20.4
1-17	Boys	895	14.3 (14.1-14.5)	11.0	12.8	14.2 (14.0-14.4)	15.7	18.1
1-17	Girls	928	14.1 (13.9-14.3)	10.5	12.4	13.9 (13.7-14.1)	15.6	18.4
18-79	Men	880	15.7 (15.5-15.9)	12.1	14.0	15.5 (15.3-15.7)	17.2	19.9
18-79	Women	867	15.9 (15.6-16.1)	11.6	13.8	15.6 (15.4-15.9)	17.6	20.9
1-3	Boys	353	13.9 (13.7-14.2)	10.8	12.4	13.8 (13.6-14.1)	15.2	17.8
1-3	Girls	350	14.0 (13.7-14.6)	10.4	12.4	13.8 (13.5-14.3)	15.5	18.4
4-11	Boys	270	14.2 (14.0-14.4)	11.0	12.7	14.1 (13.8-14.3)	15.6	17.9
4-11	Girls	278	14.1 (13.6-14.3)	10.5	12.4	13.9 (13.4-14.1)	15.6	18.3
12-17	Boys	272	14.6 (14.4-14.9)	11.3	13.0	14.4 (14.2-14.7)	15.9	18.4
12-17	Girls	300	14.2 (13.9-14.5)	10.5	12.5	14.0 (13.7-14.3)	15.7	18.5
18-50	Men	318	15.5 (15.2-15.7)	11.9	13.8	15.3 (15.1-15.6)	16.9	19.6
18-50	Women	284	15.2 (15.0-15.6)	11.2	13.3	15.0 (14.8-15.3)	16.9	20.0
51-64	Men	251	16.0 (15.6-16.2)	12.3	14.3	15.8 (15.5-16.0)	17.5	20.1
51-64	Women	287	16.6 (16.0-16.9)	12.3	14.6	16.3 (15.8-16.6)	18.3	21.6
65-79	Men	311	16.0 (15.7-16.3)	12.4	14.4	15.9 (15.5-16.1)	17.5	20.2
65-79	Women	296	16.8 (16.4-17.2)	12.4	14.7	16.6 (16.2-16.9)	18.6	21.8

Table 3.5 Habitual intake distribution of animal protein (g/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	45 (44-45)	20	33	43 (42-43)	56	76
1-17	Children	1823	34 (33-35)	15	24	33 (31-33)	42	59
18-79	Adults	1747	48 (47-48)	23	36	46 (44-46)	58	78
1-17	Boys	895	37 (37-39)	16	26	36 (35-37)	46	63
1-17	Girls	928	32 (29-32)	14	23	30 (28-31)	39	53
18-79	Men	880	54 (53-54)	30	42	53 (51-52)	64	84
18-79	Women	867	42 (40-42)	20	31	40 (38-41)	51	68
1-3	Boys	353	26 (27-30)	11	19	25 (25-28)	32	45
1-3	Girls	350	30 (27-31)	13	22	29 (26-30)	37	50
4-11	Boys	270	36 (36-38)	17	26	34 (34-36)	43	59
4-11	Girls	278	31 (29-32)	14	23	30 (28-31)	38	53
12-17	Boys	272	44 (42-44)	23	33	42 (40-42)	53	69
12-17	Girls	300	33 (31-34)	15	24	32 (29-32)	41	55
18-50	Men	318	54 (51-51)	30	42	52 (49-49)	64	83
18-50	Women	284	38 (37-39)	18	28	37 (35-37)	47	63
51-64	Men	251	55 (56-56)	31	44	54 (54-54)	66	85
51-64	Women	287	44 (42-45)	23	34	43 (41-44)	53	70
65-79	Men	311	54 (58-58)	30	42	52 (56-57)	64	83
65-79	Women	296	48 (45-50)	25	37	46 (44-49)	57	75

Table 3.6 Habitual intake distribution of vegetable protein (g/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	31 (30-32)	17	24	30 (30-30)	36	48
1-17	Children	1823	26 (26-27)	14	20	25 (25-26)	31	42
18-79	Adults	1747	32 (31-33)	18	25	31 (31-32)	38	49
1-17	Boys	895	28 (27-30)	15	22	28 (26-29)	34	44
1-17	Girls	928	24 (24-25)	14	19	24 (23-24)	29	37
18-79	Men	880	36 (35-38)	22	29	35 (34-37)	42	52
18-79	Women	867	28 (28-28)	17	23	27 (27-28)	32	41
1-3	Boys	353	20 (19-22)	11	16	19 (18-21)	24	31
1-3	Girls	350	19 (18-21)	11	15	18 (17-20)	23	30
4-11	Boys	270	27 (25-29)	16	22	27 (25-29)	32	41
4-11	Girls	278	24 (24-25)	14	19	23 (23-24)	28	36
12-17	Boys	272	33 (31-35)	20	27	32 (30-34)	38	48
12-17	Girls	300	27 (25-28)	16	22	26 (25-27)	31	40
18-50	Men	318	38 (36-41)	24	31	37 (35-40)	43	54
18-50	Women	284	29 (27-30)	17	23	28 (26-29)	33	42
51-64	Men	251	35 (34-38)	22	29	35 (33-37)	41	51
51-64	Women	287	28 (27-29)	17	22	27 (27-28)	32	41
65-79	Men	311	32 (31-33)	20	26	31 (30-32)	37	47
65-79	Women	296	26 (25-30)	16	21	26 (24-30)	31	39

Table 3.7 Habitual distribution of the contribution of vegetable protein to the total protein intake (%) by the Dutch population aged 1-79 (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	43 (42-43)	27	35	42 (42-42)	49	61
1-17	Children	1823	46 (45-47)	31	39	46 (45-46)	53	65
18-79	Adults	1747	42 (41-42)	27	35	41 (41-41)	48	59
1-17	Boys	895	45 (45-46)	31	39	45 (45-45)	51	62
1-17	Girls	928	47 (45-49)	30	39	46 (44-48)	54	67
18-79	Men	880	42 (41-42)	28	35	41 (41-42)	47	57
18-79	Women	867	42 (41-43)	26	34	41 (40-42)	48	61
1-3	Boys	353	46 (46-46)	32	39	46 (45-46)	52	63
1-3	Girls	350	48 (46-51)	31	40	48 (45-50)	56	69
4-11	Boys	270	46 (45-46)	31	39	45 (45-45)	52	62
4-11	Girls	278	47 (45-50)	30	39	47 (45-49)	54	67
12-17	Boys	272	45 (45-45)	31	38	44 (44-45)	51	61
12-17	Girls	300	46 (44-48)	30	38	45 (44-47)	53	66
18-50	Men	318	43 (42-43)	29	36	42 (42-43)	49	59
18-50	Women	284	43 (42-45)	27	36	42 (41-44)	50	62
51-64	Men	251	41 (40-41)	27	35	40 (40-41)	46	56
51-64	Women	287	40 (40-42)	25	33	39 (39-41)	47	59
65-79	Men	311	40 (39-40)	26	33	39 (39-40)	45	55
65-79	Women	296	38 (38-40)	23	31	38 (37-39)	45	56

3.3.3 *Carbohydrates*

3.3.3.1 Total carbohydrates

In Figure 3.3 and Tables 3.8 and 3.9, the distribution of the habitual intake of total carbohydrates is presented in both absolute amounts (g/day) as well as relative to energy intake (En%).

The average habitual intake of total carbohydrates relative to energy intake was 43.1 En% and the median intake was equal. In absolute amounts, the average habitual intake of total carbohydrates was 213 g/day and the median intake was 208 g/day.

The average intake of total carbohydrates relative to energy by boys was equal to the intake by girls (48.9 En%). The average intake by men and by women was almost equal (41.4 and 41.9 En%, respectively). In absolute amounts, the average total carbohydrates intake by boys (228 g/day) was higher than by girls (195 g/day), and the intake by men (240 g/day) was higher than the intake by women (188 g/day).

Children had a higher intake of total carbohydrates relative to energy intake than adults (48.9 En% and 41.7 En%, respectively). This was seen in both boys/men and girls/women. In absolute amounts, the intake of total carbohydrates by children and adults was almost equal (211 g/day and 214 g/day, respectively), which was seen in both boys/men and girls/women.

On average, the most important source of total carbohydrates was ‘Bread, cereals, rice, pasta’ (37%). ‘Dairy (incl. substitutes)’ and ‘Fruits, nuts, olives’ each contributed 10% to total carbohydrate intake. Other groups contributed 9% or less (see section 3.5).

The adequate intake set by the Health Council of the Netherlands for total carbohydrates is only set for the percentage of energy intake.[25] The median intake of total carbohydrates (En%) was equal or above the RDA for the entire population, indicating that intake seemed adequate.

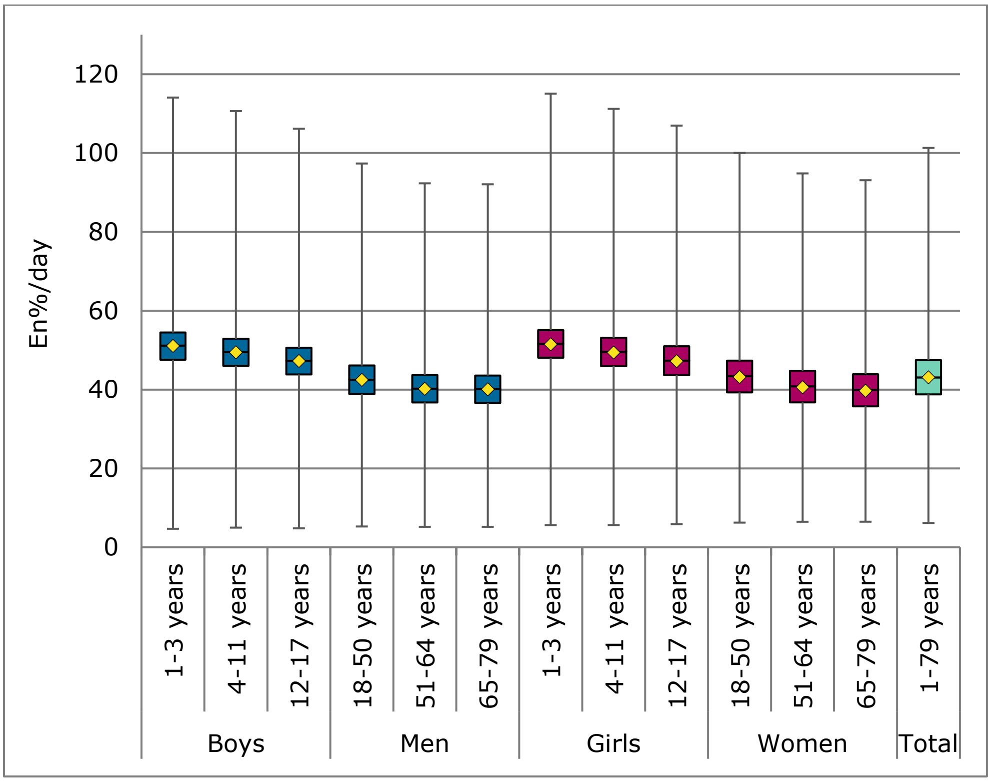


Figure 3.3 Habitual intake distribution of total carbohydrates (En%) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 3.8 Habitual intake distribution of total carbohydrates (En%) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	RDA[a]	P50 related to RDA	Evaluation RDA
1-79	Total	3570	43.1 (42.8-43.4)	32.6	38.8	43.1 (42.8-43.3)	47.5	53.8			
1-17	Children	1823	48.9 (48.6-49.3)	39.8	45.3	49.0 (48.7-49.4)	52.6	57.7			
18-79	Adults	1747	41.7 (41.3-42.0)	31.9	37.8	41.8 (41.4-42.0)	45.6	51.1			
1-17	Boys	895	48.9 (48.4-49.3)	40.3	45.4	48.9 (48.5-49.4)	52.4	57.5			
1-17	Girls	928	48.9 (48.5-49.4)	39.4	45.3	49.1 (48.6-49.6)	52.8	58.0			
18-79	Men	880	41.4 (41.0-41.9)	32.5	37.8	41.5 (41.0-41.9)	45.1	50.3			
18-79	Women	867	41.9 (41.3-42.3)	31.3	37.8	42.1 (41.5-42.5)	46.2	51.7			
1-3	Boys	353	51.1 (50.6-51.9)	42.9	47.6	51.1 (50.6-51.9)	54.5	59.6	45	P50>RDA	Seems adequate
1-3	Girls	350	51.5 (50.9-52.1)	42.5	48.1	51.6 (51.0-52.2)	55.1	60.0	45	P50>RDA	Seems adequate
4-11	Boys	270	49.4 (48.9-49.9)	41.1	46.0	49.5 (48.9-49.9)	52.9	57.7	45	P50>RDA	Seems adequate
4-11	Girls	278	49.4 (49.0-50.0)	40.3	45.9	49.6 (49.1-50.1)	53.2	58.0	45	P50>RDA	Seems adequate
12-17	Boys	272	47.2 (46.7-47.8)	39.0	43.8	47.3 (46.7-47.9)	50.6	55.5	40;45[b]	P50>RDA	Seems adequate
12-17	Girls	300	47.2 (46.4-47.9)	37.8	43.7	47.3 (46.6-48.1)	51.0	56.0	40;45[b]	P50>RDA	Seems adequate
18-50	Men	318	42.5 (41.9-43.1)	33.6	38.9	42.5 (41.9-43.1)	46.1	51.3	40	P50>RDA	Seems adequate
18-50	Women	284	43.2 (42.5-43.7)	33.0	39.3	43.4 (42.7-43.8)	47.3	52.7	40	P50>RDA	Seems adequate
51-64	Men	251	40.2 (39.6-40.8)	31.5	36.7	40.2 (39.6-40.8)	43.7	48.6	40	P50>RDA	Seems adequate
51-64	Women	287	40.6 (39.8-41.2)	30.3	36.8	40.8 (40.0-41.4)	44.8	50.1	40	P50>RDA	Seems adequate
65-79	Men	311	40.1 (39.3-40.7)	31.4	36.6	40.1 (39.4-40.7)	43.6	48.5	40	P50>RDA	Seems adequate
65-79	Women	296	39.7 (39.1-40.7)	29.3	35.8	39.9 (39.3-41.0)	43.9	49.2	40	P50<RDA	Seems adequate[c]

[a] RDA=recommended dietary allowance.
[b] RI 12-13 years=45, 14+ years=40.
[c] P50<RDA, however, RDA within confidence interval. Therefore, intake is evaluated as seems adequate.

Table 3.9 Habitual intake distribution of total carbohydrates (g/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	213 (210-217)	125	172	208 (205-211)	249	319
1-17	Children	1823	211 (208-213)	121	170	207 (203-209)	248	315
18-79	Adults	1747	214 (211-218)	126	172	208 (205-212)	250	319
1-17	Boys	895	228 (223-232)	131	184	224 (218-227)	267	337
1-17	Girls	928	195 (191-197)	115	160	193 (189-196)	228	280
18-79	Men	880	240 (236-247)	154	199	235 (231-242)	276	344
18-79	Women	867	188 (184-191)	114	154	185 (181-188)	218	270
1-3	Boys	353	170 (166-174)	98	134	164 (161-170)	200	259
1-3	Girls	350	159 (155-163)	86	125	156 (153-160)	189	240
4-11	Boys	270	230 (221-233)	146	189	225 (216-228)	265	330
4-11	Girls	278	199 (195-202)	125	165	196 (192-199)	229	281
12-17	Boys	272	251 (247-258)	166	209	247 (242-253)	287	357
12-17	Girls	300	206 (199-210)	130	172	203 (197-208)	237	289
18-50	Men	318	250 (244-262)	163	208	245 (239-256)	286	354
18-50	Women	284	195 (189-199)	121	161	192 (187-197)	226	277
51-64	Men	251	234 (229-239)	151	194	229 (224-234)	268	333
51-64	Women	287	182 (178-186)	110	150	179 (175-183)	212	261
65-79	Men	311	221 (212-225)	142	183	217 (207-220)	254	317
65-79	Women	296	174 (169-180)	104	142	172 (167-178)	204	253

3.3.3.2 Mono- and disaccharides

In Figure 3.4 and Tables 3.10 and 3.11, the distribution of the habitual intake of mono- and disaccharides is presented in both absolute amounts (g/day) as well as relative to energy intake (En%).

The average habitual intake of mono- and disaccharides relative to energy intake was 18.8 En% and the median intake was 18.4 En%. In absolute amounts, the average habitual intake of mono- and disaccharides was 93 g/day and the median intake was 89 g/day.

The average intake of mono- and disaccharides relative to energy by boys (22.9 En%) was almost equal to the intake by girls (23.2 En%), and the average intake by men (17.2 En%) was almost equal to the intake by women (18.3 En%). In absolute amounts, the average mono- and disaccharides intake by boys (105 g/day) was higher than by girls (89 g/day), and the intake by men (101 g/day) was higher than the intake by women (83 g/day).

Children had a higher intake of mono- and disaccharides relative to energy intake than adults (23.1 En% and 17.8 En%, respectively). This was seen in both boys/men and girls/women. In absolute amounts, the intake of mono- and disaccharides by children and adults was almost equal (97 g/day and 92 g/day, respectively). This was also seen in both boys/men and girls/women.

On average, the most important sources of mono- and disaccharides were ‘Dairy (incl. substitutes)’ (20%), ‘Fruits, nuts, olives’ (19%), ‘Non-alcoholic beverages (15%), ‘Sugar and confectionery’ (15%) and ‘Cakes and sweet biscuits’ (11%). Other groups contributed 7% or less (see section 3.5).

For mono- and disaccharides, no dietary reference value has been set by the Health Council in the Netherlands. Therefore, no statement could be made about adequacy of intake.

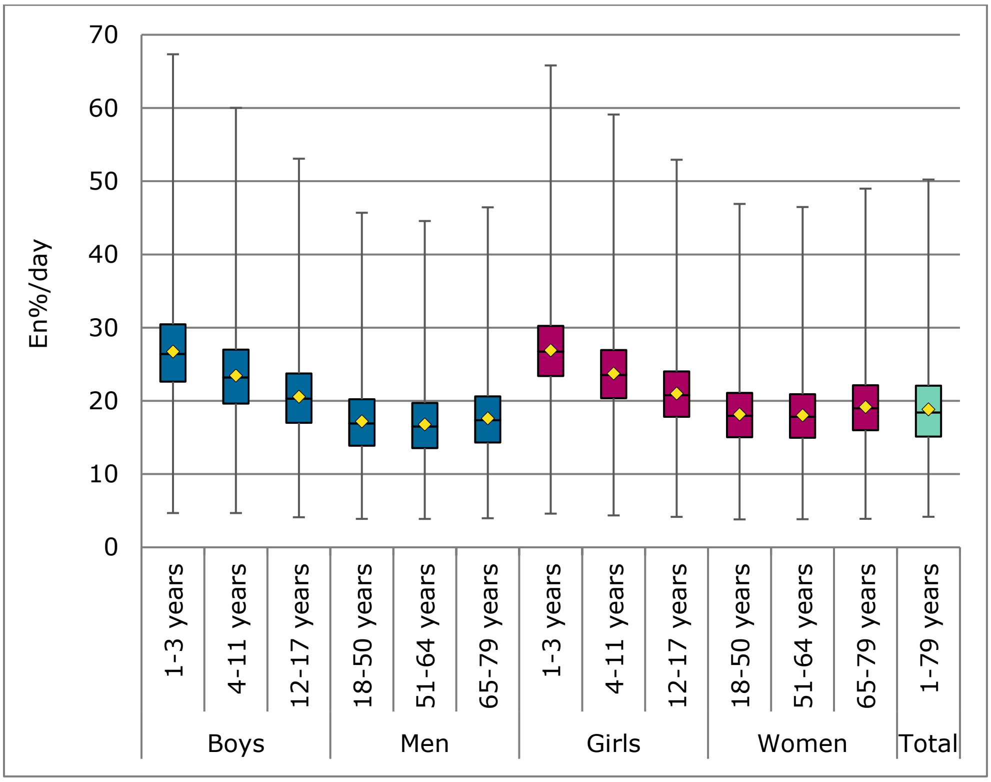


Figure 3.4 Habitual intake distribution of mono- and disaccharides (En%) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 3.10 Habitual intake distribution of mono- and disaccharides (En%) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	18.8 (18.6-19.1)	11.0	15.1	18.4 (18.2-18.7)	22.1	28.2
1-17	Children	1823	23.1 (22.8-23.4)	14.5	19.2	22.8 (22.5-23.1)	26.6	32.7
18-79	Adults	1747	17.8 (17.5-18.0)	10.6	14.5	17.5 (17.3-17.8)	20.8	25.7
1-17	Boys	895	22.9 (22.5-23.5)	14.1	18.8	22.6 (22.1-23.1)	26.6	33.1
1-17	Girls	928	23.2 (22.8-23.6)	15.0	19.5	23.0 (22.5-23.4)	26.7	32.3
18-79	Men	880	17.2 (16.8-17.5)	10.0	13.9	16.9 (16.5-17.2)	20.2	25.4
18-79	Women	867	18.3 (18.0-18.8)	11.3	15.2	18.1 (17.8-18.6)	21.2	26.0
1-3	Boys	353	26.7 (26.1-27.5)	17.9	22.6	26.4 (25.8-27.2)	30.5	36.9
1-3	Girls	350	26.9 (26.4-27.5)	18.8	23.4	26.7 (26.2-27.4)	30.2	35.6
4-11	Boys	270	23.5 (22.9-24.0)	15.0	19.6	23.2 (22.7-23.7)	27.0	33.0
4-11	Girls	278	23.7 (23.1-24.2)	16.0	20.4	23.5 (22.9-24.0)	26.9	32.2
12-17	Boys	272	20.6 (20.1-21.4)	12.9	17.0	20.3 (19.8-21.1)	23.7	29.3
12-17	Girls	300	21.0 (20.5-21.4)	13.7	17.8	20.8 (20.3-21.2)	24.0	28.9
18-50	Men	318	17.2 (16.7-17.7)	10.0	13.9	16.9 (16.4-17.4)	20.2	25.5
18-50	Women	284	18.2 (17.7-18.8)	11.2	15.0	18.0 (17.5-18.6)	21.1	25.8
51-64	Men	251	16.8 (16.2-17.2)	9.7	13.6	16.5 (15.9-16.9)	19.7	24.8
51-64	Women	287	18.0 (17.6-18.5)	11.1	15.0	17.8 (17.4-18.3)	20.9	25.6
65-79	Men	311	17.6 (17.0-18.2)	10.3	14.3	17.4 (16.7-18.0)	20.6	25.8
65-79	Women	296	19.2 (18.6-19.6)	12.1	16.0	19.0 (18.4-19.5)	22.1	26.9

Table 3.11 Habitual intake distribution of mono- and disaccharides (g/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	93 (91-95)	47	69	89 (87-91)	112	154
1-17	Children	1823	97 (95-99)	50	73	93 (91-95)	116	159
18-79	Adults	1747	92 (90-94)	46	69	88 (86-90)	111	152
1-17	Boys	895	105 (102-108)	52	78	101 (98-104)	128	173
1-17	Girls	928	89 (87-91)	48	69	86 (85-89)	106	138
18-79	Men	880	101 (98-104)	50	75	97 (94-100)	123	166
18-79	Women	867	83 (80-86)	43	64	81 (78-83)	100	131
1-3	Boys	353	90 (86-94)	42	65	85 (82-90)	110	154
1-3	Girls	350	90 (85-94)	49	71	87 (82-91)	107	141
4-11	Boys	270	107 (103-110)	54	80	104 (99-106)	130	174
4-11	Girls	278	90 (87-92)	49	70	87 (85-90)	107	139
12-17	Boys	272	109 (105-114)	57	82	106 (101-110)	132	178
12-17	Girls	300	88 (86-90)	47	68	85 (83-88)	105	137
18-50	Men	318	104 (101-108)	53	78	100 (97-104)	126	170
18-50	Women	284	83 (81-87)	44	64	81 (78-84)	100	131
51-64	Men	251	99 (96-101)	49	74	95 (92-97)	120	163
51-64	Women	287	82 (78-85)	42	63	79 (75-83)	98	129
65-79	Men	311	96 (92-99)	47	71	92 (88-95)	116	158
65-79	Women	296	84 (81-87)	44	64	81 (78-84)	100	132

3.3.3.3 Polysaccharides

The distribution of the habitual intake of polysaccharides is presented as relative to energy intake (En%) and in absolute amounts (g/day) (Tables 3.12 and 3.13).

The average habitual intake of polysaccharides relative to energy intake was 24.0 En% and the median intake was 24.1 En%. In absolute amounts, the average habitual intake of polysaccharides was 120 g/day and the median intake was 117 g/day.

The average intake of polysaccharides relative to energy intake by boys was equal to the intake by girls (both 26.0 En%) and the average intake by men (24.0 En%) was almost equal to the intake by women (23.0 En%). In absolute amounts, the average polysaccharides intake by boys (122 g/day) was higher than the intake by girls (104 g/day) and the intake by men (140 g/day) was higher than that by women (103 g/day).

The intake of polysaccharides relative to energy intake by men (24.0 En%) was almost equal to the intake by boys (26.0 En%). Girls had a higher intake of polysaccharides relative to energy intake than women (26.0 and 23.0 En%, respectively). In absolute amounts, the intake of polysaccharides by men (140 g/day) was higher than the intake by boys (122 g/day). The intake by women (103 g/day) was almost equal to the intake by girls (104 g/day).

On average, the most important source of polysaccharides was 'Bread, cereals, rice, pasta' (59%). In addition, 'Potatoes' (12%) was also an important contributor to the intake of polysaccharides. Other groups contributed 7% or less (see section 3.5).

For polysaccharides, no dietary reference value has been set by the Health Council in the Netherlands. Therefore, the adequacy of the intake could not be assessed.

Table 3.12 Habitual intake distribution of polysaccharides (En%) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	24.0 (23.8-24.2)	16.5	21.1	24.1 (23.8-24.3)	27.1	31.4
1-17	Children	1823	26.0 (25.7-26.2)	19.0	23.1	25.9 (25.7-26.2)	28.8	32.9
18-79	Adults	1747	23.5 (23.3-23.8)	16.1	20.6	23.6 (23.3-23.8)	26.5	30.8
1-17	Boys	895	26.0 (25.6-26.3)	19.7	23.3	25.9 (25.6-26.3)	28.5	32.3
1-17	Girls	928	26.0 (25.6-26.2)	18.3	22.9	25.9 (25.6-26.2)	29.1	33.5
18-79	Men	880	24.0 (23.7-24.3)	17.6	21.4	24.0 (23.6-24.3)	26.7	30.5
18-79	Women	867	23.0 (22.7-23.5)	15.0	19.7	23.1 (22.7-23.5)	26.3	31.0
1-3	Boys	353	24.6 (23.9-25.5)	18.3	21.9	24.5 (23.9-25.5)	27.2	31.2
1-3	Girls	350	24.6 (24.0-25.3)	16.9	21.6	24.6 (24.0-25.3)	27.8	32.3
4-11	Boys	270	26.2 (25.7-26.6)	20.0	23.6	26.2 (25.7-26.6)	28.8	32.4
4-11	Girls	278	26.3 (25.8-26.6)	18.8	23.2	26.2 (25.8-26.6)	29.4	33.7
12-17	Boys	272	26.3 (25.6-26.8)	20.2	23.7	26.3 (25.6-26.7)	28.8	32.5
12-17	Girls	300	26.2 (25.7-26.7)	18.6	23.1	26.2 (25.7-26.6)	29.2	33.7
18-50	Men	318	24.9 (24.3-25.2)	18.6	22.3	24.8 (24.2-25.2)	27.4	31.2
18-50	Women	284	24.2 (23.8-24.9)	16.5	21.0	24.2 (23.8-24.9)	27.4	31.9
51-64	Men	251	23.4 (23.1-23.7)	17.3	20.8	23.4 (23.0-23.7)	25.9	29.6
51-64	Women	287	22.1 (21.8-22.5)	14.4	19.0	22.1 (21.8-22.5)	25.3	29.7
65-79	Men	311	22.5 (22.0-23.2)	16.3	19.9	22.5 (21.9-23.1)	25.0	28.7
65-79	Women	296	20.9 (20.3-21.4)	13.2	17.7	20.9 (20.3-21.4)	24.0	28.5

Table 3.13 Habitual intake distribution of polysaccharides (g/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	120 (118-122)	64	94	117 (116-119)	143	184
1-17	Children	1823	113 (111-114)	58	88	111 (109-112)	136	175
18-79	Adults	1747	122 (120-124)	66	95	119 (117-121)	145	186
1-17	Boys	895	122 (120-125)	62	96	121 (118-123)	147	185
1-17	Girls	928	104 (102-106)	54	82	103 (101-105)	125	158
18-79	Men	880	140 (137-143)	88	116	138 (135-140)	162	200
18-79	Women	867	103 (101-106)	58	82	101 (99-104)	122	154
1-3	Boys	353	81 (79-84)	43	63	79 (77-82)	97	128
1-3	Girls	350	77 (75-79)	36	57	74 (73-77)	94	124
4-11	Boys	270	121 (118-123)	73	98	118 (115-121)	141	176
4-11	Girls	278	105 (102-107)	61	85	104 (100-106)	124	155
12-17	Boys	272	142 (139-146)	93	119	140 (137-143)	163	200
12-17	Girls	300	115 (112-117)	69	94	113 (111-116)	134	166
18-50	Men	318	148 (145-152)	97	125	146 (142-149)	170	208
18-50	Women	284	109 (106-114)	64	89	108 (105-112)	128	160
51-64	Men	251	135 (132-138)	87	113	133 (130-135)	155	191
51-64	Women	287	98 (96-101)	56	79	97 (94-99)	116	147
65-79	Men	311	122 (119-126)	77	101	120 (116-124)	141	176
65-79	Women	296	91 (87-94)	50	72	89 (85-92)	108	138

3.3.4 Fat

3.3.4.1 Total fat

In Figure 3.5 and Tables 3.14 and 3.15, the distribution of the habitual intake of total fat is presented in both absolute amounts (g/day) as well as relative to energy intake (En%).

The average habitual intake of total fat relative to energy intake was 37.2 En% and the median intake was equal. In absolute amounts, the average habitual total fat intake was 85 g/day and the median intake was 82 g/day.

The average intake of total fat relative to energy intake by boys (34.2 En%) was almost equal to the intake by girls (34.4 En%). The average intake by men and by women was also almost equal (37.8 and 38.1 En%, respectively). In absolute amounts, the average total fat intake by boys (73 g/day) was higher than by girls (63 g/day), and the intake by men (101 g/day) was higher than the intake by women (78 g/day).

Adults had a higher intake of total fat relative to energy intake than children (37.9 and 34.3 En%, respectively). This was seen in both boys/men and girls/women. Also, in absolute amounts, the total fat intake by adults (89 g/day) was higher than the intake by children (68 g/day), which was seen in both boys/men and girls/women.

On average, the most important sources of total fat were 'Dairy (incl. substitutes)' (20%), 'Meat (incl. substitutes)' (17%) and 'Fats and oils' (17%). Other groups contributed less than 10% (see section 3.5).

The adequate intake set by the Health Council of the Netherlands for total fat was defined as percentage of energy intake.[25] The median total fat intake (En%) was above the AI for the entire population, indicating that intake seemed adequate. However, high intakes were seen in all age groups for which an upper level was set by the Health Council. The upper level was exceeded by more than 30% for adults aged 18-50.

The used upper level (40 En%) was set for those with a normal weight. When the lower levels for overweight persons or persons with undesirable weight gain were taken into account (30 or 35 En%)[25], these proportions would be even higher.

Thus, fat was responsible for more than one third of the energy supply. High intakes of fat were observed in 4-79 year-olds. Excessive energy intake can result in an increase in body weight and therefore contribute to diabetes mellitus type 2 and coronary heart disease.[25] The Health Council of the Netherlands concluded in 2015 that a reduction of fat intake from 30-40 En% to 15-30% in combination with an increase in carbohydrate intake (including dietary fibre) has a positive effect on body weight.[5]

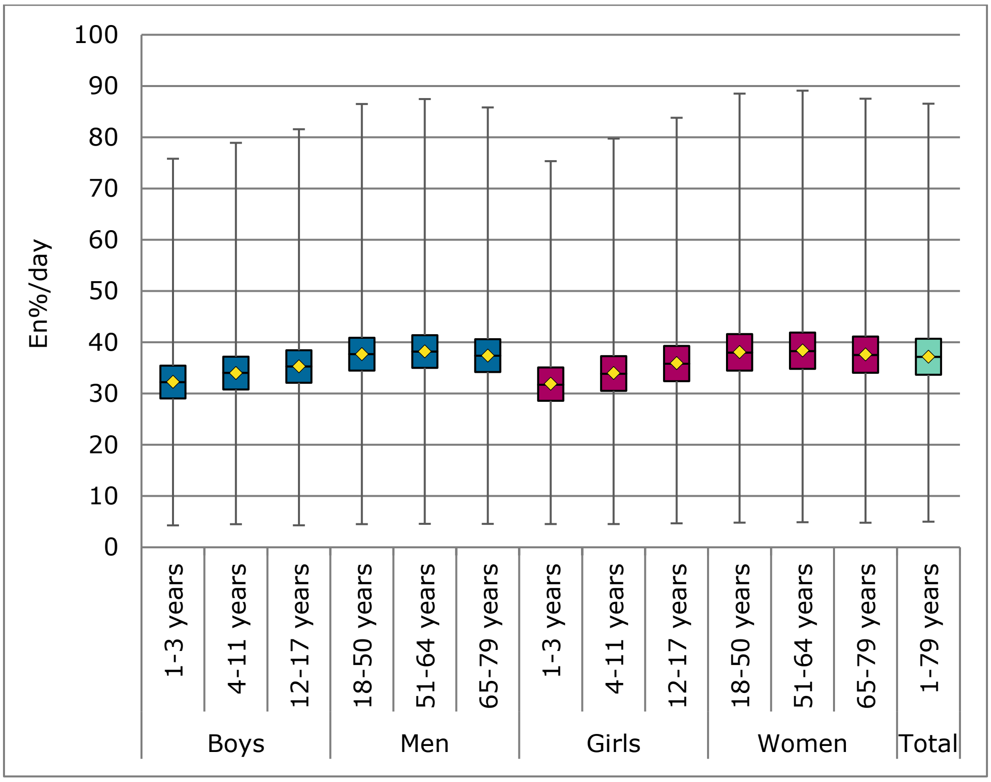


Figure 3.5 Habitual intake distribution of total fat (En%) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics and season (n=3570).

Table 3.14 Habitual intake distribution of total fat (En%) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	AI	P50 related to AI	Evaluation AI	UL	% (95%-CI) ≥UL	Evaluation UL
1-79	Total	3570	37.2 (36.9-37.4)	28.7	33.7	37.2 (36.9-37.4)	40.7	45.9						
1-17	Children	1823	34.3 (34.0-34.7)	26.2	30.9	34.2 (33.9-34.6)	37.6	42.7						
18-79	Adults	1747	37.9 (37.6-38.2)	29.8	34.5	37.9 (37.5-38.1)	41.3	46.3						
1-17	Boys	895	34.2 (33.7-34.8)	26.4	30.9	34.2 (33.7-34.7)	37.4	42.1						
1-17	Girls	928	34.4 (34.0-34.8)	26.0	30.8	34.2 (33.8-34.7)	37.8	43.2						
18-79	Men	880	37.8 (37.2-38.2)	30.0	34.6	37.8 (37.2-38.2)	41.0	45.7						
18-79	Women	867	38.1 (37.6-38.6)	29.6	34.5	38.0 (37.5-38.4)	41.6	46.9						
1-3	Boys	353	32.3 (31.5-33.5)	24.8	29.0	32.2 (31.5-33.4)	35.4	40.4	25	P50>AI	Seems adequate	40	5.8 (3.1-8.0)	High intakes
1-3	Girls	350	31.9 (31.2-32.5)	24.0	28.6	31.7 (31.0-32.3)	35.1	40.2	25	P50>AI	Seems adequate	40	5.5 (3.5-7.4)	High intakes
4-11	Boys	270	34.0 (33.4-34.6)	26.3	30.8	34.0 (33.4-34.6)	37.2	41.7	20	P50>AI	Seems adequate	40	10.4 (7.4-12.8)	High intakes
4-11	Girls	278	34.0 (33.6-34.6)	26.0	30.5	33.9 (33.4-34.5)	37.3	42.4	20	P50>AI	Seems adequate	40	11.8 (9.9-14.9)	High intakes
12-17	Boys	272	35.3 (34.4-36.2)	27.8	32.1	35.3 (34.3-36.2)	38.4	43.1	20	P50>AI	Seems adequate	40	15.7 (10.9-20.5)	High intakes
12-17	Girls	300	35.9 (35.4-36.5)	27.7	32.4	35.8 (35.3-36.4)	39.3	44.5	20	P50>AI	Seems adequate	40	20.9 (17.9-24.8)	High intakes
18-50	Men	318	37.7 (36.8-38.3)	30.0	34.5	37.7 (36.8-38.3)	40.9	45.6	20	P50>AI	Seems adequate	40	31.3 (25.0-35.6)	High intakes

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	AI	P50 related to AI	Evalu-ation AI	UL	% (95%-CI) ≥UL	Evalu-ation UL
18-50	Women	284	38.1 (37.5-38.7)	29.7	34.5	38.0 (37.4-38.6)	41.6	46.9	20	P50>AI	Seems adequate	40	35.3 (30.6-39.8)	High intakes
51-64	Men	251	38.2 (37.5-38.9)	30.4	35.0	38.2 (37.5-38.9)	41.4	46.1	20	P50>AI	Seems adequate			
51-64	Women	287	38.4 (37.8-39.0)	29.9	34.8	38.3 (37.7-38.9)	41.9	47.2	20	P50>AI	Seems adequate			
65-79	Men	311	37.4 (36.6-38.4)	29.6	34.2	37.4 (36.6-38.3)	40.6	45.2	20	P50>AI	Seems adequate			
65-79	Women	296	37.6 (36.9-38.4)	29.3	34.1	37.5 (36.8-38.2)	41.1	46.4	20	P50>AI	Seems adequate			

Table 3.15 Habitual intake distribution of total fat (g/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	85 (83-86)	46	66	82 (81-83)	101	132
1-17	Children	1823	68 (67-69)	34	51	66 (65-67)	82	109
18-79	Adults	1747	89 (87-90)	52	71	86 (84-87)	105	135
1-17	Boys	895	73 (72-75)	36	55	71 (70-74)	88	116
1-17	Girls	928	63 (61-64)	33	48	61 (60-63)	75	98
18-79	Men	880	101 (97-102)	63	83	98 (95-100)	116	146
18-79	Women	867	78 (76-79)	48	63	76 (74-77)	90	113
1-3	Boys	353	49 (47-50)	26	37	47 (46-49)	58	78
1-3	Girls	350	45 (43-46)	24	35	43 (42-44)	53	70
4-11	Boys	270	70 (69-73)	40	56	68 (67-71)	83	107
4-11	Girls	278	61 (60-64)	36	49	60 (58-62)	72	93
12-17	Boys	272	87 (85-90)	54	71	85 (83-88)	101	127
12-17	Girls	300	72 (70-74)	44	59	71 (68-72)	84	106
18-50	Men	318	103 (98-106)	66	85	101 (96-104)	119	149
18-50	Women	284	79 (76-81)	49	65	77 (74-79)	91	115
51-64	Men	251	100 (97-103)	64	83	98 (95-100)	116	145
51-64	Women	287	77 (75-79)	48	63	76 (74-77)	90	113
65-79	Men	311	93 (90-96)	57	76	90 (88-94)	107	135
65-79	Women	296	74 (71-77)	45	60	72 (70-75)	86	108

In addition to total fat intake, the type of fatty acids consumed is of interest. The next sections describe the intake of saturated fatty acids, trans fatty acids, cis-unsaturated fatty acids, linoleic acid, alpha-linolenic acid and n-3 fish fatty acids (EPA and DHA).

3.3.4.2 Saturated fatty acids

In Tables 3.16 and 3.17 and Figure 3.6, the distribution of the habitual intake of saturated fatty acids (SFA) is presented in both absolute amounts (g/day) as well as relative to energy intake (En%).

The average habitual intake of SFA relative to energy intake was 13.3 En% and the median intake was 13.2 En%. In absolute amounts, the average habitual SFA intake was 30 g/day and the median intake was 29 g/day.

The average intake of SFA relative to energy intake by boys (12.3 En%) was almost equal to the intake by girls (12.6 En%). The average intake by men and by women was also almost equal (13.4 and 13.8 En%, respectively). In absolute amounts, the average SFA intake by boys (26 g/day) was higher than the intake by girls (23 g/day) and the intake by men (35 g/day) was higher than the intake by women (28 g/day).

The intake of SFA relative to energy intake by adults was almost equal to the intake by children (13.6 and 12.4 En%, respectively). This was seen in both boys/men and girls/women. In absolute amounts, the SFA intake by adults (31 g/day) was higher than the intake by children (25 g/day), which was seen in both boys/men and girls/women.

On average, the most important sources of SFA were ‘Dairy (incl. substitutes)’ (34%), ‘Meat (incl. substitutes)’ (17%) and ‘Fats and oils’ (12%). Other groups contributed less than 10% (see section 3.5).

The upper level intake set by the Health Council of the Netherlands for SFA is only set for the intake as percentage of energy intake.[25] Intake levels above the UL were observed in all age groups, indicating high intakes of SFA. Except for the youngest age group, the upper level was surpassed by 85% or more of the participants in each group.

Thus, about one eighth of people’s energy was derived from SFA, and intake for the majority of the population (85% or more of the population aged 4-79 years) exceeded the upper level of 10 En%. The Health Council of the Netherlands concluded in 2015 that replacing foods rich in saturated fatty acids with foods rich in cis-unsaturated fatty acids, while maintaining a balanced diet, might reduce the risk of coronary heart diseases.[5]

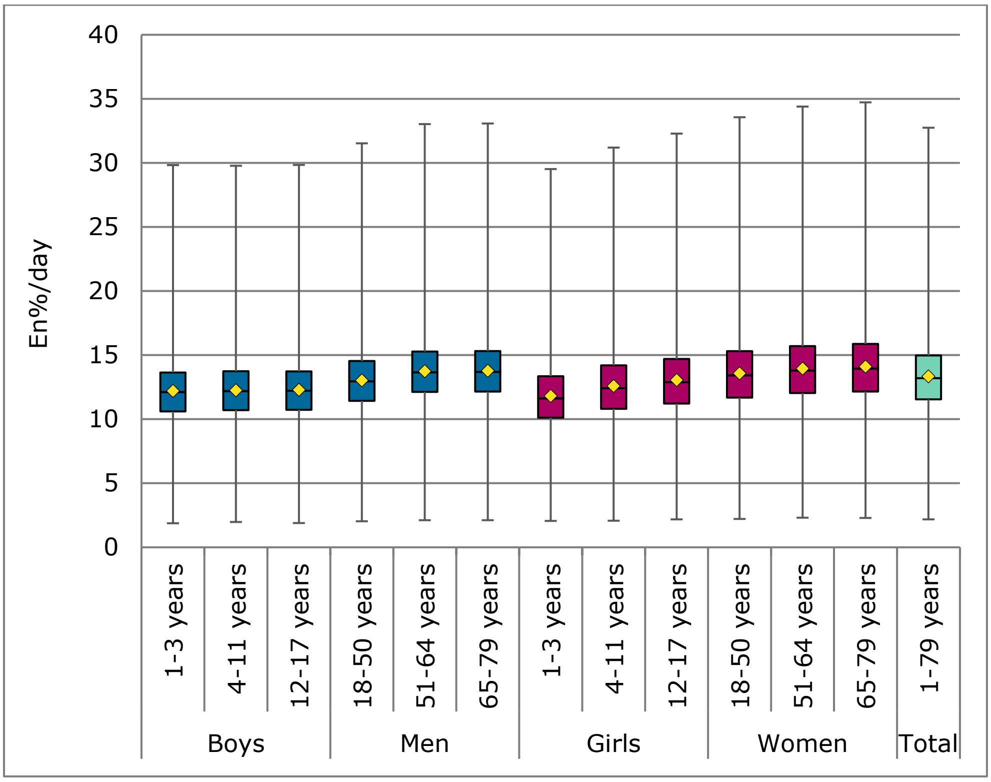


Figure 3.6 Habitual intake distribution of saturated fatty acids (En%) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics and season (n=3570).

Table 3.16 Habitual intake distribution of saturated fatty acids (En%) from exclusively foods by the Dutch population aged 1- 79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	UL	% (95%-CI) ≥UL	Evaluation UL
1-79	Total	3570	13.3 (13.2-13.5)	9.4	11.5	13.2 (13.0-13.3)	15.0	17.8			
1-17	Children	1823	12.4 (12.3-12.6)	8.7	10.8	12.3 (12.2-12.5)	14.0	16.6			
18-79	Adults	1747	13.6 (13.4-13.7)	9.6	11.8	13.4 (13.2-13.6)	15.2	18.0			
1-17	Boys	895	12.3 (12.1-12.5)	8.8	10.7	12.2 (12.0-12.4)	13.7	16.1			
1-17	Girls	928	12.6 (12.4-12.9)	8.7	10.8	12.5 (12.2-12.8)	14.3	17.1			
18-79	Men	880	13.4 (13.2-13.6)	9.6	11.7	13.3 (13.1-13.5)	14.9	17.4			
18-79	Women	867	13.8 (13.5-14.0)	9.6	11.9	13.6 (13.3-13.8)	15.5	18.5			
1-3	Boys	353	12.2 (11.9-12.4)	8.7	10.6	12.1 (11.8-12.3)	13.6	16.2	15	11.0 (8.1-13.0)	High intakes
1-3	Girls	350	11.8 (11.4-12.4)	8.1	10.1	11.6 (11.2-12.2)	13.3	16.2	15	10.4 (7.0-15.1)	High intakes
4-11	Boys	270	12.3 (12.0-12.4)	8.7	10.7	12.2 (12.0-12.4)	13.7	16.0	10	84.6 (81.6-87.3)	High intakes
4-11	Girls	278	12.6 (12.3-13.0)	8.7	10.8	12.4 (12.2-12.8)	14.2	17.0	10	84.8 (81.7-88.5)	High intakes
12-17	Boys	272	12.3 (12.2-12.6)	8.8	10.7	12.2 (12.1-12.5)	13.7	16.1	10	85.2 (82.8-88.6)	High intakes
12-17	Girls	300	13.1 (12.6-13.4)	9.0	11.2	12.9 (12.5-13.2)	14.7	17.6	10	88.8 (84.8-91.5)	High intakes
18-50	Men	318	13.0 (12.8-13.3)	9.4	11.4	13.0 (12.8-13.2)	14.5	17.0	10	91.1 (89.1-93.3)	High intakes

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	UL	% (95%-CI) ≥UL	Evaluation UL
18-50	Women	284	13.6 (13.1-13.8)	9.5	11.7	13.4 (13.0-13.7)	15.3	18.3	10	91.9 (88.8-93.8)	High intakes
51-64	Men	251	13.7 (13.4-14.0)	10.0	12.1	13.7 (13.3-13.9)	15.3	17.8	10	95.1 (93.1-96.8)	High intakes
51-64	Women	287	14.0 (13.6-14.2)	9.7	12.0	13.8 (13.4-14.0)	15.7	18.7	10	93.6 (91.8-95.1)	High intakes
65-79	Men	311	13.8 (13.4-14.2)	10.0	12.2	13.7 (13.3-14.1)	15.3	17.8	10	95.2 (93.4-97.4)	High intakes
65-79	Women	296	14.1 (13.7-14.6)	9.9	12.2	13.9 (13.5-14.5)	15.9	18.9	10	94.4 (92.5-96.7)	High intakes

Table 3.17 Habitual intake distribution of saturated fatty acids (g/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	30 (30-31)	16	23	29 (29-30)	36	48
1-17	Children	1823	25 (24-25)	12	18	24 (23-24)	30	40
18-79	Adults	1747	31 (31-32)	17	24	31 (30-31)	37	49
1-17	Boys	895	26 (25-27)	13	20	25 (25-26)	32	42
1-17	Girls	928	23 (22-24)	11	17	22 (22-23)	28	38
18-79	Men	880	35 (34-36)	21	29	34 (34-35)	41	52
18-79	Women	867	28 (27-29)	16	22	27 (26-28)	33	43
1-3	Boys	353	18 (18-19)	9	13	17 (17-18)	22	30
1-3	Girls	350	17 (16-18)	8	12	16 (15-17)	20	28
4-11	Boys	270	26 (25-26)	14	20	25 (24-26)	30	40
4-11	Girls	278	23 (22-24)	13	18	22 (21-23)	28	37
12-17	Boys	272	30 (29-31)	18	24	30 (29-31)	35	46
12-17	Girls	300	26 (25-27)	15	20	25 (24-26)	31	41
18-50	Men	318	35 (34-37)	22	29	35 (33-36)	41	52
18-50	Women	284	27 (27-29)	15	21	27 (26-28)	33	43
51-64	Men	251	36 (35-37)	22	29	35 (34-36)	41	52
51-64	Women	287	28 (27-29)	16	22	27 (26-28)	33	44
65-79	Men	311	34 (33-35)	21	28	33 (32-34)	40	50
65-79	Women	296	28 (27-29)	16	22	27 (26-28)	33	44

3.3.4.3 Trans fatty acids

In Tables 3.18 and 3.19 and Figure 3.7, the distribution of the habitual intake of trans fatty acids (TFA) is presented in both absolute amounts (g/day) as well as relative to energy intake (En%).

The average habitual intake of TFA relative to energy intake was 0.3 En% and the median intake was equal. In absolute amounts, the average habitual TFA intake was 0.6 g/day and the median intake was equal.

The average intake of TFA relative to energy intake by boys (0.2 En%) was almost equal to the intake by girls (0.3 En%). The average intake by men and by women was equal (0.3 En%). In absolute amounts, the average TFA intake by boys was equal to the intake by girls (0.5 g/day), and the intake by men (0.7 g/day) was higher than the intake by women (0.6 g/day).

Adults had a higher intake of TFA relative to energy intake (0.3 En%) than children (0.2 En%). This was seen in both boys/men and girls/women. Also, in absolute amounts, the TFA intake by adults (0.7 g/day) was higher than the intake by children (0.5 g/day), which was seen in both boys/men and girls/women.

On average, the most important sources of TFA were 'Dairy (incl. substitutes)' (46%), 'Meat (incl. substitutes)' (21%) and 'Fats and oils' (15%). Other groups contributed 8% or less (see section 3.5).

The upper level intakes set by the Health Council of the Netherlands for TFA is only set for the percentage of energy intake.[25] The intake levels of TFA (En%) did not exceed the UL in all age groups for which an UL was set (4-79 year-olds), indicating tolerable intakes. Thus, intake of trans fatty acids in the Netherlands met the recommendation of less than 1 En%. A favourable fatty acid pattern can be important to prevent coronary heart disease.[5]

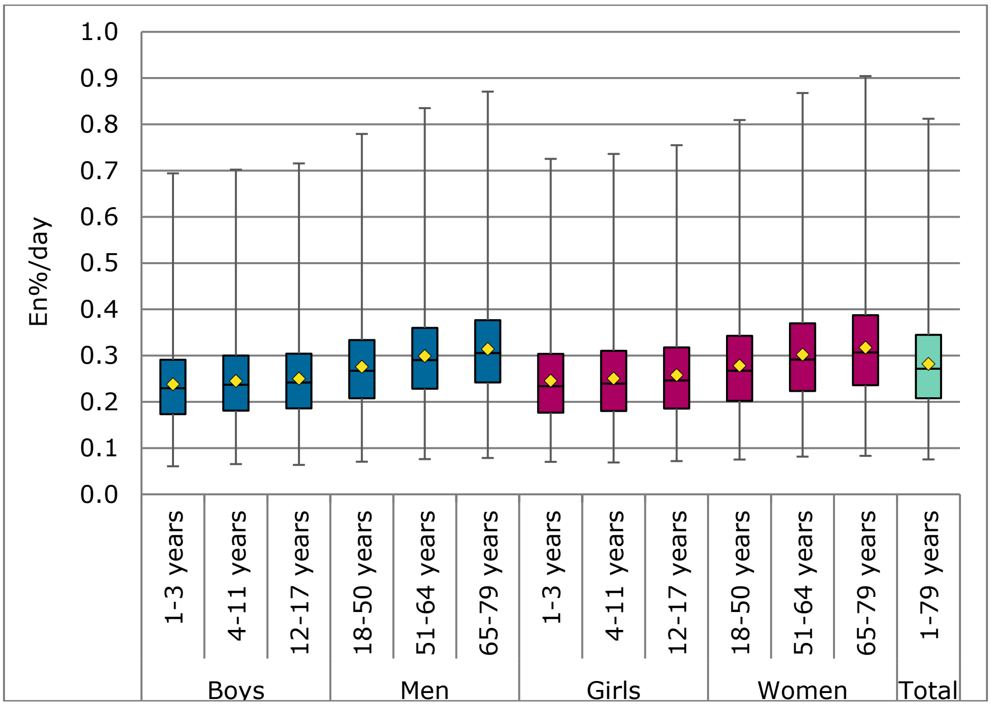


Figure 3.7 Habitual intake distribution of trans fatty acids (En%) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 3.18 Habitual intake distribution of trans fatty acids (En%) from exclusively foods by the Dutch population aged 1- 79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	UL	% (95%-CI) ≥UL	Evaluation UL
1-79	Total	3570	0.3 (0.3-0.3)	0.1	0.2	0.3 (0.3-0.3)	0.3	0.5			
1-17	Children	1823	0.2 (0.2-0.3)	0.1	0.2	0.2 (0.2-0.2)	0.3	0.4			
18-79	Adults	1747	0.3 (0.3-0.3)	0.1	0.2	0.3 (0.3-0.3)	0.4	0.5			
1-17	Boys	895	0.2 (0.2-0.3)	0.1	0.2	0.2 (0.2-0.2)	0.3	0.4			
1-17	Girls	928	0.3 (0.2-0.3)	0.1	0.2	0.2 (0.2-0.3)	0.3	0.4			
18-79	Men	880	0.3 (0.3-0.3)	0.1	0.2	0.3 (0.3-0.3)	0.3	0.5			
18-79	Women	867	0.3 (0.3-0.3)	0.1	0.2	0.3 (0.3-0.3)	0.4	0.5			
1-3	Boys	353	0.2 (0.2-0.3)	0.1	0.2	0.2 (0.2-0.2)	0.3	0.4			
1-3	Girls	350	0.2 (0.2-0.3)	0.1	0.2	0.2 (0.2-0.2)	0.3	0.4			
4-11	Boys	270	0.2 (0.2-0.3)	0.1	0.2	0.2 (0.2-0.2)	0.3	0.4	1	0.0 (0.0-0.0)	Tolerable intakes
4-11	Girls	278	0.3 (0.2-0.3)	0.1	0.2	0.2 (0.2-0.3)	0.3	0.4	1	0.0 (0.0-0.0)	Tolerable intakes
12-17	Boys	272	0.3 (0.2-0.3)	0.1	0.2	0.2 (0.2-0.3)	0.3	0.4	1	0.0 (0.0-0.0)	Tolerable intakes
12-17	Girls	300	0.3 (0.2-0.3)	0.1	0.2	0.2 (0.2-0.3)	0.3	0.4	1	0.0 (0.0-0.0)	Tolerable intakes
18-50	Men	318	0.3 (0.3-0.3)	0.1	0.2	0.3 (0.3-0.3)	0.3	0.4	1	0.0 (0.0-0.0)	Tolerable intakes
18-50	Women	284	0.3 (0.3-0.3)	0.1	0.2	0.3 (0.3-0.3)	0.3	0.5	1	0.0 (0.0-0.0)	Tolerable intakes
51-64	Men	251	0.3 (0.3-0.3)	0.2	0.2	0.3 (0.3-0.3)	0.4	0.5	1	0.0 (0.0-0.0)	Tolerable intakes
51-64	Women	287	0.3 (0.3-0.3)	0.1	0.2	0.3 (0.3-0.3)	0.4	0.5	1	0.0 (0.0-0.0)	Tolerable intakes
65-79	Men	311	0.3 (0.3-0.3)	0.2	0.2	0.3 (0.3-0.3)	0.4	0.5	1	0.0 (0.0-0.0)	Tolerable intakes
65-79	Women	296	0.3 (0.3-0.3)	0.2	0.2	0.3 (0.3-0.3)	0.4	0.5	1	0.0 (0.0-0.0)	Tolerable intakes

Table 3.19 Habitual intake distribution of trans fatty acids (g/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	0.6 (0.6-0.6)	0.2	0.4	0.6 (0.6-0.6)	0.8	1.2
1-17	Children	1823	0.5 (0.5-0.5)	0.2	0.3	0.5 (0.4-0.5)	0.6	0.9
18-79	Adults	1747	0.7 (0.7-0.7)	0.3	0.5	0.6 (0.6-0.7)	0.8	1.2
1-17	Boys	895	0.5 (0.5-0.6)	0.2	0.3	0.5 (0.5-0.5)	0.7	1.0
1-17	Girls	928	0.5 (0.4-0.5)	0.2	0.3	0.4 (0.4-0.5)	0.6	0.9
18-79	Men	880	0.7 (0.7-0.8)	0.3	0.5	0.7 (0.7-0.7)	0.9	1.3
18-79	Women	867	0.6 (0.6-0.6)	0.2	0.4	0.6 (0.5-0.6)	0.7	1.1
1-3	Boys	353	0.4 (0.4-0.4)	0.1	0.2	0.4 (0.3-0.4)	0.5	0.8
1-3	Girls	350	0.4 (0.3-0.4)	0.1	0.2	0.3 (0.3-0.3)	0.5	0.7
4-11	Boys	270	0.5 (0.5-0.5)	0.2	0.3	0.5 (0.5-0.5)	0.6	0.9
4-11	Girls	278	0.5 (0.4-0.5)	0.2	0.3	0.4 (0.4-0.5)	0.6	0.9
12-17	Boys	272	0.6 (0.6-0.6)	0.3	0.4	0.6 (0.5-0.6)	0.7	1.0
12-17	Girls	300	0.5 (0.5-0.6)	0.2	0.4	0.5 (0.5-0.5)	0.7	1.0
18-50	Men	318	0.7 (0.7-0.8)	0.3	0.5	0.7 (0.6-0.7)	0.9	1.2
18-50	Women	284	0.6 (0.6-0.6)	0.2	0.4	0.5 (0.5-0.6)	0.7	1.0
51-64	Men	251	0.8 (0.7-0.8)	0.4	0.6	0.7 (0.7-0.8)	1.0	1.3
51-64	Women	287	0.6 (0.6-0.6)	0.2	0.4	0.6 (0.5-0.6)	0.8	1.1
65-79	Men	311	0.8 (0.8-0.8)	0.4	0.6	0.8 (0.7-0.8)	1.0	1.4
65-79	Women	296	0.6 (0.6-0.7)	0.2	0.4	0.6 (0.5-0.6)	0.8	1.1

3.3.4.4 Cis-unsaturated fatty acids

In Tables 3.20 and 3.21 and Figure 3.8, the distribution of the habitual intake of cis-unsaturated fatty acids (UFA-cis) is presented in both absolute amounts (g/day) as well as relative to energy intake (En%). UFA-cis includes mono-unsaturated fatty acids-cis as wel as poly-unsaturated fatty acids.

The average habitual intake of UFA-cis relative to energy intake was 20.6 En% and the median intake was about equal (20.4 En%). In absolute amounts, the average habitual UFA-cis intake was 47 g/day and the median intake was 45 g/day.

The average intake of UFA-cis relative to energy intake by boys (19.0 En%) was almost equal to the intake by girls (18.8 En%). The average intake by men (21.1 En%) was also almost equal to the intake by women (20.9 En%). In absolute amounts, the average UFA-cis intake by boys (41 g/day) was higher than by girls (35 g/day), and the intake by men (56 g/day) was higher than the intake by women (43 g/day).

Adults had a higher intake of UFA-cis relative to energy intake than children (21.0 and 18.9 En%, respectively). This was seen in both boys/men and girls/women. Also, in absolute amounts, the UFA-cis intake by adults (49 g/day) was higher than the intake by children (38 g/day). This was seen in both boys/men and girls/women.

On average, the most important sources of UFA-cis were 'Fats and oils' (20%), 'Meat (incl. substitutes)' (17%), 'Fruits, nuts, olives' (10%), 'Bread, cereals, rice, pasta' (10%) and 'Sauces and seasonings' (10%). Other groups contributed 9% or less (see section 3.5).

The adequate intake set by the Health Council of the Netherlands for UFA-cis is only set for the percentage of energy.[25] The median UFA-cis intake (En%) was above the AI for the entire population for which an AI was set (4-79 year-olds), indicating that intake seemed adequate. Tolerable intakes were seen in all age groups for which an upper level was set by the Health Council. Thus, with about 20% of the energy derived from UFA-cis, Dutch children and adults met the recommendations for UFA-cis.

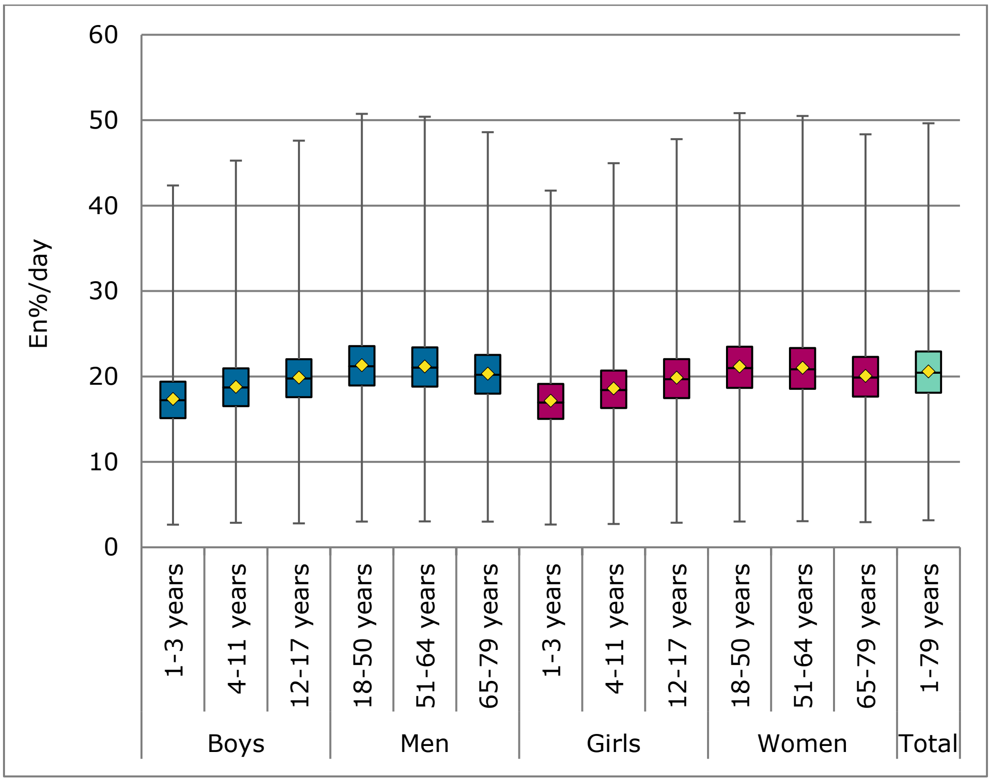


Figure 3.8 Habitual intake distribution of cis-unsaturated fatty acids (En%) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 3.20 Habitual intake distribution of cis-unsaturated fatty acids (En%) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics and season (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	AI	P50 related to AI	Evaluation AI	UL	% (95%-CI)≥UL	Evaluation UL
1-79	Total	3570	20.6 (20.4-20.8)	14.9	18.1	20.4 (20.2-20.6)	22.9	26.7						
1-17	Children	1823	18.9 (18.7-19.2)	13.6	16.5	18.8 (18.5-19.0)	21.1	24.7						
18-79	Adults	1747	21.0 (20.8-21.2)	15.5	18.6	20.9 (20.6-21.1)	23.3	27.0						
1-17	Boys	895	19.0 (18.7-19.4)	13.7	16.6	18.9 (18.5-19.3)	21.2	24.7						
1-17	Girls	928	18.8 (18.5-19.1)	13.5	16.4	18.6 (18.3-18.9)	21.0	24.8						
18-79	Men	880	21.1 (20.7-21.4)	15.7	18.7	21.0 (20.6-21.2)	23.3	27.0						
18-79	Women	867	20.9 (20.6-21.3)	15.4	18.4	20.7 (20.5-21.1)	23.2	27.1						
1-3	Boys	353	17.4 (16.8-17.9)	12.5	15.1	17.2 (16.7-17.8)	19.4	23.0						
1-3	Girls	350	17.2 (16.7-17.7)	12.4	15.0	17.0 (16.6-17.5)	19.1	22.6						
4-11	Boys	270	18.8 (18.5-19.3)	13.7	16.5	18.7 (18.3-19.2)	21.0	24.3	8	P50>AI	Seems adequate	38	0.0 (0.0-0.0)	Tolerable intakes
4-11	Girls	278	18.6 (18.2-18.9)	13.6	16.3	18.4 (18.0-18.7)	20.7	24.3	8	P50>AI	Seems adequate	38	0.0 (0.0-0.0)	Tolerable intakes
12-17	Boys	272	19.9 (19.5-20.5)	14.8	17.6	19.8 (19.4-20.4)	22.0	25.6	8	P50>AI	Seems adequate	38	0.0 (0.0-0.0)	Tolerable intakes
12-17	Girls	300	19.9 (19.3-20.3)	14.6	17.5	19.7 (19.1-20.1)	22.0	25.8	8	P50>AI	Seems adequate	38	0.0 (0.0-0.0)	Tolerable intakes
18-50	Men	318	21.3 (20.8-21.7)	15.9	18.9	21.2 (20.6-21.6)	23.6	27.2	8	P50>AI	Seems adequate	38	0.0 (0.0-0.0)	Tolerable intakes

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	AI	P50 related to AI	Evalu-ation AI	UL	% (95%-CI)≥UL	Evalu-ation UL
18-50	Women	284	21.2 (20.9-21.6)	15.6	18.7	21.0 (20.7-21.4)	23.5	27.3	8	P50>AI	Seems adequate	38	0.0 (0.0-0.0)	Tolerable intakes
51-64	Men	251	21.2 (20.7-21.6)	15.8	18.8	21.0 (20.5-21.4)	23.4	27.0	8	P50>AI	Seems adequate	38	0.0 (0.0-0.0)	Tolerable intakes
51-64	Women	287	21.0 (20.6-21.5)	15.5	18.6	20.8 (20.4-21.3)	23.3	27.2	8	P50>AI	Seems adequate	38	0.0 (0.0-0.0)	Tolerable intakes
65-79	Men	311	20.3 (19.8-20.9)	15.0	18.0	20.2 (19.7-20.8)	22.5	26.1	8	P50>AI	Seems adequate	38	0.0 (0.0-0.0)	Tolerable intakes
65-79	Women	296	20.1 (19.5-20.5)	14.7	17.6	19.9 (19.3-20.3)	22.3	26.1	8	P50>AI	Seems adequate	38	0.0 (0.0-0.0)	Tolerable intakes

Table 3.21 Habitual intake distribution of cis-unsaturated fatty acids (g/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics and season (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	47 (46-48)	24	36	45 (44-46)	56	76
1-17	Children	1823	38 (37-38)	18	28	36 (35-37)	46	62
18-79	Adults	1747	49 (48-50)	28	38	47 (46-48)	58	78
1-17	Boys	895	41 (40-42)	19	30	39 (38-41)	50	67
1-17	Girls	928	35 (33-35)	18	26	34 (32-34)	42	55
18-79	Men	880	56 (54-58)	33	45	55 (53-56)	66	85
18-79	Women	867	43 (42-44)	26	34	41 (40-43)	50	63
1-3	Boys	353	26 (25-27)	14	20	25 (24-26)	32	44
1-3	Girls	350	24 (23-25)	13	18	23 (22-24)	29	39
4-11	Boys	270	39 (38-41)	21	30	38 (37-40)	47	62
4-11	Girls	278	34 (32-35)	19	27	33 (31-34)	40	52
12-17	Boys	272	49 (48-51)	29	39	48 (46-49)	57	75
12-17	Girls	300	40 (39-41)	24	32	39 (37-40)	47	60
18-50	Men	318	59 (55-60)	35	47	57 (54-59)	68	87
18-50	Women	284	44 (42-45)	26	35	42 (41-44)	51	65
51-64	Men	251	56 (54-57)	34	45	54 (52-56)	65	84
51-64	Women	287	42 (41-44)	25	34	41 (40-42)	49	63
65-79	Men	311	51 (49-53)	30	40	49 (48-51)	59	77
65-79	Women	296	40 (38-41)	24	32	39 (37-40)	47	60

3.3.4.5 Polyunsaturated fatty acids

The distribution of the habitual intake of polyunsaturated fatty acids (PUFAs) is presented in both relative to energy intake (En%) (Table 3.22) as well as in both absolute amounts (g/day) (Table 3.23).

The average habitual intake of PUFAs relative to energy intake was 7.0 En% and the median intake was almost equal (6.9 En%). In absolute amounts, the average habitual PUFAs intake was 16 g/day and the median intake was 15 g/day.

The average intake of PUFAs relative to energy intake by boys was equal to the intake by girls (6.5 En%). Also, the average intake by men was equal to the intake by women (7.2 En%). In absolute amounts, the average PUFAs intake by boys (14 g/day) was higher than by girls (12 g/day), and the intake by men (19 g/day) was higher than the intake by women (15 g/day).

The intake of PUFAs relative to energy intake by adults was higher than the intake by children (7.2 and 6.5 En%, respectively). Also, in absolute amounts, the intake of PUFA by adults (17 g/day) was higher than the intake by children (13 g/day). This was seen in both boys/men and girls/women.

On average, the most important sources of PUFAs were 'Fats and oils' (24%). 'Bread, cereals, rice, pasta' (16%), 'Sauces and seasonings' (12%), 'Meat (incl. substitutes)' (11%) and 'Fruits, nuts, olives' (11%). Other groups contributed 5% or less (see section 3.5).

The intake levels of PUFAs (En%) exceeded the UL with less than 1.0% in all age-gender groups, indicating tolerable intakes. Thus, intake of PUFAs in the Netherlands met the recommendation of less than 12 En%.

Table 3.22 Habitual intake distribution of polyunsaturated fatty acids (En%) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	UL	% (95%-CI) ≥UL	Evaluation UL
1-79	Total	3570	7.0 (7.0-7.1)	4.7	5.9	6.9 (6.8-7.0)	8.0	9.9			
1-17	Children	1823	6.5 (6.4-6.6)	4.3	5.5	6.4 (6.3-6.5)	7.4	9.2			
18-79	Adults	1747	7.2 (7.1-7.3)	4.8	6.0	7.0 (6.9-7.1)	8.1	10.0			
1-17	Boys	895	6.5 (6.4-6.8)	4.3	5.4	6.4 (6.3-6.6)	7.5	9.3			
1-17	Girls	928	6.5 (6.3-6.6)	4.4	5.5	6.4 (6.2-6.5)	7.4	9.0			
18-79	Men	880	7.2 (7.0-7.3)	4.7	6.0	7.0 (6.9-7.2)	8.2	10.1			
18-79	Women	867	7.2 (7.0-7.3)	4.9	6.1	7.0 (6.9-7.2)	8.1	9.9			
1-3	Boys	353	6.1 (5.8-6.4)	4.0	5.0	6.0 (5.7-6.3)	7.0	8.9	12.0	0.1 (0.0-0.2)	Tolerable intakes
1-3	Girls	350	6.1 (5.8-6.3)	4.1	5.1	5.9 (5.7-6.2)	6.9	8.5	12.0	0.0 (0.0-0.1)	Tolerable intakes
4-11	Boys	270	6.5 (6.3-6.8)	4.3	5.4	6.4 (6.2-6.6)	7.5	9.2	12.0	0.2 (0.0-0.4)	Tolerable intakes
4-11	Girls	278	6.4 (6.3-6.6)	4.4	5.4	6.3 (6.1-6.4)	7.3	8.9	12.0	0.1 (0.0-0.2)	Tolerable intakes
12-17	Boys	272	6.7 (6.5-7.1)	4.5	5.6	6.6 (6.4-6.9)	7.7	9.6	12.0	0.3 (0.1-0.7)	Tolerable intakes
12-17	Girls	300	6.8 (6.5-7.0)	4.6	5.7	6.6 (6.4-6.8)	7.6	9.4	12.0	0.3 (0.0-0.4)	Tolerable intakes
18-50	Men	318	7.1 (6.9-7.4)	4.7	5.9	6.9 (6.7-7.3)	8.1	10.0	12.0	0.6 (0.3-1.1)	Tolerable intakes
18-50	Women	284	7.2 (7.0-7.4)	4.9	6.1	7.1 (6.9-7.3)	8.2	10.0	12.0	0.5 (0.2-1.0)	Tolerable intakes
51-64	Men	251	7.3 (7.1-7.4)	4.8	6.1	7.1 (6.9-7.3)	8.3	10.2	12.0	0.8 (0.4-1.2)	Tolerable intakes
51-64	Women	287	7.2 (7.0-7.4)	4.9	6.1	7.1 (6.9-7.3)	8.2	10.0	12.0	0.6 (0.2-1.0)	Tolerable intakes
65-79	Men	311	7.3 (6.9-7.6)	4.8	6.1	7.2 (6.7-7.4)	8.4	10.3	12.0	0.9 (0.2-1.4)	Tolerable intakes
65-79	Women	296	6.9 (6.7-7.2)	4.7	5.8	6.8 (6.5-7.0)	7.8	9.6	12.0	0.3 (0.1-0.6)	Tolerable intakes

Table 3.23 Habitual intake distribution of polyunsaturated fatty acids (g/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	16.1 (15.8-16.4)	8.1	11.9	15.2 (14.9-15.5)	19.3	27.0
1-17	Children	1823	13.1 (12.7-13.3)	6.2	9.4	12.4 (12.0-12.6)	15.9	22.5
18-79	Adults	1747	16.8 (16.5-17.3)	9.0	12.7	15.9 (15.6-16.3)	20.1	27.7
1-17	Boys	895	14.3 (13.7-14.7)	6.4	10.2	13.5 (13.0-13.9)	17.6	24.5
1-17	Girls	928	11.9 (11.4-12.3)	6.0	8.9	11.4 (10.9-11.8)	14.4	19.6
18-79	Men	880	19.1 (18.6-19.8)	10.6	14.7	18.3 (17.8-18.9)	22.7	30.5
18-79	Women	867	14.6 (14.2-15.0)	8.3	11.4	14.0 (13.6-14.5)	17.2	22.7
1-3	Boys	353	9.2 (8.9-9.7)	4.5	6.6	8.6 (8.3-9.1)	11.2	15.9
1-3	Girls	350	8.5 (8.2-8.8)	4.5	6.4	8.1 (7.8-8.4)	10.1	13.8
4-11	Boys	270	13.9 (13.2-14.3)	7.2	10.4	13.2 (12.5-13.6)	16.7	22.9
4-11	Girls	278	11.7 (11.1-12.1)	6.5	9.0	11.2 (10.6-11.6)	13.8	18.5
12-17	Boys	272	16.9 (16.4-17.6)	9.4	12.9	16.2 (15.6-16.8)	20.1	27.3
12-17	Girls	300	13.8 (13.1-14.2)	7.9	10.8	13.2 (12.5-13.7)	16.2	21.4
18-50	Men	318	19.5 (18.9-20.5)	10.9	15.0	18.7 (18.1-19.7)	23.1	31.0
18-50	Women	284	14.9 (14.4-15.6)	8.6	11.7	14.4 (13.8-15.0)	17.6	23.1
51-64	Men	251	19.1 (18.5-19.8)	10.6	14.7	18.3 (17.7-18.9)	22.6	30.4
51-64	Women	287	14.5 (14.0-15.0)	8.3	11.3	13.9 (13.5-14.5)	17.0	22.5
65-79	Men	311	18.0 (17.1-18.7)	9.9	13.8	17.3 (16.3-17.9)	21.4	28.8
65-79	Women	296	13.7 (13.0-14.2)	7.8	10.7	13.2 (12.5-13.7)	16.1	21.3

3.3.4.6 Linoleic acid

In Tables 3.24 and 3.25 and Figure 3.9, the distribution of the habitual intake of linoleic acid is presented in both absolute amounts (g/day) as well as relative to energy intake (En%).

The average habitual intake of linoleic acid (LA) relative to energy intake was 5.7 En% and the median intake was almost equal (5.5 En%). In absolute amounts, the average habitual LA intake was 13 g/day and the median intake was 12 g/day.

The average intake of LA relative to energy intake by boys (5.4 En%) was almost equal to the intake by girls (5.2 En%). And the average intake by men and by women was also almost equal (5.8 and 5.7 En%, respectively). In absolute amounts, the average LA intake by boys (12 g/day) was higher than the intake by girls (10 g/day) and the intake by men (15 g/day) was higher than the intake by women (12 g/day).

The intake of LA relative to energy intake by adults was almost equal to the intake by children (5.7 and 5.3 En%, respectively). This was seen in both boys/men and girls/women. In absolute amounts, the LA intake by adults (14 g/day) was higher than the intake by children (11 g/day). This was seen in both boys/men and girls/women.

On average, the most important sources of LA were 'Fats and oils' (23%), 'Bread, cereals, rice, pasta' (17%), 'Meat (incl. substitutes)' (12%), 'Fruits, nuts, olives' (12%) and 'Sauces and seasonings (12%). Other groups contributed 6% or less (see section 3.5).

The adequate intake set by the Health Council of the Netherlands for LA is only set for the percentage of energy intake.[25] The median LA intake (En%) was above the AI for the entire population, indicating that intake seemed adequate.

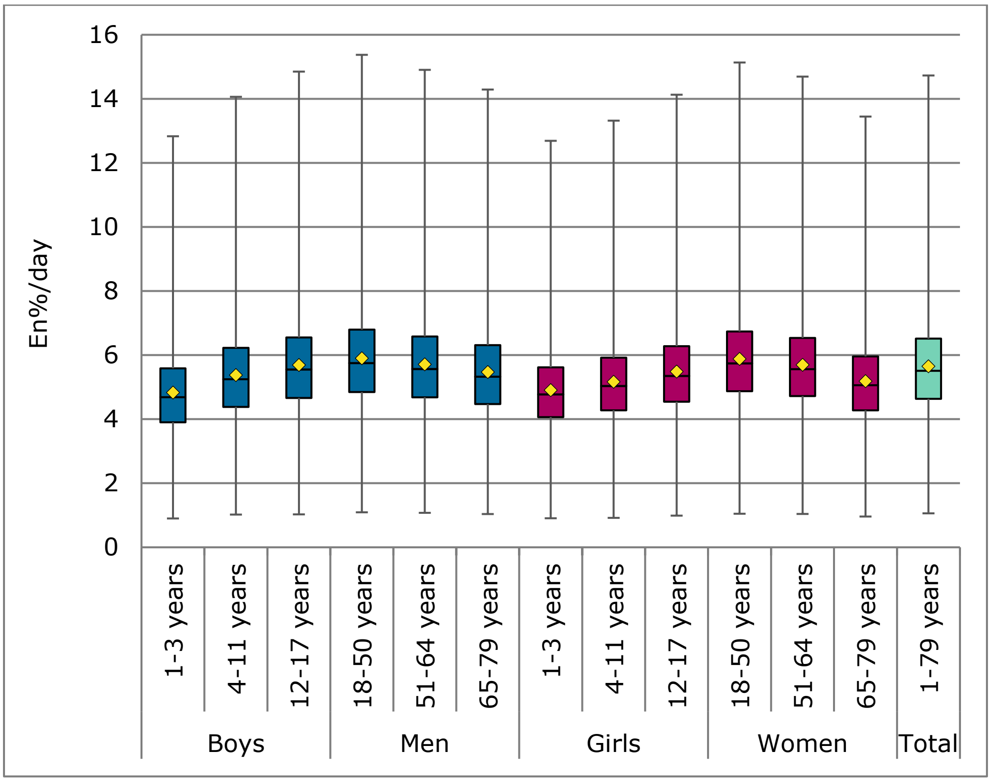


Figure 3.9 Habitual intake distribution of linoleic acid (En%) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 3.24 Habitual intake distribution of linoleic acid (En%) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	AI	P50 related to AI	Evaluation AI
1-79	Total	3570	5.7 (5.6-5.7)	3.6	4.6	5.5 (5.4-5.6)	6.5	8.2			
1-17	Children	1823	5.3 (5.2-5.4)	3.4	4.4	5.2 (5.1-5.3)	6.1	7.8			
18-79	Adults	1747	5.7 (5.6-5.8)	3.6	4.7	5.6 (5.5-5.7)	6.6	8.3			
1-17	Boys	895	5.4 (5.2-5.6)	3.4	4.4	5.3 (5.1-5.4)	6.3	7.9			
1-17	Girls	928	5.2 (5.1-5.4)	3.4	4.3	5.1 (5.0-5.3)	6.0	7.5			
18-79	Men	880	5.8 (5.6-5.9)	3.6	4.7	5.6 (5.5-5.8)	6.7	8.4			
18-79	Women	867	5.7 (5.6-5.8)	3.7	4.7	5.6 (5.4-5.7)	6.6	8.2			
1-3	Boys	353	4.8 (4.6-5.1)	3.0	3.9	4.7 (4.5-5.0)	5.6	7.2	2	P50>AI	Seems adequate
1-3	Girls	350	4.9 (4.7-5.1)	3.2	4.1	4.8 (4.6-4.9)	5.6	7.1	2	P50>AI	Seems adequate
4-11	Boys	270	5.4 (5.2-5.5)	3.4	4.4	5.2 (5.0-5.4)	6.2	7.8	2	P50>AI	Seems adequate
4-11	Girls	278	5.2 (5.1-5.3)	3.4	4.3	5.0 (4.9-5.2)	5.9	7.4	2	P50>AI	Seems adequate
12-17	Boys	272	5.7 (5.4-5.9)	3.6	4.7	5.6 (5.3-5.8)	6.6	8.3	2	P50>AI	Seems adequate
12-17	Girls	300	5.5 (5.3-5.7)	3.6	4.5	5.3 (5.2-5.6)	6.3	7.8	2	P50>AI	Seems adequate
18-50	Men	318	5.9 (5.7-6.1)	3.8	4.8	5.7 (5.5-6.0)	6.8	8.6	2	P50>AI	Seems adequate
18-50	Women	284	5.9 (5.7-6.0)	3.8	4.9	5.7 (5.6-5.9)	6.7	8.4	2	P50>AI	Seems adequate
51-64	Men	251	5.7 (5.6-5.9)	3.6	4.7	5.6 (5.4-5.8)	6.6	8.3	2	P50>AI	Seems adequate
51-64	Women	287	5.7 (5.5-5.9)	3.7	4.7	5.6 (5.4-5.7)	6.5	8.2	2	P50>AI	Seems adequate
65-79	Men	311	5.5 (5.2-5.7)	3.4	4.5	5.3 (5.0-5.6)	6.3	8.0	2	P50>AI	Seems adequate
65-79	Women	296	5.2 (5.0-5.4)	3.3	4.3	5.1 (4.9-5.3)	6.0	7.5	2	P50>AI	Seems adequate

Table 3.25 Habitual intake distribution of linoleic acid (g/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	13 (13-13)	6	9	12 (12-12)	16	22
1-17	Children	1823	11 (10-11)	5	8	10 (10-10)	13	19
18-79	Adults	1747	14 (13-14)	7	10	13 (12-13)	16	23
1-17	Boys	895	12 (11-12)	5	8	11 (11-11)	15	21
1-17	Girls	928	10 (9-10)	5	7	9 (9-9)	12	16
18-79	Men	880	15 (15-16)	8	12	15 (14-15)	18	25
18-79	Women	867	12 (11-12)	6	9	11 (11-12)	14	19
1-3	Boys	353	7 (7-8)	3	5	7 (7-7)	9	13
1-3	Girls	350	7 (7-7)	3	5	6 (6-7)	8	12
4-11	Boys	270	11 (11-12)	6	8	11 (10-11)	14	19
4-11	Girls	278	9 (9-10)	5	7	9 (9-9)	11	15
12-17	Boys	272	14 (14-15)	8	11	13 (13-14)	17	23
12-17	Girls	300	11 (11-12)	6	9	11 (10-11)	13	18
18-50	Men	318	16 (15-17)	9	12	15 (15-16)	19	26
18-50	Women	284	12 (12-13)	7	9	12 (11-12)	15	20
51-64	Men	251	15 (15-16)	8	11	14 (14-15)	18	25
51-64	Women	287	12 (11-12)	6	9	11 (10-11)	14	19
65-79	Men	311	14 (13-14)	7	10	13 (12-14)	17	23
65-79	Women	296	10 (10-11)	6	8	10 (9-10)	12	17

3.3.4.7 Alpha-linolenic acid

In Tables 3.26 and 3.27 and Figure 3.10, the distribution of the habitual intake of alpha-linolenic acid (ALA) is presented in both absolute amounts (g/day) as well as relative to energy intake (En%).

The average habitual intake of ALA relative to energy intake was 0.7 En% and the median intake was equal. In absolute amounts, the average habitual ALA intake was 1.7 g/day and the median intake was 1.6 g/day.

The average intake of ALA relative to energy intake by boys was equal to the intake by girls (0.7 En%). The average intake by men and by women was also equal (0.8 En%). In absolute amounts, the average ALA intake by boys (1.4 g/day) was almost equal to the intake by girls (1.2 g/day), and the intake by men (2.0 g/day) was higher than the intake by women (1.5 g/day).

Adults had a higher intake of ALA relative to energy intake than children (0.8 and 0.7 En%, respectively). This was seen in both boys/men and girls/women. Also, in absolute amounts, the ALA intake by adults (1.8 g/day) was higher than the intake by children (1.3 g/day). This was seen in both boys/men and girls/women.

On average, the most important sources of ALA were ‘Fats and oils’ (23%), ‘Bread, cereals, rice, pasta’ (16%), ‘Sauces and seasonings (14%), ‘Fruits, nuts, olives (10%) and ‘Dairy (incl. substitutes)’ (10%). Other groups contributed 8% or less (see section 3.5).

The adequate intake set by the Health Council of the Netherlands for ALA is only set for the percentage of energy intake.[25] For all age groups, no statement could be made about the prevalence of adequacy of ALA (En%) intake, because the median intake was below the AI. In addition, in all age groups the 95th percentile was around the AI. There are no indications for direct concern of ALA intake[34], and the Dutch dietary reference for ALA derived in 2001 (1 En%)[25], which is currently used in this report for the evaluation, seems rather high compared to the more recent value of EFSA (0.5 En%).[35]

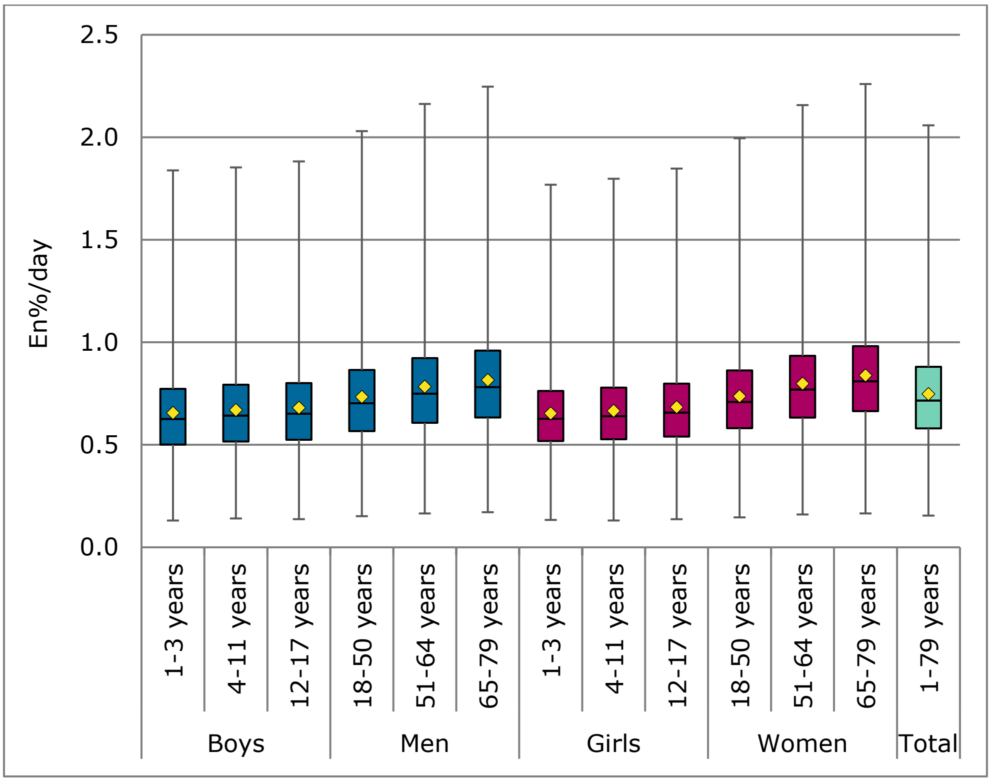


Figure 3.10 Habitual intake distribution of alpha-linolenic acid (En%) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 3.26 Habitual intake distribution of alpha-linolenic acid (En%) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	AI	P50 related to AI	Evaluation AI
1-79	Total	3570	0.7 (0.7-0.8)	0.4	0.6	0.7 (0.7-0.7)	0.9	1.2			
1-17	Children	1823	0.7 (0.7-0.7)	0.4	0.5	0.6 (0.6-0.7)	0.8	1.0			
18-79	Adults	1747	0.8 (0.8-0.8)	0.4	0.6	0.7 (0.7-0.7)	0.9	1.2			
1-17	Boys	895	0.7 (0.7-0.7)	0.4	0.5	0.6 (0.6-0.7)	0.8	1.1			
1-17	Girls	928	0.7 (0.7-0.7)	0.4	0.5	0.6 (0.6-0.7)	0.8	1.0			
18-79	Men	880	0.8 (0.7-0.8)	0.4	0.6	0.7 (0.7-0.7)	0.9	1.2			
18-79	Women	867	0.8 (0.8-0.8)	0.5	0.6	0.7 (0.7-0.8)	0.9	1.2			
1-3	Boys	353	0.7 (0.6-0.7)	0.4	0.5	0.6 (0.6-0.7)	0.8	1.1	1	P50<AI	No statement
1-3	Girls	350	0.7 (0.6-0.7)	0.4	0.5	0.6 (0.6-0.7)	0.8	1.0	1	P50<AI	No statement
4-11	Boys	270	0.7 (0.6-0.7)	0.4	0.5	0.6 (0.6-0.7)	0.8	1.1	1	P50<AI	No statement
4-11	Girls	278	0.7 (0.6-0.7)	0.4	0.5	0.6 (0.6-0.7)	0.8	1.0	1	P50<AI	No statement
12-17	Boys	272	0.7 (0.7-0.7)	0.4	0.5	0.7 (0.6-0.7)	0.8	1.1	1	P50<AI	No statement
12-17	Girls	300	0.7 (0.7-0.7)	0.4	0.5	0.7 (0.6-0.7)	0.8	1.0	1	P50<AI	No statement
18-50	Men	318	0.7 (0.7-0.8)	0.4	0.6	0.7 (0.7-0.7)	0.9	1.2	1	P50<AI	No statement
18-50	Women	284	0.7 (0.7-0.8)	0.4	0.6	0.7 (0.7-0.7)	0.9	1.1	1	P50<AI	No statement
51-64	Men	251	0.8 (0.8-0.8)	0.4	0.6	0.7 (0.7-0.8)	0.9	1.2	1	P50<AI	No statement
51-64	Women	287	0.8 (0.8-0.8)	0.5	0.6	0.8 (0.7-0.8)	0.9	1.2	1	P50<AI	No statement
65-79	Men	311	0.8 (0.8-0.8)	0.5	0.6	0.8 (0.7-0.8)	1.0	1.3	1	P50<AI	No statement
65-79	Women	296	0.8 (0.8-0.9)	0.5	0.7	0.8 (0.8-0.8)	1.0	1.3	1	P50<AI	No statement

Table 3.27 Habitual intake distribution of alpha-linolenic acid (mg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	1.7 (1.6-1.7)	0.8	1.2	1.6 (1.5-1.6)	2.0	3.0
1-17	Children	1823	1.3 (1.2-1.3)	0.6	0.9	1.2 (1.2-1.2)	1.5	2.3
18-79	Adults	1747	1.8 (1.7-1.8)	0.9	1.3	1.6 (1.6-1.7)	2.1	3.1
1-17	Boys	895	1.4 (1.3-1.4)	0.6	1.0	1.3 (1.2-1.3)	1.7	2.5
1-17	Girls	928	1.2 (1.1-1.2)	0.6	0.9	1.1 (1.1-1.1)	1.4	2.0
18-79	Men	880	2.0 (1.9-2.1)	1.0	1.5	1.9 (1.8-2.0)	2.4	3.4
18-79	Women	867	1.5 (1.5-1.6)	0.8	1.2	1.5 (1.4-1.5)	1.8	2.5
1-3	Boys	353	1.0 (1.0-1.1)	0.5	0.7	0.9 (0.9-1.0)	1.2	1.8
1-3	Girls	350	0.9 (0.9-1.0)	0.5	0.7	0.9 (0.8-0.9)	1.1	1.6
4-11	Boys	270	1.3 (1.3-1.4)	0.6	1.0	1.3 (1.2-1.3)	1.6	2.3
4-11	Girls	278	1.2 (1.1-1.2)	0.6	0.9	1.1 (1.0-1.1)	1.4	1.9
12-17	Boys	272	1.6 (1.5-1.7)	0.8	1.2	1.5 (1.4-1.6)	1.9	2.8
12-17	Girls	300	1.3 (1.2-1.3)	0.7	1.0	1.2 (1.2-1.3)	1.5	2.1
18-50	Men	318	2.0 (1.9-2.1)	1.0	1.4	1.9 (1.8-2.0)	2.4	3.4
18-50	Women	284	1.5 (1.4-1.5)	0.8	1.1	1.4 (1.3-1.5)	1.8	2.4
51-64	Men	251	2.1 (2.0-2.1)	1.0	1.5	1.9 (1.9-2.0)	2.5	3.5
51-64	Women	287	1.6 (1.5-1.6)	0.9	1.2	1.5 (1.5-1.6)	1.9	2.6
65-79	Men	311	2.0 (1.9-2.1)	1.0	1.5	1.9 (1.8-2.0)	2.4	3.4
65-79	Women	296	1.6 (1.6-1.7)	0.9	1.2	1.6 (1.5-1.6)	2.0	2.7

3.3.4.8 N-3 fish fatty acids (EPA and DHA)

In Table 3.28 and Figure 3.11, the absolute intake of n-3 fish fatty acids from foods and dietary supplements is presented. In Appendix B, the intake of n-3 fish fatty acids from exclusively foods is presented. Because part of the study population did not consume n-3 fish fatty acids, this data was not suitable for calculating the habitual intake using SPADE. In order to be able to estimate the intake of n-3 fish fatty acids, the 25^{th}, 50^{th} and 75^{th} percentiles and the average were calculated based on the average intake of the two recall days of the participants. To evaluate the intake, the median was compared to the AI.

The average intake of n-3 fish fatty acids from foods and dietary supplements was 198 mg/day and the median intake was 43 mg/day. This difference between average and median intake can mainly be explained by high intakes from foods or dietary supplements by parts of the population.

The average intake of n-3 fish fatty acids by boys was almost equal to the intake by girls (94 and 82 mg/day, respectively), and the intake by men was almost equal to the intake by women (226 and 224 mg/day, respectively).

Adults had a higher intake of n-3 fish fatty acids than children (225 and 88 mg/day, respectively). This was seen in both boys/men and girls/women.

On average, the most important sources of n-3 fish fatty acids were 'Meat (incl. substitutes)' (24%) and 'Fish and shellfish' (19%) and 'Eggs' (10%). Other groups contributed 9% or less and dietary supplements contributed 5% (see section 3.5).

For all age groups, no statement could be made about the prevalence of adequacy of the intake of n-3 fish fatty acids, because the median intake was below the AI. In 2015, the Health Council in the Netherlands concluded that fatty acids from fish reduces the risk of fatal coronary heart disease. Also, consuming one portion of fish a week was related to a lower risk of stroke.[5]

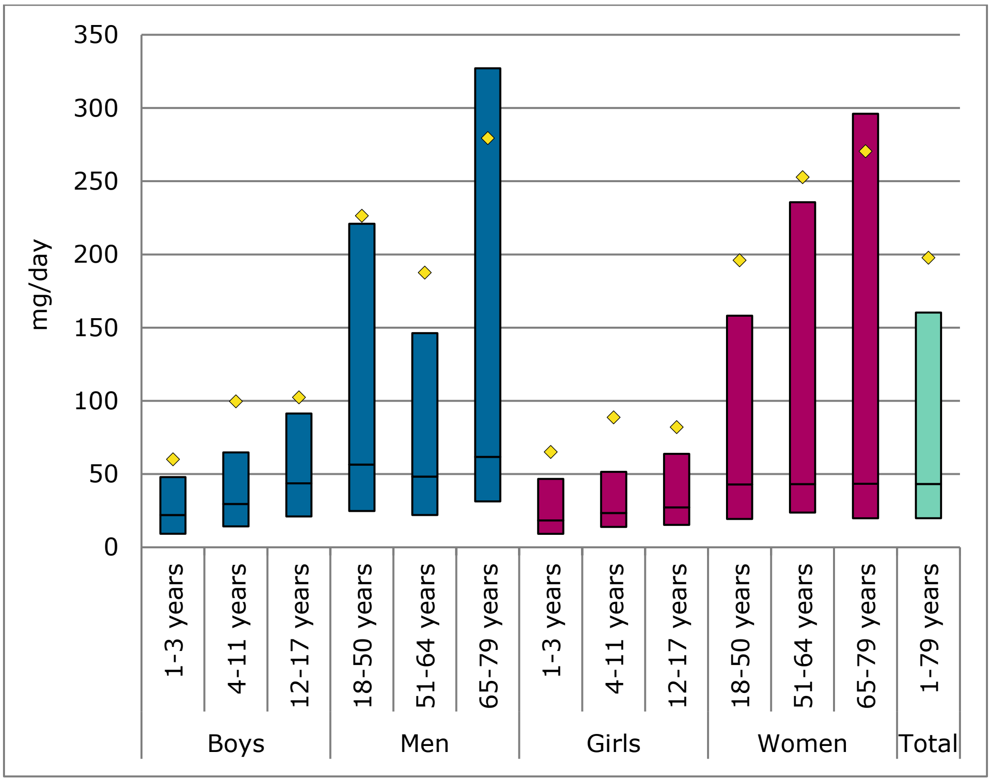


Figure 3.11 Average intake of n-3 fish fatty acids (mg/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 3.28 Average intake of n-3 fish fatty acids (mg/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).*

Age	Gender	n	Mean	P25	P50	P75	AI	P50 related to AI	Evaluation AI
1-79	Total	3570	198	20	43	160			
1-17	Children	1823	88	14	28	65			
18-79	Adults	1747	225	22	48	203			
1-17	Boys	895	94	15	34	71			
1-17	Girls	928	82	13	24	55			
18-79	Men	880	226	25	56	231			
18-79	Women	867	224	20	43	192			
1-3	Boys	353	60	9	22	48	150	P50<AI	No statement
1-3	Girls	350	65	9	18	47	150	P50<AI	No statement
4-11	Boys	270	100	14	30	65	150	P50<AI	No statement
4-11	Girls	278	89	14	23	52	150	P50<AI	No statement
12-17	Boys	272	102	21	44	91	150	P50<AI	No statement
12-17	Girls	300	82	15	27	64	150	P50<AI	No statement
18-50	Men	318	226	25	56	221	200	P50<AI	No statement
18-50	Women	284	196	19	43	158	200	P50<AI	No statement
51-64	Men	251	188	22	48	146	200	P50<AI	No statement
51-64	Women	287	253	24	43	236	200	P50<AI	No statement
65-79	Men	311	279	31	62	327	200	P50<AI	No statement
65-79	Women	296	271	20	43	296	200	P50<AI	No statement

* The 5th, 25th, 50th, 75th and 95th percentiles and the average were calculated based on the average intake of the two recall days of the participants.

3.3.5 *Dietary fibre*

In Figure 3.12 and Tables 3.29 and 3.30, the distribution of the habitual intake of dietary fibre is presented in both absolute amounts (g/day) as well as relative to energy intake (g/MJ/day). Since there were only a few users of dietary fibre supplements (n=17) and most users had low intake levels (<1 g/day), total dietary fibre intake including that from supplements could not be calculated.

The average habitual intake of dietary fibre was 21 g/day and the median intake was 20 g/day. Related to energy intake, the average habitual dietary fibre intake was 2.5 g/MJ/day and the median intake was equal.

Dietary fibre intake by boys (19 g/day) was higher than the intake by girls (17 g/day), and the intake by men (23 g/day) was higher than the intake by women (19 g/day). The dietary fibre intake per MJ by boys was equal to the intake by girls (2.5 g/MJ/day), and the intake by men (2.4 g/MJ/day) was almost equal to the intake by women (2.6 g/MJ/day).

Adults had a higher intake of dietary fibre than children (21 and 18 g/day, respectively). This was seen in both boys/men and girls/women. The dietary fibre intake per MJ by adults and children was equal (2.5 g/MJ/day). This was also seen in both boys/men and girls/women.

On average, the most important source of dietary fibre was ‘Bread, cereals, rice, pasta’ (41%). In addition, ‘Fruits, nuts, olives’ (16%) and ‘Vegetables’ (15%) were also important contributors to the intake of dietary fibre. The other food groups contributed 4% or less (see section 3.5).

For children aged 1-3, median intakes of dietary fibre were below the guideline of 2.8 g/MJ. However, the guideline of 2.8 g/MJ was within the confidence interval of the median intakes (2.6-2.8 g/MJ). Therefore, the dietary fibre intake of children aged 1-3 is evaluated as seems adequate. For all other age groups, the confidence interval of the median intakes was below the guidelines. However, as in most age groups, even the 95th percentile was below the guideline, the intake was assumed to be low in these groups.

Thus, the intake of dietary fibre with 2.5 g/MJ/day was low in the Netherlands. An increase in dietary fibre consumption can contribute to the reduction in the risk of constipation, blood pressure, coronary heart disease, stroke and overweight.[36, 5]

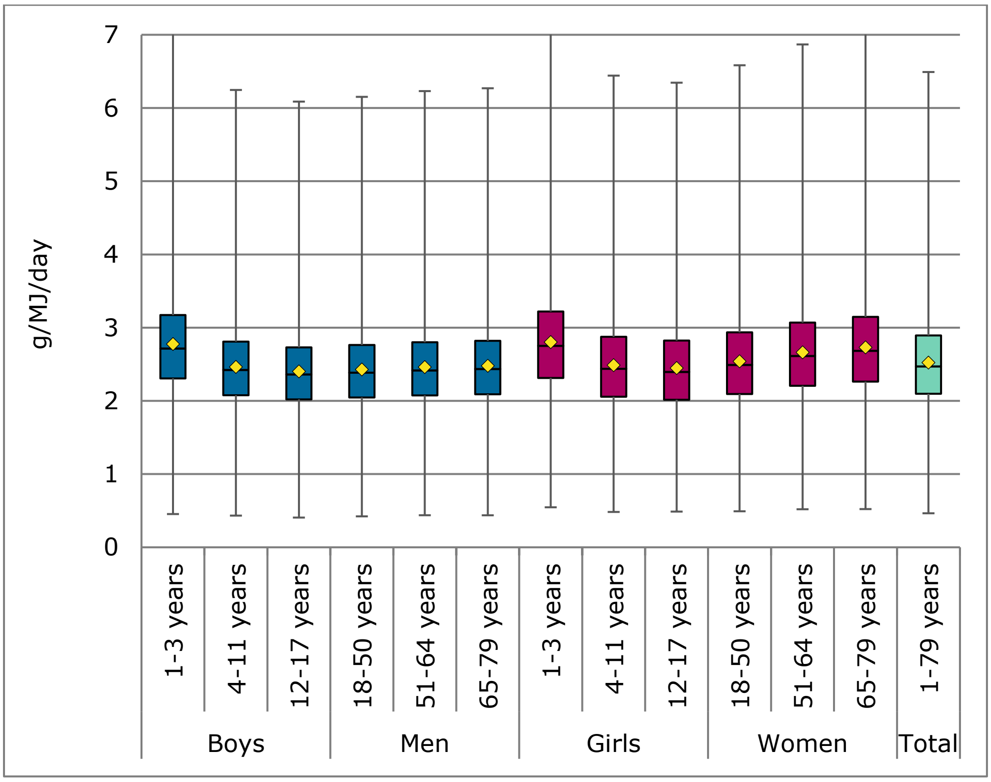


Figure 3.12 Habitual intake distribution of dietary fibre (g/MJ/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 3.29 Habitual intake distribution of dietary fibre (g/MJ/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	Guideline	P50 related to guideline	Evaluation guideline
1-79	Total	3570	2.5 (2.5-2.6)	1.6	2.1	2.5 (2.4-2.5)	2.9	3.6			
1-17	Children	1823	2.5 (2.5-2.6)	1.6	2.1	2.5 (2.4-2.5)	2.9	3.6			
18-79	Adults	1747	2.5 (2.5-2.6)	1.6	2.1	2.5 (2.4-2.5)	2.9	3.6			
1-17	Boys	895	2.5 (2.5-2.6)	1.7	2.1	2.4 (2.4-2.5)	2.8	3.5			
1-17	Girls	928	2.5 (2.5-2.6)	1.6	2.1	2.5 (2.4-2.5)	2.9	3.7			
18-79	Men	880	2.4 (2.4-2.5)	1.6	2.1	2.4 (2.4-2.4)	2.8	3.4			
18-79	Women	867	2.6 (2.6-2.7)	1.6	2.2	2.6 (2.5-2.6)	3.0	3.7			
1-3	Boys	353	2.8 (2.7-2.9)	1.9	2.3	2.7 (2.6-2.8)	3.2	3.9	2.8	P50<guideline	Seems adequate[b]
1-3	Girls	350	2.8 (2.7-2.9)	1.8	2.3	2.8 (2.6-2.8)	3.2	4.0	2.8	P50<guideline	Seems adequate[b]
4-11	Boys	270	2.5 (2.4-2.5)	1.6	2.1	2.4 (2.4-2.5)	2.8	3.4	3.0;3.2[a]	P50<guideline	Low intakes[c]
4-11	Girls	278	2.5 (2.4-2.5)	1.6	2.1	2.4 (2.4-2.5)	2.9	3.6	3.0;3.2[a]	P50<guideline	Low intakes[c]
12-17	Boys	272	2.4 (2.3-2.5)	1.6	2.0	2.4 (2.3-2.5)	2.7	3.4	3.2;3.4[a]	P50<guideline	Low intakes[c]
12-17	Girls	300	2.4 (2.4-2.5)	1.5	2.0	2.4 (2.3-2.5)	2.8	3.5	3.2;3.4[a]	P50<guideline	Low intakes[c]
18-50	Men	318	2.4 (2.4-2.5)	1.6	2.0	2.4 (2.3-2.4)	2.8	3.4	3.4	P50<guideline	Low intakes[c]
18-50	Women	284	2.5 (2.5-2.6)	1.6	2.1	2.5 (2.4-2.6)	2.9	3.6	3.4	P50<guideline	Low intakes[c]
51-64	Men	251	2.5 (2.4-2.5)	1.6	2.1	2.4 (2.4-2.5)	2.8	3.4	3.4	P50<guideline	Low intakes[c]
51-64	Women	287	2.7 (2.6-2.7)	1.7	2.2	2.6 (2.5-2.7)	3.1	3.8	3.4	P50<guideline	Low intakes[c]
65-79	Men	311	2.5 (2.4-2.5)	1.7	2.1	2.4 (2.4-2.5)	2.8	3.4	3.4	P50<guideline	Low intakes[c]
65-79	Women	296	2.7 (2.6-2.9)	1.7	2.3	2.7 (2.6-2.8)	3.1	3.9	3.4	P50<guideline	Low intakes[c]

[a] AI 4-8 years=3.0 mg, 9-13 years=3.2 mg, 14+ years=3.4 mg.
[b] P50<guideline, however value guideline within CI. Therefore, intake is evaluated as seems adequate.
[c] If P50< guideline value it is evaluated as low intakes.

Table 3.30 Habitual intake distribution of dietary fibre (g/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	21 (20-21)	12	16	20 (20-20)	24	32
1-17	Children	1823	18 (17-18)	10	14	17 (17-17)	21	28
18-79	Adults	1747	21 (21-21,7)	12	17	21 (20-21)	25	32
1-17	Boys	895	19 (18-19)	11	15	18 (18-19)	22	29
1-17	Girls	928	17 (16-17)	10	13	16 (16-17)	20	26
18-79	Men	880	23 (23-24)	14	19	23 (22-23)	27	35
18-79	Women	867	19 (19-20)	11	15	18 (18-19)	22	28
1-3	Boys	353	15 (15-16)	9	12	15 (14-15)	18	24
1-3	Girls	350	14 (14-15)	8	11	14 (13-14)	17	22
4-11	Boys	270	19 (18-19)	11	15	18 (17-19)	22	28
4-11	Girls	278	17 (16-17)	10	13	16 (15-17)	20	26
12-17	Boys	272	21 (20-22)	13	17	20 (20-21)	24	32
12-17	Girls	300	18 (17-18)	11	14	17 (16-18)	21	27
18-50	Men	318	24 (23-25)	15	19	23 (22-24)	28	35
18-50	Women	284	19 (18-19)	11	15	18 (18-19)	22	28
51-64	Men	251	24 (23-24)	14	19	23 (22-24)	27	35
51-64	Women	287	19 (19-20)	11	15	19 (18-19)	22	29
65-79	Men	311	23 (22-23)	14	18	22 (21-23)	26	34
65-79	Women	296	19 (19-20)	11	15	19 (18-20)	23	29

3.3.6 *Cholesterol*

The average habitual cholesterol intake was 209 mg/day and the median intake was 195 mg/day (see Table 3.31).

The average cholesterol intake by boys (164 mg/day) was higher than the cholesterol intake by girls (144 mg/day). Also, the cholesterol intake by men (246 mg/day) was higher than the intake by women (200 mg/day). Adults had a higher intake of cholesterol than children (233 and 154 mg/day, respectively). This was seen in both boys/men and girls/women.

On average, the most important sources of cholesterol were 'Meat (incl. substitutes)' (30%), 'Dairy (incl. substitutes)' (28%) and 'Eggs' (20%). Other groups contributed 7% or less (see section 3.5).

For cholesterol, no dietary reference value has been set by the Health Council in the Netherlands. Therefore, the adequacy of the intake could not be assessed.

Table 3.31 Habitual intake distribution of cholesterol (mg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	209 (203-213)	82	141	195 (190-200)	262	383
1-17	Children	1823	154 (150-160)	59	101	142 (138-147)	193	289
18-79	Adults	1747	223 (216-228)	96	155	209 (203-214)	276	396
1-17	Boys	895	164 (158-172)	65	110	152 (147-161)	205	301
1-17	Girls	928	144 (138-151)	55	94	132 (126-138)	181	275
18-79	Men	880	246 (235-252)	119	179	233 (223-239)	299	418
18-79	Women	867	200 (193-208)	85	136	185 (178-193)	248	364
1-3	Boys	353	113 (107-120)	46	75	104 (98-111)	141	215
1-3	Girls	350	111 (104-117)	41	72	100 (94-107)	139	216
4-11	Boys	270	158 (151-168)	68	109	148 (141-157)	195	283
4-11	Girls	278	142 (134-149)	57	94	130 (123-136)	176	266
12-17	Boys	272	193 (186-205)	91	138	182 (175-193)	236	337
12-17	Girls	300	163 (155-171)	67	110	150 (143-158)	202	300
18-50	Men	318	243 (229-250)	117	177	230 (217-237)	295	415
18-50	Women	284	190 (182-202)	80	129	176 (168-187)	236	347
51-64	Men	251	253 (241-260)	123	185	240 (228-247)	307	428
51-64	Women	287	209 (200-217)	90	144	194 (185-202)	258	376
65-79	Men	311	246 (236-258)	119	179	233 (223-245)	298	416
65-79	Women	296	217 (202-227)	94	150	203 (187-212)	268	389

3.3.7 *Alcohol*

In the calculation of alcohol intake, children aged 1-11 were not considered.
The average habitual alcohol intake was 8 g/day and the median intake was 3 g/day (see Figure 3.13 and Table 3.32). This difference between average and median intake is explained by high alcohol intakes by parts of the population.

The average alcohol intake by boys aged 12-17 (1 g/day) was almost equal to the alcohol intake by girls aged 12-17 (0 g/day). The alcohol intake by men (11 g/day) was higher than the alcohol intake by women (6 g/day).
Adults had a higher intake of alcohol than children aged 12-17 (8 g/day and 1 g/day, respectively). This was seen in both boys/men and girls/women.

As expected, the food group 'Alcoholic beverages' (98%) was almost completely responsible for the alcohol intake. Other food groups contributed 2% or less (see section 3.5). For adults, the most important sources of alcohol within the food group 'Alcohol beverages' were 'Wine, cider, fruit wines' (49%), 'Beer' (33%) and 'Spirits, brandy' (11%).[37]

For alcohol use, the Health Survey and PEIL/HBSC for youth have been designated as the source for the (annual) key figure on this theme.[12] In the evaluation of the findings of DNFCS 2019-2021, a habitual intake of more than 10 g alcohol/day is considered as an high intake. This upper level is based on the guideline of the Health Council in the Netherlands of drinking no alcohol or no more than one glass per day.[5] The assumption is that 1 glass of beer, wine, et cetera contains 10 grams of alcohol. This upper level was exceeded by more than 15% by all age groups, with prevalence increasing with age, and higher prevalence among men than women. More than half of the men aged 65-79 exceeded the UL of 10 g alcohol/day.

Thus, the prevalence of not adhering to the guideline of drinking less than one glass of alcohol per is high. The Health Council of the Netherlands recommends drinking no alcohol or less than one standard glass, because of increased risk of stroke, breast cancer, colorectal cancer and lung cancer associated with higher consumption.[5]

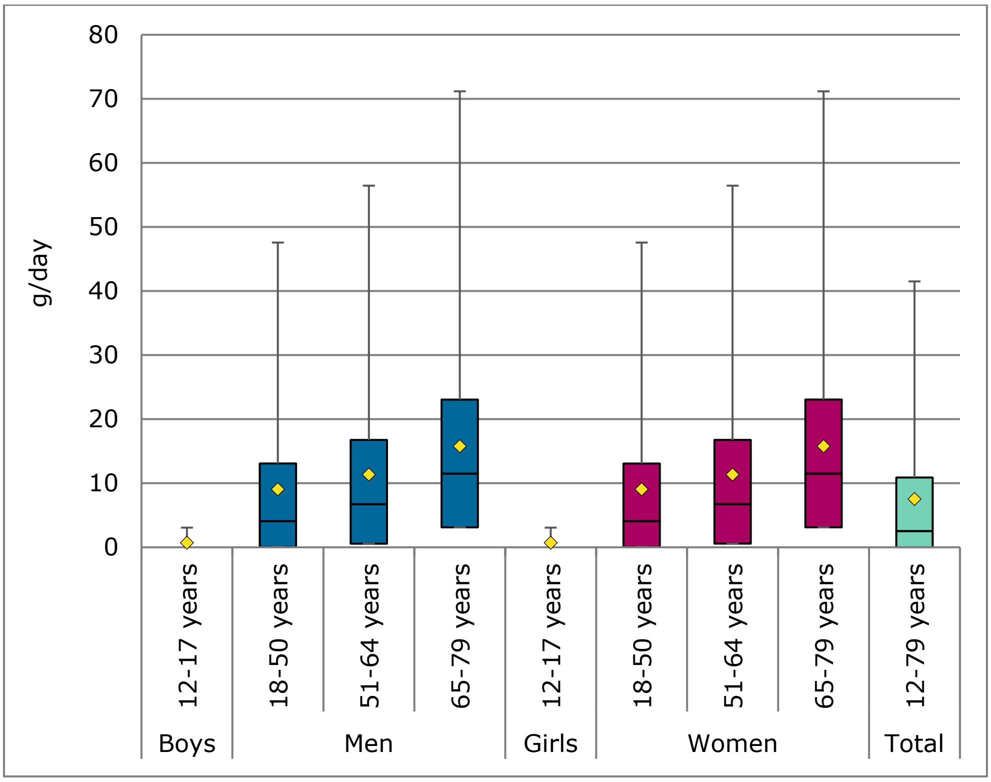


Figure 3.13 Habitual intake distribution of alcohol (g/day) from exclusively foods by the Dutch population aged 12-79 (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 3.32 Habitual intake distribution of alcohol (g/day) from exclusively foods by the Dutch population aged 12-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	UL[a]	% (95%-CI)≥UL	Evaluation UL
12-79	Total	2319	8 (7-8)	0	0	3 (2-3)	11	31			
12-17	Children	572	1 (0-1)	0	0	0 (0-0)	0	2			
18-79	Adults	1747	8 (7-9)	0	0	3 (3-4)	12	32			
12-17	Boys	272	1 (0-1)	0	0	0 (0-0)	0	3			
12-17	Girls	300	0 (0-1)	0	0	0 (0-0)	0	2			
18-79	Men	880	11 (10-12)	0	0	6 (4-7)	16	39			
18-79	Women	867	6 (5-6)	0	0	2 (1-3)	8	22			
12-17	Boys	272	1 (0-1)	0	0	0 (0-0)	0	3	0	16 (11-21)	High intakes
12-17	Girls	300	0 (0-1)	0	0	0 (0-0)	0	2	0	18 (13-21)	High intakes
18-50	Men	318	9 (8-11)	0	0	4 (3-6)	13	34	10	32 (26-37)	High intakes
18-50	Women	284	5 (3-6)	0	0	1 (0-2)	6	20	10	16 (11-21)	High intakes
51-64	Men	251	11 (10-13)	0	1	7 (5-8)	17	40	10	40 (34-45)	High intakes
51-64	Women	287	6 (5-7)	0	0	3 (1-4)	9	23	10	23 (19-28)	High intakes
65-79	Men	311	16 (14-18)	0	3	12 (9-13)	23	48	10	54 (48-60)	High intakes
65-79	Women	296	8 (6-9)	0	0	4 (3-6)	12	27	10	31 (26-37)	High intakes

[a] This upper level is based on the guideline of the Health Council in the Netherlands of drinking no alcohol or no more than one glass per day.[5] The assumption is that 1 glass of beer, wine, et cetera contains 10 grams of alcohol.

3.3.8 *Water*

The average habitual total water intake (from all foods, thus from beverages as well as solid foods) was 2691 g/day and the median intake was 2664 g/day (see Table 3.33). The average water intake by boys (1890 g/day) was almost equal to the water intake by girls (1782 g/day). Also, the water intake by men (2976 g/day) was almost equal to the water intake by women (2842 g/day).
Adults had a higher intake of water than children (2909 g/day and 1836 g/day, respectively). This was seen in both boys/men and girls/women.

On average, the most important sources of water were ‘Non-alcoholic beverages’ (64%, including 27% from ‘Waters’) and ‘Dairy (incl. substitutes)‘ (12%). Other groups contributed 5% or less (see section 3.5).

For water, no dietary reference value has been set by the Health Council in the Netherlands. Therefore, no statement could be made about adequacy of intake.

Table 3.33 Habitual intake distribution of water (g/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).*

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	2691 (2657-2723)	1412	2154	2664 (2628-2698)	3192	4040
1-17	Children	1823	1836 (1814-1860)	1049	1434	1777 (1753-1801)	2172	2822
18-79	Adults	1747	2909 (2870-2945)	1904	2420	2843 (2803-2877)	3325	4141
1-17	Boys	895	1890 (1862-1924)	1081	1484	1835 (1803-1866)	2235	2883
1-17	Girls	928	1782 (1748-1815)	1019	1389	1723 (1686-1757)	2106	2751
18-79	Men	880	2976 (2923-3025)	1981	2490	2908 (2856-2955)	3387	4203
18-79	Women	867	2842 (2789-2894)	1840	2352	2775 (2722-2827)	3259	4074
1-3	Boys	353	1349 (1321-1386)	880	1110	1311 (1286-1351)	1545	1958
1-3	Girls	350	1306 (1276-1331)	826	1072	1265 (1238-1294)	1500	1912
4-11	Boys	270	1792 (1761-1820)	1146	1473	1746 (1712-1771)	2063	2593
4-11	Girls	278	1684 (1647-1723)	1062	1371	1634 (1597-1674)	1945	2472
12-17	Boys	272	2251 (2216-2302)	1511	1882	2198 (2163-2247)	2562	3186
12-17	Girls	300	2113 (2067-2157)	1375	1747	2060 (2012-2105)	2415	3032
18-50	Men	318	3010 (2945-3076)	2003	2517	2942 (2878-3007)	3425	4257
18-50	Women	284	2784 (2717-2852)	1784	2291	2717 (2649-2783)	3201	4021
51-64	Men	251	3049 (2992-3100)	2067	2570	2983 (2926-3030)	3458	4259
51-64	Women	287	2980 (2916-3037)	1972	2492	2910 (2848-2966)	3397	4212
65-79	Men	311	2773 (2703-2832)	1862	2328	2710 (2640-2767)	3150	3898
65-79	Women	296	2826 (2751-2903)	1866	2357	2761 (2685-2836)	3225	4014

* Water from beverages as well as solid foods.

3.4 Evaluation of macronutrient intake

A summary of the evaluation of the intake of macronutrients is presented in Table 3.34.

Table 3.34 Summary of the evaluation of the intake of macronutrients with the Dutch dietary reference values by the Dutch population aged 1-79 (DNFCS 2019-2021).

Evaluation	Boys	Girls	Men	Women
Adequate intakes/no high intakes	Protein (g/kg)	Protein (g/kg)	Protein (g/kg)	Protein (g/kg; 65-79 yr)
	Carbohydrates (en%)	Carbohydrates (en%)	Carbohydrates (en%)	Carbohydrates (en%)
	Dietary fibre (g/MJ; 1-3 yr)	Dietary fibre (g/MJ; 1-3 yr)		
			Fat (en%; 51-79 yr)	Fat (en%; 51-79 yr)
	Trans fatty acids (en%)	Trans fatty acids (en%)	Trans fatty acids (en%)	Trans fatty acids (en%)
	Cis-unsaturated fatty acids (en%; 4-17 yr)	Cis-unsaturated fatty acids (en%; 4-17 yr)	Cis-unsaturated fatty acids (en%)	Cis-unsaturated fatty acids (en%)
	Linoleic acid (en%)	Linoleic acid (en%)	Linoleic acid (en%)	Linoleic acid(en%)
Low intakes	Dietary fibre (g/MJ; 4-18 yr)	Dietary fibre (g/MJ; 4-18 yr)	Dietary fibre (g/MJ)	Dietary fibre (g/MJ)
				Protein (g/kg; 18-64 yr)[a]
No statement	Alpha-linolenic acid (en%)	Alpha-linolenic acid (en%)	Alpha-linolenic acid (en%)	Alpha-linolenic acid (en%)
	N-3 fish fatty acids (mg)	N-3 fish fatty acids (mg)	N-3 fish fatty acids (mg)	N-3 fish fatty acids (mg)
High intakes	Fat (en%)	Fat (en%)	Fat (en%; 18-50 yr)	Fat (en%; 18-50 yr)
	Saturated fatty acids (en%)	Saturated fatty acids (en%)	Saturated fatty acids (en%)	Saturated fatty acids (en%)
	Alcohol[b] (12-17 yr)	Alcohol[b] (12-17 yr)	Alcohol[b]	Alcohol[b]

[a] Evaluation based on reported body weight. The intake is adequate if it was based on an average healthy weight.
[b] To assess alcohol intake, we analysed which percentage of the population has an intake of more than 10 grams of alcohol per day. This is based on the guideline of the Health Council of not drinking alcohol or no more than one glass per day. The assumption is that 1 glass of beer, wine, et cetera contains 10 grams of alcohol.

3.5 Sources of energy and macronutrients per food group

In this section we present for each food group which macronutrients and energy contributed substiantially on average to the intake (at least 10%) and, if applicable, whether the food group was the major source of the intake of energy or a macronutrient (see Figure 3.14 and Appendix C.1). Fortified foods were included in the food groups. In the previous sections we reported only the most important sources.

- 'Potatoes' were an important source of polysaccharides (12%).
- 'Vegetables' were an important source of dietary fibre (15%).
- 'Fruits, nuts, olives' were an important source of many macronutrients: vegetable protein (11%), total carbohydrates (10%), mono- and disaccharides (19%), dietary fibre (16%), and fatty acids (cis-unsaturated fatty acids, polyunsaturated fatty acids, alpha-linolenic acid and linoleic acid; each 10-12%).
- 'Dairy (incl. substitutes)' was the major source of animal protein (42%), mono- and disaccharides (20%), total fat (20%), saturated fatty acids (34%) and trans fatty acids (46%). 'Dairy (incl. substitutes)' was also an important source of energy (16%), total protein (24%), total carbohydrates (10%), alpha-linolenic acid (10%), cholesterol (28%), and water (12%).
- 'Bread, cereals, rice, pasta' were the major source of energy (23%), vegetable protein (54%), total carbohydrates (37%), polysaccharides (59%) and dietary fibre (41%). They were also an important source of total protein (23%) and fatty acids (polyunsaturated fatty acids, alpha-linolenic acid and linoleic acid (16-17%) and cis-unsaturated fatty acids (10%)).
- 'Meat (incl. substitutes)' was the major source of total protein (26%), animal protein (42%), cholesterol (30%), n-3 fish fatty acids (24%).'Meat (incl. substitutes)' was also an important source of energy (11%), total fat (17%) and the following fatty acids: polyunsaturated fatty acids (11%), saturated fatty acids (17%), trans fatty acids (21%), cis-unsaturated fatty acids (17%), and linoleic acid (12%).
- 'Fish and shellfish' contributed for 19% to the intake of n-3 fish fatty acids.
- 'Eggs' contributed for 20% to the intake of cholesterol and 10% to the intake of n-3 fish fatty acids.
- 'Fats and oils' were the major source of polyunsaturated fatty acids (24%), cis-unsaturated fatty acids (20%), alpha-linolenic acid (23%), and linoleic acid (23%). 'Fats and oils' were also an important source of total fat (17%), saturated fatty acids (12%), and trans fatty acids (15%).
- 'Sugar and confectionery' were an important source of mono- and disaccharides (15%).
- 'Cakes and sweet biscuits' contributed for 11% to the intake of mono- and disaccharides.
- 'Non-alcoholic beverages' were the major source of water (64%) and an important source of mono- and disaccharides (15%).
- 'Alcoholic beverages' were (obviously) the major source of alcohol (98%).

- 'Sauces and seasonings' were an important source of polyunsaturated fatty acids (12%), cis-unsaturated fatty acids (10%), alpha-linolenic acid (14%) and linoleic acid (12%).
- The following food groups contributed less than 10% to all macronutrients: 'Legumes' (0-2%), 'Stocks' (0-1%), 'Miscellaneous' (0%) and 'Savoury snacks' (0-6%).
- The contribution of 'Dietary supplements' was calculated for n-3 fish fatty acids only and was 5%.

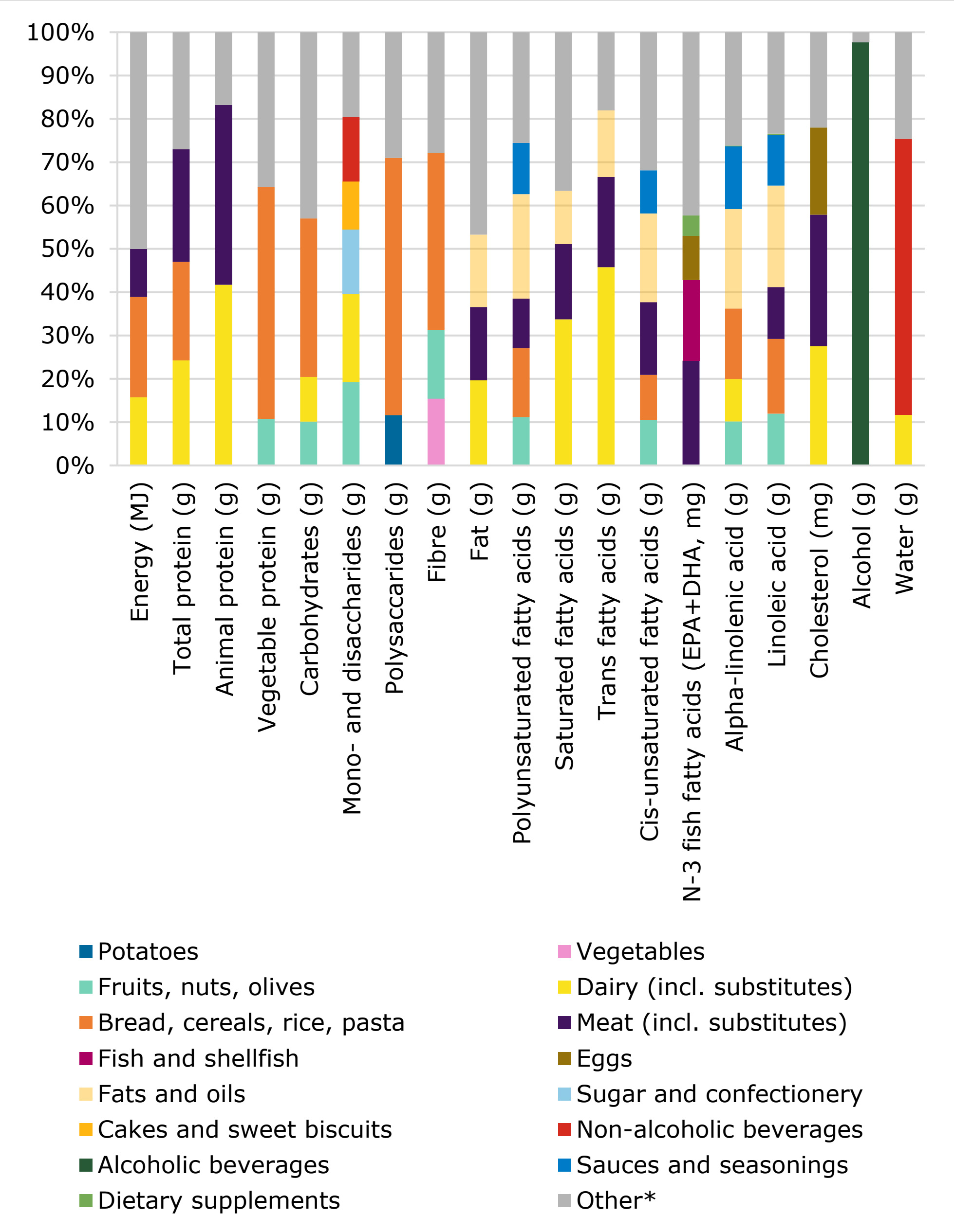


Figure 3.14 Main sources of macronutrients by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570). All food groups with a contribution of less than 10% are categorized into 'Other' (besides for ''Dietary supplements').

3.6 Intake of energy and macronutrients by eating occasions and place of consumption

3.6.1 Eating occasions

Figure 3.15 and Appendix D.2 present the food consumption occasions for the intake of energy and macronutrients from exclusively foods. Thus, intake from dietary supplements was not included. Of the total amount of energy that people consume, about one third (34%) was consumed during dinner. During breakfast, lunch, and in between meals 16, 22, and 28% of the amount of energy was consumed, respectively. The intakes of most macronutrients are distributed in a similar way over the different consumption occassions. However, alcohol was mainly consumed in between meals (78%) and at dinner (21%). In addition, mono- and disaccharides and water were consumed to a greater extent in between meals (46 and 54%, respectively) and animal protein was mainly consumed at dinner (50%).

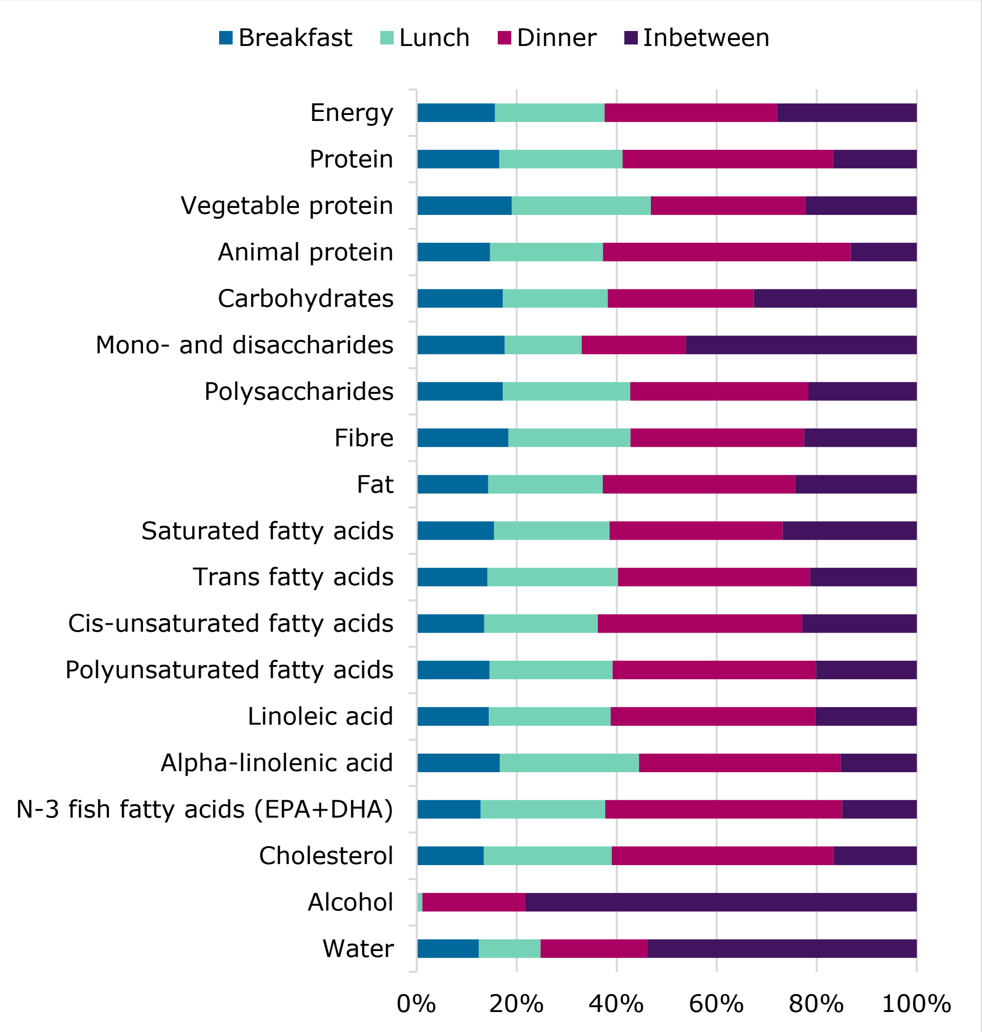


Figure 3.15 Average contribution of eating occasions to the intake of energy and macronutrients of the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic factors season and day of the week (n=3570).

3.6.2 *Place of consumption*

Figure 3.16 and Appendix E.1 present the place of consumption for the intake of energy and macronutrients from exclusively foods. Thus, intake from dietary supplements was not included.
On average, 87% of all energy from foods was consumed at home (including family, friends and home daycare) and 8% was consumed at school (including daycare) or work. The rest was consumed at restaurants (including canteens), outside and traveling or other places. The same pattern can be seen for the other macronutrients. Only alcohol was hardly consumed at school or at work, but more frequently at a restaurant (7%).

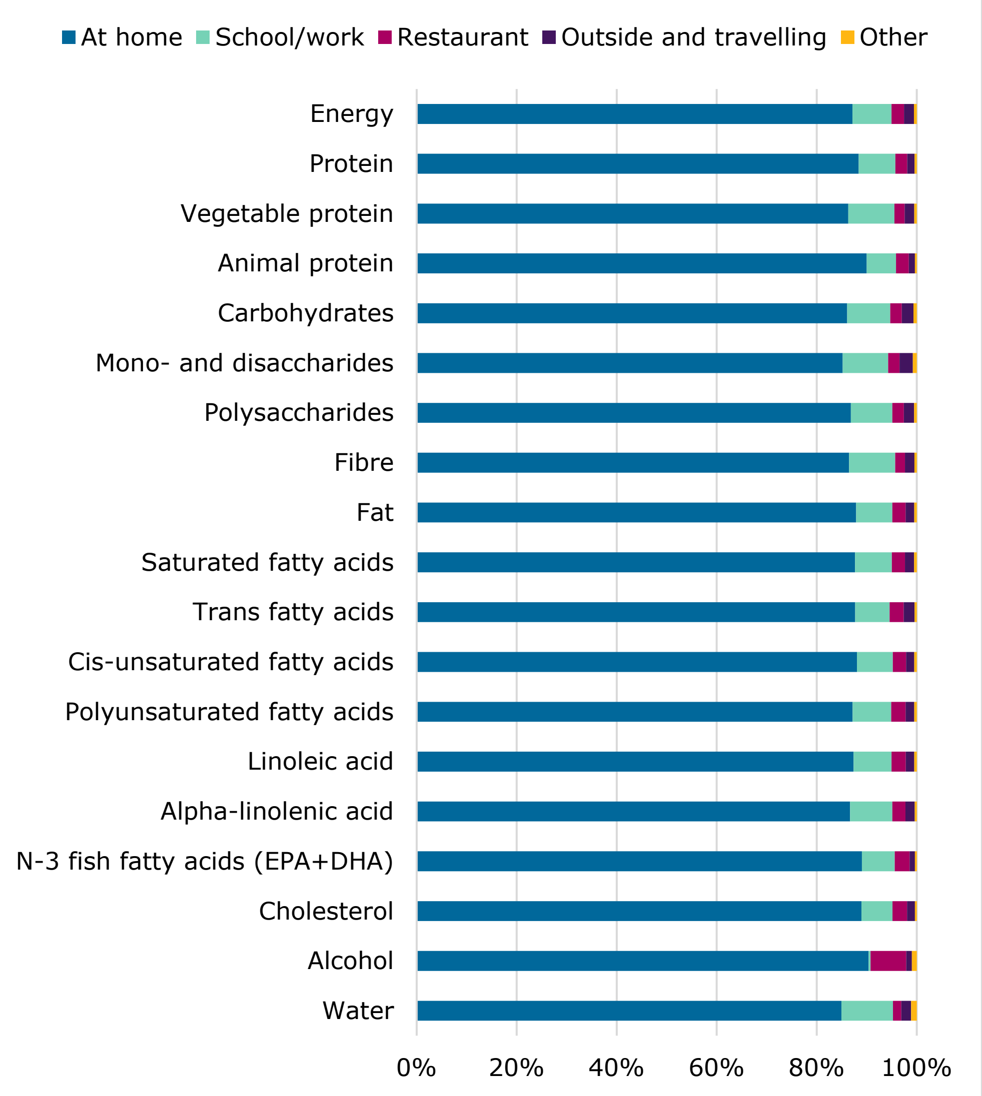


Figure 3.16 Average contribution of places of consumption to the intake of macronutrients of the Dutch population aged 1-79 (DFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

3.7 Differences by education level

Adherence to the Dutch dietary reference values (DRVs) for macronutrients was also studied for each education level of the population. These subgroup analyses focused on those nutrients for which the survey has identified high intakes, low intakes or for which no statement could be made, see section 3.4. This consisted of low intakes of dietary fibre, high intakes of fat, saturated fatty acids and alcohol. Furthermore, no statement could be made for the intakes of alpha-linolenic acid and n-3 fish fatty acids. The mean habitual intakes of these macronutrients by education level are presented in Appendix G.

Mean intake of fat, saturated fatty acids and alpha-linolenic acid was for adults and children almost equal between education levels. Differences in education levels were found for the intake of dietary fibre and n-3 fish fatty acids by children and by adults, and for the intake of alcohol by women. The median habitual intake of dietary fibre and n-3 fish fatty acids, and the percentages of the subgroups with intakes of alcohol above the UL by education level are presented in Table 3.35.

Dietary fibre
The habitual mean intake of dietary fibre (g/MJ) by adults with a higher education level was higher than the intake by adults with a middle or lower educational level. The mean dietary fibre intake by boys with higher and middle educated parents/caretakers was higher than the intake by boys with lower educated parents/caretakers. The dietary fibre intake by girls with higher educated parents/caretakers was higher than the intake by girls with middle or lower educated parents/caretakers (Appendix G). Also, when looking at the median intakes by education level, in most age-gender groups the intake of dietary fibre by the higher educated group was higher than the intake by the middle and/or lower educated group.

Alcohol
The habitual alcohol intake by women was higher for higher educated than for lower educated women. Also, more higher educated women exceeded the upper level of 10 g alcohol/day compared to middle- and lower educated women (however, this was not statistically significant).

N-3 fish fatty acids
The mean intake of n-3 fish fatty acids was higher by men with higher and middle education levels than the intake by men with lower education levels, and the intake by higher educated women was higher than the intake by middle- and lower educated women. The intake of n-3 fish fatty acids by boys with higher educated parents/caretakers was higher than by boys with lower educated parents/caretakers. Girls with higher and lower educated parents/caretakers had a higher intake than girls with middle educated parents/caretakers (Appendix G). When looking at the median intakes of n-3 fish fatty acids, this is also observed in women.

Table 3.35 Median habitual intakes of dietary fibre and n-3 fish fatty acids and intake percentages of alcohol above the UL by education level in DNFCS 2019-2021, weighted for socio-demographic characteristics, season and day of the week.

Nutrient	Age	Gender	AI	Lower educated P50 (95%-CI)	Middle educated P50 (95%-CI)	Higher educated P50 (95%-CI)
Dietary fibre (g/MJ/day)	1-3	Boys	2.8	2.1 (1.9-2.2)	2.6 (2.3-2.7)	2.8 (2.7-2.9)
Dietary fibre (g/MJ/day)	4-8	Boys	3	2.1 (1.9-2.2)	2.4 (2.2-2.4)	2.6 (2.5-2.7)
Dietary fibre (g/MJ/day)	9-13	Boys	3.2	2.1 (2-2.2)	2.3 (2.2-2.4)	2.5 (2.4-2.6)
Dietary fibre (g/MJ/day)	14-17	Boys	3.4	2.1 (2-2.2)	2.3 (2.2-2.4)	2.5 (2.4-2.6)
Dietary fibre (g/MJ/day)	18-79	Men	3.4	2.2 (2.2-2.3)	2.3 (2.3-2.4)	2.5 (2.4-2.6)
Dietary fibre (g/MJ/day)	1-3	Girls	2.8	2.7 (2.2-3.2)	2.3 (2.2-2.8)	2.8 (2.6-2.9)
Dietary fibre (g/MJ/day)	4-8	Girls	3	2.4 (2.2-2.6)	2.4 (2.3-2.5)	2.6 (2.5-2.7)
Dietary fibre (g/MJ/day)	9-13	Girls	3.2	2.2 (2.1-2.3)	2.4 (2.2-2.4)	2.6 (2.5-2.7)
Dietary fibre (g/MJ/day)	14-17	Girls	3.4	2.2 (2.1-2.3)	2.4 (2.2-2.5)	2.6 (2.5-2.7)
Dietary fibre (g/MJ/day)	18-79	Women	3.4	2.4 (2.3-2.5)	2.5 (2.4-2.6)	2.7 (2.6-2.8)
Nutrient	**Age**	**Gender**	**AI**	**Lower educated P50**	**Middle educated P50**	**Higher educated P50**
N-3 fish fatty acids (mg/day)[a]	1-17	Boys	150	34	31	35
N-3 fish fatty acids (mg/day)[a]	18-79	Men	200	55	54	59
N-3 fish fatty acids (mg/day)[a]	1-17	Girls	150	20	27	24
N-3 fish fatty acids (mg/day)[a]	18-79	Women	200	34	43	54
Nutrient	**Age**	**Gender**	**UL**	**Lower educated % above UL (95%-CI)**	**Middle educated % above UL (95%-CI)**	**Higher educated % above UL (95%-CI)**
Alcohol (g/day)	18-79	Women	10	17 (13-21)	16 (10-22)	28 (20-34)

[a] Based on the average intake of the two recall days of the participants. Confidence intervals could not be calculated.

3.8 Time trends in energy and macronutrient intake

This chapter describes the comparison of the mean intake data on energy and macro nutrients and their evaluation along the dietary references values with results from previous surveys, conducted in 2007-2010 and 2012-2016.[38, 39] Based on the available age groups in all three surveys, the analyses were performed for 7-69 year-olds (total population, men, women, boys and girls). Differences between the surveys are expressed in percentage changes in mean intakes compared to that in the previous surveys. Changes of more than 1% decrease or increase on average per year have been assessed as relevant. This equates to a difference of 6% or more between the successive surveys and 12% or more between the surveys of 2007-2010 and 2019-2021. These age-specific results may differ slightly from previous chapters, because they are modelled based on data from 7-69 year-olds instead of 1-79 year-olds.

Appendix H shows the mean intake of energy and macronutrients in 2007-2010, in 2012-2016 and 2019-2021. Results are given for the 7-17 and 18-69 year-olds by gender, as well as the total population aged 7-69. The evaluation of the intake in these periods are also shown in Appendix H. In this section below, only the nutrients with a relevant and statistically significant difference are shown (indicated in the figures with an asterisk (*). The most remarkable changes are observed in the intake of carbohydrates and mono- disaccharides, dietary fibre and alcohol.

Protein

Compared to the previous measurement of food consumption in 2012-2016, the contribution of plant protein to the total intake of protein intake hardly increased (less than 6% change), see Figure 3.17. In 2007, this contribution was 40%, in 2012-2016 41% and in 2019-2021 43%. In girls, the increase was statistically significant and relevant. This increase might be explained by a lower intake of animal protein and higher intake in plant-based protein. However, only the decrease of intake of animal protein was statistically significant and relevant for men and the total population aged 7-69 years, see Figure 3.18.

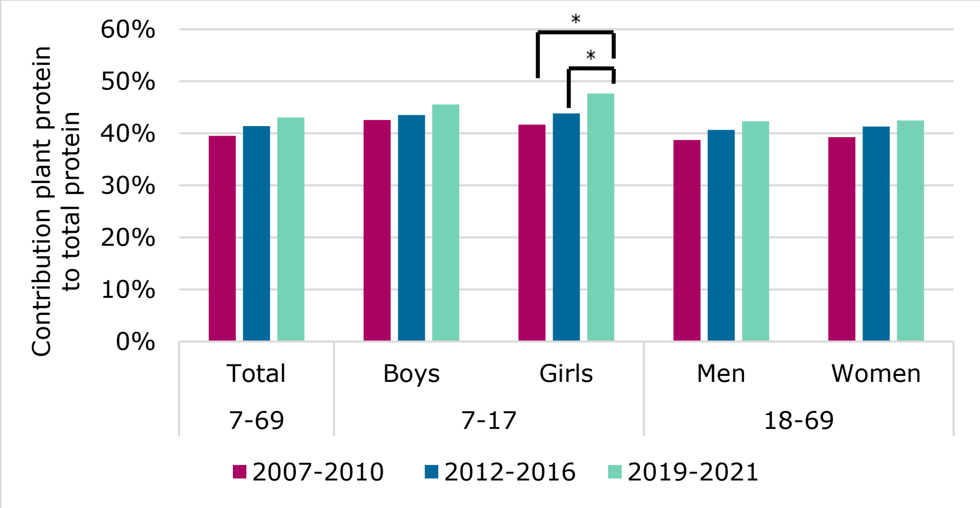


Figure 3.17 Mean habitual contribution of plant protein to total intake of protein (%) of Dutch children and adults aged 7-69 in DNFCS 2007-2010, DNFCS 2012-2016 and DNFCS 2019-2021, weighted for socio-demographic characteristics, season and day of the week.

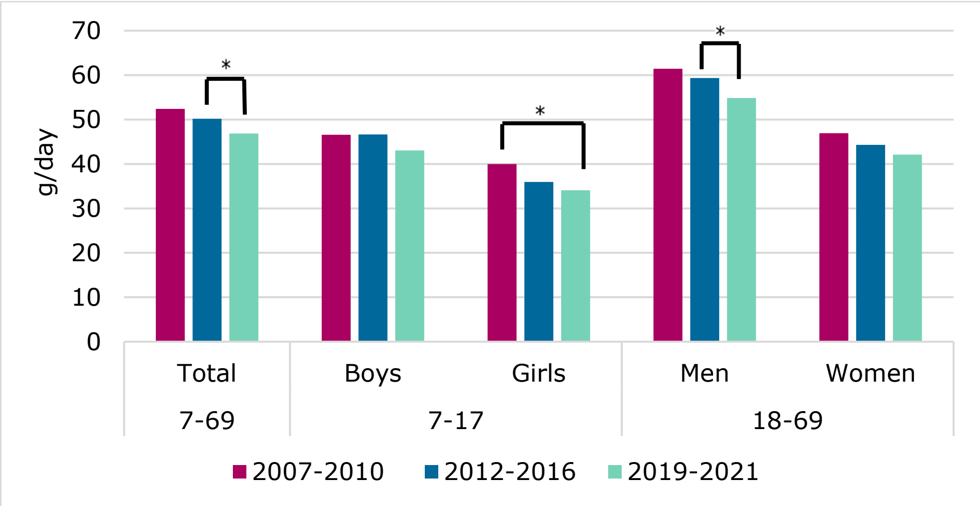


Figure 3.18 Mean habitual intake animal protein (g/day) of Dutch children and adults aged 7-69 in DNFCS 2007-2010, DNFCS 2012-2016 and DNFCS 2019-2021, weighted for socio-demographic characteristics, season and day of the week.

Carbohydrates and mono- and disaccharides
The average habitual intake of grams of carbohydrates and mono- and disaccharides (also as contribution to the energy intake, see Appendix H) has decreased compared to the survey of 2012-2016. See Figure for the intake of mono- and disaccharides and carbohydrates in gram/day. This decrease in both mono- and disaccharides and carbohydrates was observed in boys, girls, men and women. In the period 2007-2010 to 2012-2016, the intake of mono- and disaccharides also decreased in children and women. In the same period, the intake of carbohydrates decreased in girls and women.

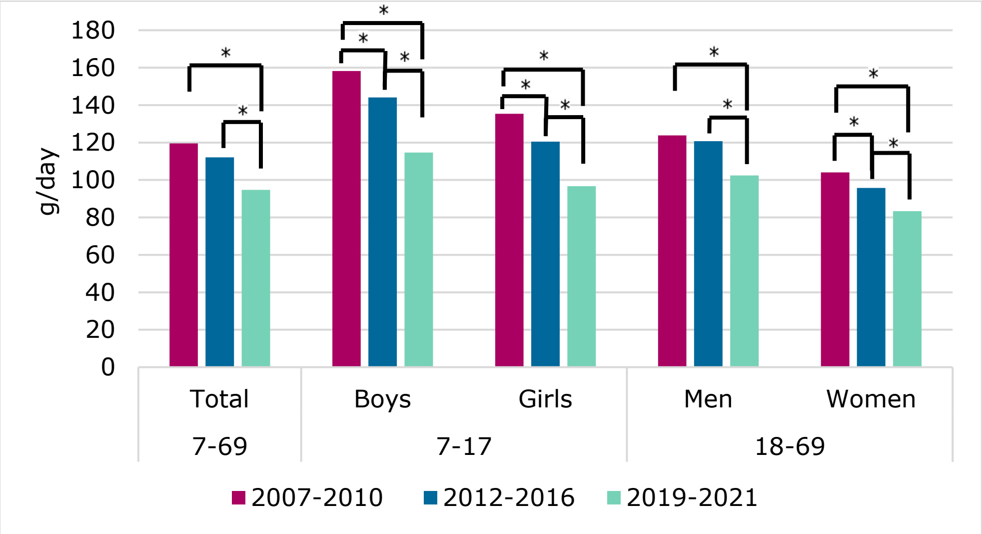


Figure 3.19 Mean habitual intake of mono- and disaccharides (g/day) of Dutch children and adults aged 7-69 in DNFCS 2007-2010, DNFCS 2012-2016 and DNFCS 2019-2021, weighted for socio-demographic characteristics, season and day of the week.

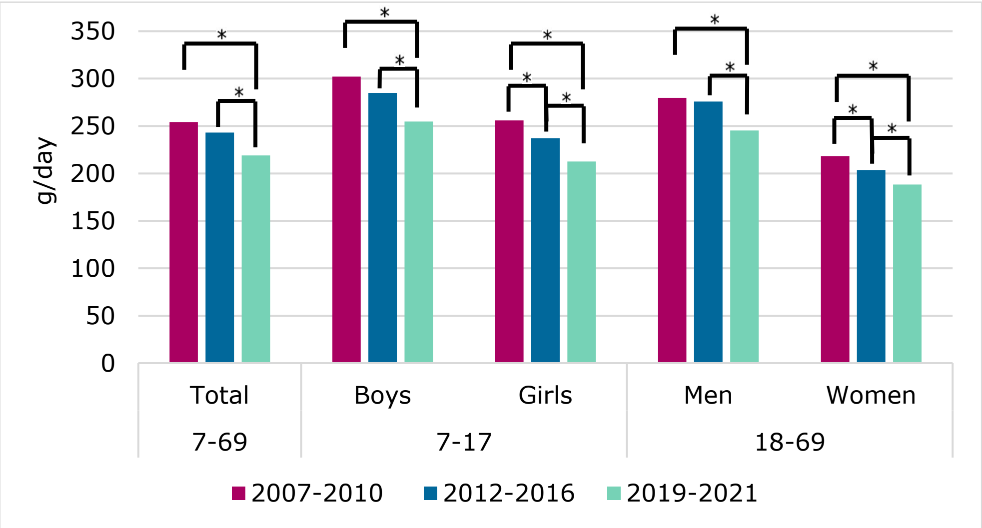


Figure 3.20 Mean habitual intake of carbohydrates (g/day) of Dutch children and adults aged 7-69 in DNFCS 2007-2010, DNFCS 2012-2016 and DNFCS 2019-2021, weighted for socio-demographic characteristics, season and day of the week.

Fats
Compared to the previous measurement of food consumption in 2012-2016, the intake of cis-unsaturated fatty acids (gram/day) and total fats (as contribution to the energy intake) has increased, and the intake of trans fatty acids (g/day and En%) decreased among 7 to 69 year-olds, see Figures 3.21-3.23. These changes in intake of trans fatty acids and cis-unsaturated fatty acids were seen in boys, girls, men and women. The increase in the contribution of total fats to the energy intake was statistically significant and relevant in girls and women. Some of these changes were also seen in the period from 2007-2010 to 2012-2016.

This was the case for the intake of trans fatty acids (in boys, girls, men, women) and cis-unsaturated fatty acids (only in women).

In addition, compared to the previous survey in 2012-2016, the contribution of saturated fats to the energy intake in girls and women has increased. Also, from 2007-2010 to 2012-2016 several changes were observed in girls and/or women (intake in total fat, saturated fatty acids, polyunsaturated fatty acids, linoleic acid, alpha-linolenic acid), see Appendix H.

These changes in fat intakes hardly lead to a different evaluation of intake. Compared to the previous survey, the percentage of the population with a high intake of total fat (as contribution to the energy intake) has increased.

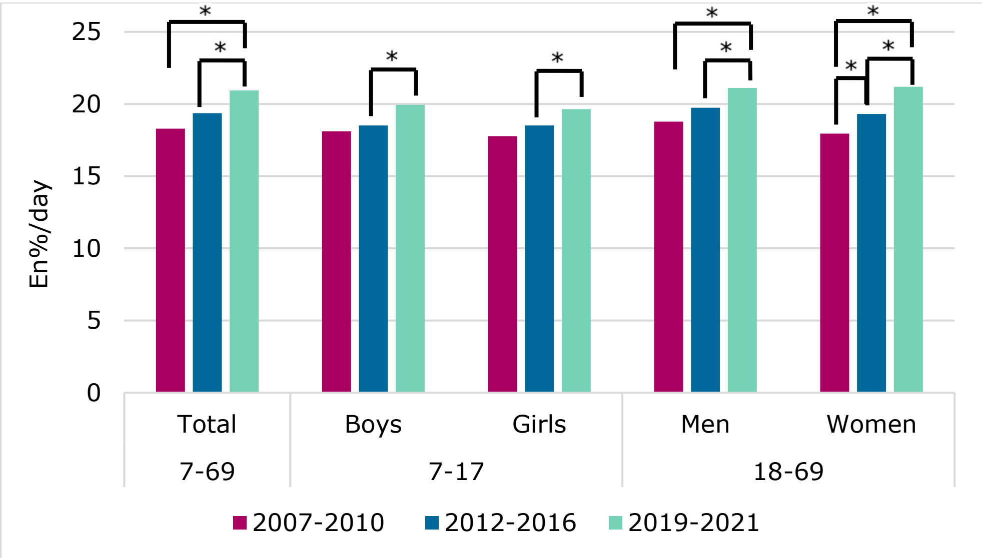


Figure 3.21 Mean habitual intake of cis-unsaturated fatty acids (En%) of Dutch children and adults aged 7-69 in DNFCS 2007-2010, DNFCS 2012-2016 and DNFCS 2019-2021, weighted for socio-demographic characteristics, season and day of the week.

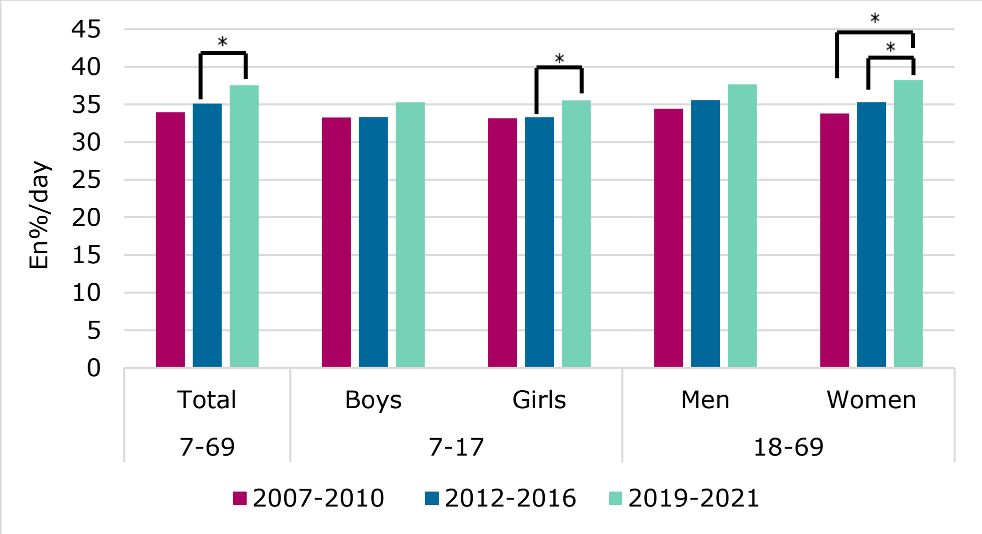


Figure 3.22 Mean habitual intake of total fats (En%) of Dutch children and adults aged 7-69 in DNFCS 2007-2010, DNFCS 2012-2016 and DNFCS 2019-2021, weighted for socio-demographic characteristics, season and day of the week.

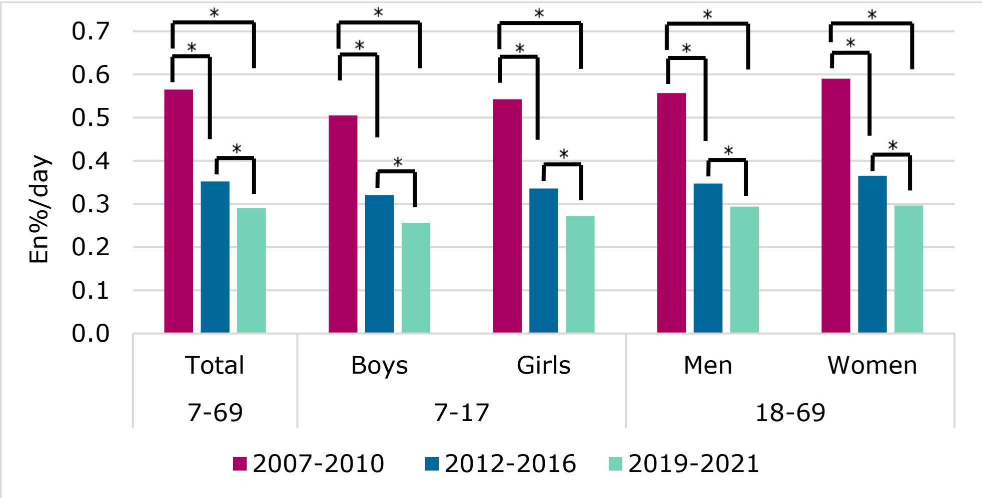


Figure 3.23 Mean habitual intake of trans fatty acids (En%) of Dutch children and adults aged 7-69 in DNFCS 2007-2010, DNFCS 2012-2016 and DNFCS 2019-2021, weighted for socio-demographic characteristics, season and day of the week.

Dietary fibre

The intake of dietary fibre per MJ based on the survey in 2019-2021 has increased compared to the previous measurement in 2012-2016. This was observed in boys, girls, men and women. In the period before (between 2007-2010 and 2012-2016), an increase was also observed in children, see Figure 3.24. In all three surveys the intake of dietary fibre was evaluated as low.

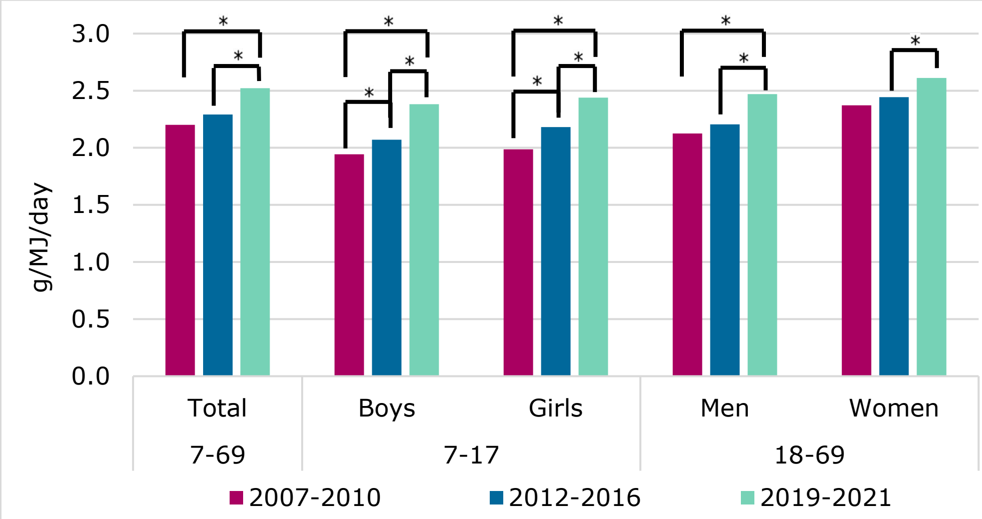


Figure 3.24 Mean habitual intake of dietary fibre (g/MJ/day) of Dutch children and adults aged 7-69 in DNFCS 2007-2010, DNFCS 2012-2016 and DNFCS 2019-2021, weighted for socio-demographic characteristics, season and day of the week.

Alcohol
Based on the DNFCS, the mean intake of alcohol of 12 to 69 year-olds has decreased between 2012-2016 and 2019-2021, see Figure 3.25. This corresponds with findings of the Health Survey, in which a decrease was also observed.[40] The decrease in alcohol was only statistically significant for men. In the period between 2007-2010 and 2012-2016 statistically significant decreases in alcohol intakes were observed in girls, women and men. Despite the beneficial change, high alcohol intakes were still observed.

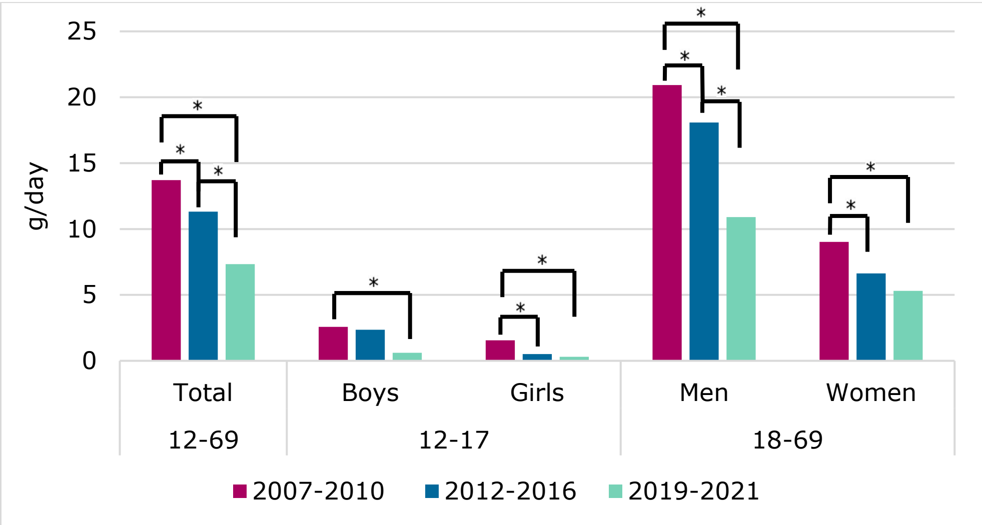


Figure 3.25 Mean habitual intake of alcohol (g/day) of Dutch children and adults aged 12-69 in DNFCS 2007-2010, DNFCS 2012-2016 and DNFCS 2019-2021, weighted for socio-demographic characteristics, season and day of the week.

4 Micronutrients

4.1 Introduction

This chapter describes the habitual intake of micronutrients. We report on the total intake, i.e. from foods and dietary supplements unless otherwise stated. The habitual intake from exclusively foods (this is the consumption of foods and drinks, excluding dietary supplements) are presented in Appendix B. If different conclusions were drawn for the habitual intake from exclusively foods by age-gender groups compared to that for the intake from foods and dietary supplements, both conclusions were described.

Furthermore, we present the sources of the micronutrients (section 4.6), as well as intake by food consumption occasions and places of intake (section 4.7). The differences in intake by education level are described in section 4.8. In section 4.9, a comparison is made with the findings from the DNFCS of 2007-2010 and 2012-2016.

This chapter presents the results of the habitual intakes mainly in figures like the example in section 3.1. More results are presented in the tables and online tables (see Appendix F). The online tables include results for subgroups which are not shown in this report.

4.2 Key findings

- The intake of iodine, copper, magnesium, zinc, vitamins B_1, B_3, B_{12} and K_1 was sufficient in adults. For children, this was the case for iodine, copper, vitamin B_3 and vitamin B_{12}. For men, the intake of folate was sufficient.
- The vitamin D intake by older adults aged 70-79 is low. Not all of them follow the recommendation for vitamin D supplementation. Increased adherence to this recommendation, along with adequate calcium intake, can reduce the risk of bone fractures. The vitamin D intake did increase in recent years.
- Low intakes were observed for several micronutrients in parts of the population (folate, calcium, iron, and vitamins A, B_2, B_6 and C). There are no concrete indications that these low intakes are worrying from a public health point of view. For some of these nutrients (calcium, and vitamins B_2, B_6 and C), we see in parts of the population more people with a lower intake than previously. Follow-up research on nutritional status (e.g. certain blood values) or on the prevalence of clinical signs is desirable.
- Due to insufficient knowledge about the requirements of certain micronutrients, the adequacy of intake could not be determined with certainty in different age-gender groups, especially teenagers.
- Sodium intake was high. A high sodium intake is associated with high blood pressure.[5] However, there has been a beneficial change: the total sodium intake appears to have decreased.
- For a number of micronutrients, high intakes are seen in parts of the population (zinc, iodine, copper, magnesium and retinol). With a high intake, a health risk cannot be ruled out. However,

there is no concrete evidence for a public health concern. Follow-up research on the potentially high intakes is desirable.

4.3 Intake of vitamins

4.3.1 Vitamin A

This section describes the intake of retinol and retinol activity equivalents (RAE). Retinol is preformed vitamin A, present in animal products. RAE includes the vitamin A activity from some carotenoids. RAE was calculated as retinol (µg) + β-carotene/12 (µg) + other carotenoids (µg)/24.[22] The tolerable upper level (UL) applies to both dietary and supplemental intakes of retinol.

The average habitual intake of retinol activity equivalents from foods and dietary supplements was 823 µg/day and the median intake was 708 µg/day (see Figure 4.1 and Table 4.1). This difference between average and median intake can mainly be explained by high intakes from foods by parts of the population. The average intake of retinol activity equivalents from exclusively foods was 724 µg/day (see Appendix B).
The average habitual retinol intake from foods and dietary supplements was 618 µg/day and the median intake was 513 µg/day (see Figure 4.2 and Table 4.2). Also, for retinol intake this difference between average and median intake can mainly be explained by high intakes from foods by parts of the population. The average retinol intake from exclusively foods was 527 µg/day (see Appendix B).

The average intake of retinol activity equivalents by boys (628 µg/day) was higher than the intake by girls (551 µg/day), and the intake by men (972 µg/day) was higher than the intake by women (794 µg/day). Adults had a higher intake of retinol activity equivalents than children (883 and 589 µg/day, respectively). This was seen in both boys/men and girls/women.
Also, the average retinol intake by boys (469 µg/day) was higher than the intake by girls (409 µg/day), and the intake by men (754 µg/day) was higher than the intake by women (575 µg/day).
Adults had also a higher intake of retinol than children (664 and 439 µg/day, respectively). This was seen in both boys/men and girls/women.

On average, the most important sources of retinol activity equivalents were ‘Dairy (incl. substitutes)’ (25%), ‘Vegetables’ (19%), ‘Fats and oils’ (16%) and ‘Meat (incl. substitutes)’ (11%). Other food groups contributed 5% or less. Dietary supplements contributed 9% to the intake of retinol activity equivalents (see section 4.6).
For retinol, ‘Dairy (products)’ (34%), ‘Fats and oils’ (22%) and ‘Meat (products)’ (14%) were the major sources. Other food groups contributed 8% or less. Dietary supplements contributed on average 10% to the intake of retinol (see section 4.6).

For boys aged 1-13 and girls aged 1-9, the AI was lower than or within the confidence interval of the median intake of retinol activity equivalent, indicating that the intake seemed adequate. For 10-13 year-old girls, no statement could be made about the adequacy of the intake of retinol activity equivalents, because the median intake was below the

AI. For children aged 14-17 and adults, low intakes of µg retinol activity equivalents intake below the EAR were observed. The highest prevalence of low intakes was observed for adolescents (around 50%). Among adults the prevalence of low intake ranged from 15 to 34%, with higher prevalence in younger age groups.

Thus, for children aged 14-17 and adults, low intakes of retinol activity equivalents were observed. For girls aged 10-13, no statement could be made about the adequacy of the intake. Researching nutritional status in a general population is complex, and it is therefore difficult to verify the results from this survey.[41] As far as we know, no studies have shown that intake below the EAR will result in health problems. In addition, a RIVM survey among professionals in 2020 did not suggest any health problems related to low retinol activity equivalents intake.[41] Thus, there are no concrete indications that this low intake of retinol activity equivalents is worrying from a public health point of view. However, follow-up research into the clinical signs associated with low retinol activity equivalents intake would be useful.

High intakes of retinol were observed among boys aged 1-6 years, girls aged 1-3 year and women aged 51-79. Without the intake of dietary supplements, the intake of retinol was still high for 1-3 year-olds. However, failure to meet all assumptions in the SPADE modelling might have influenced these percentages with high intakes. This impact is further investigated within RIVM. It is advised to prioritise this follow-up research and after this, if necessary, conduct nutritional status studies in young children.

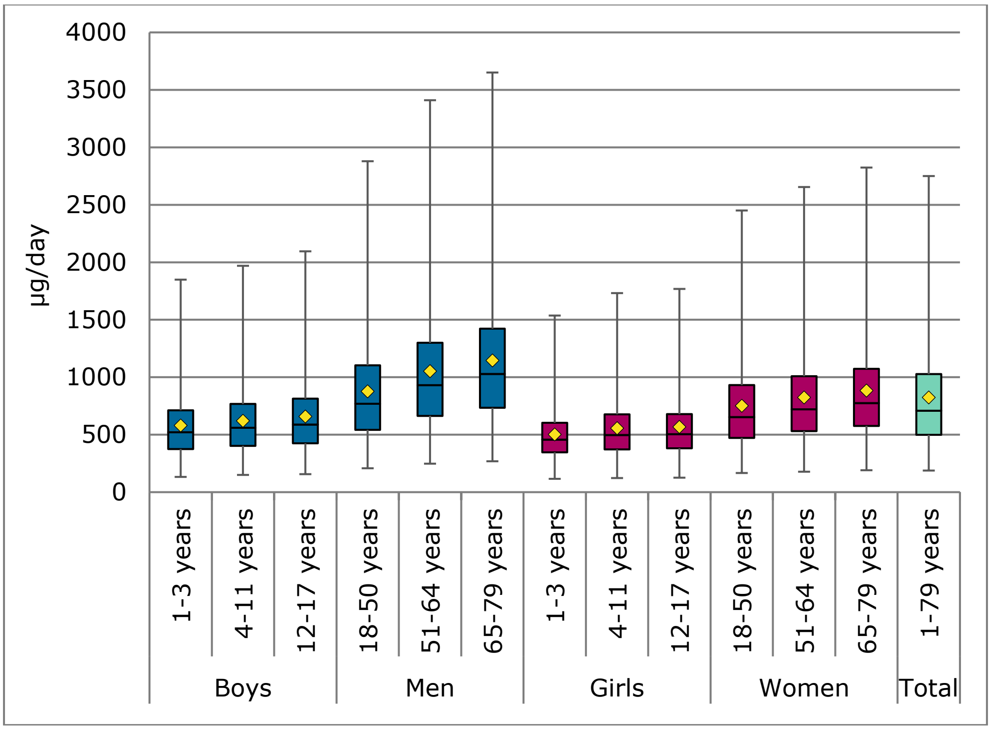


Figure 4.1 Habitual intake distribution of retinol activity equivalents (µg/day) from foods and dietary supplements by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

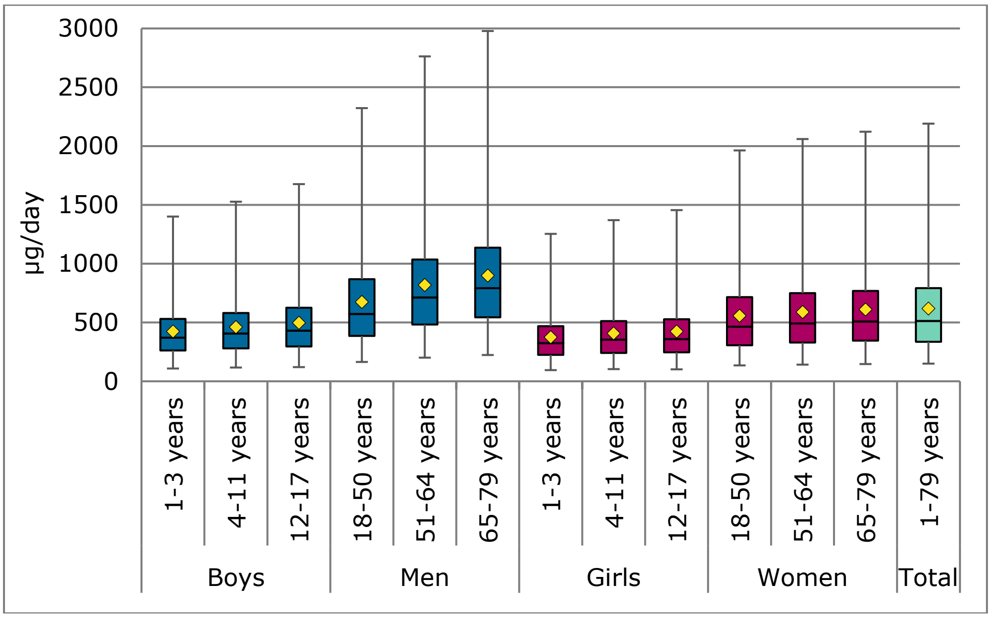


Figure 4.2 Habitual intake distribution of retinol (µg/day) from foods and dietary supplements by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 4.1 Habitual intake distribution of retinol activity equivalents (µg/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI) <EAR	AI	P50 related to AI	Evaluation EAR/AI
1-79	Total	3570	823 (800-848)	311	499	708 (691-732)	1027	1723					
1-17	Children	1823	589 (574-612)	251	387	524 (512-546)	721	1144					
18-79	Adults	1747	883 (854-912)	342	544	767 (744-795)	1103	1811					
1-17	Boys	895	628 (603-664)	256	405	563 (543-595)	776	1222					
1-17	Girls	928	551 (526-581)	247	371	492 (472-519)	666	1049					
18-79	Men	880	972 (924-1022)	365	600	854 (818-900)	1223	1970					
18-79	Women	867	794 (756-830)	326	503	694 (663-727)	978	1594					
1-3	Boys	353	579 (526-611)	242	375	521 (471-548)	712	1137			300; 350[b]	P50>AI	Seems adequate
1-3	Girls	350	501 (466-526)	230	346	457 (418-479)	604	933			300; 350[b]	P50>AI	Seems adequate
4-11	Boys	270	620 (591-658)	253	403	560 (534-592)	767	1202			350; 400; 600[b]	4-9 yr: P50>AI; 10-11 yr: P50<AI	Seems adequate[c]
4-11	Girls	278	556 (522-588)	249	372	497 (472-526)	677	1055			350; 400; 600[b]	4-9 yr: P50>AI; 10-11 yr: P50<AI	4-9 yr: seems adequate; 10-11 yr: no statement

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI) <EAR	AI	P50 related to AI	Evaluation EAR/AI
12-17	Boys	272	658 (629-718)	268	425	588 (564-645)	813	1282	600 [a]	14-17 yr: 51.9 (43.2-55.8)	600[b]	12-13 yr: P50<AI	12-13 yr: seems adequate[c]; 14-17 yr: low intakes
12-17	Girls	300	568 (537-615)	256	381	504 (479-550)	679	1089	500 [a]	14-17 yr: 47.9 (39.2-53.1)	600[b]	12-13 yr: P50<AI	12-13 yr: no statement; 14-17 yr: low intakes
18-50	Men	318	877 (828-946)	334	542	769 (732-836)	1104	1776	615	33.5 (27.2-36.4)			Low intakes
18-50	Women	284	751 (712-805)	305	472	653 (622-702)	932	1519	530	33.4 (28.0-36.7)			Low intakes
51-64	Men	251	1052 (976-1105)	416	664	931 (871-980)	1300	2110	615	20.2 (17.2-23.7)			Low intakes
51-64	Women	287	824 (774-871)	353	531	721 (676-764)	1009	1646	530	24.9 (20.0-29.5)			Low intakes
65-79	Men	311	1145 (1046-1227)	465	734	1028 (925-1095)	1422	2229	615	14.7 (11.2-20.6)			Low intakes
65-79	Women	296	883 (793-921)	385	576	775 (695-817)	1073	1751	530	19.0 (14.4-27.0)			Low intakes

[a] Only for 14-17 years.
[b] 1 year=300 µg, 2-5 years=350 µg, 6-9 years=400 µg, 10-13 years=600 µg.

Table 4.2 Habitual intake distribution of retinol (μg/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	UL	% (95%-CI) ≥UL	Evaluation UL
1-79	Total	3570	618 (593-635)	186	336	513 (490-527)	792	1398			
1-17	Children	1823	439 (422-458)	149	259	378 (365-394)	552	930			
18-79	Adults	1747	664 (634-682)	203	366	557 (529-575)	856	1473			
1-17	Boys	895	469 (444-498)	165	281	408 (388-433)	590	975			
1-17	Girls	928	409 (386-433)	138	240	350 (333-369)	509	873			
18-79	Men	880	754 (712-789)	244	432	646 (605-676)	968	1610			
18-79	Women	867	575 (535-598)	180	319	480 (447-500)	734	1283			
1-3	Boys	353	424 (398-467)	153	262	371 (347-408)	530	871	800	7.0 (5.1-10.5)	High intakes
1-3	Girls	350	376 (354-406)	130	225	324 (309-353)	469	785	800	4.6 (3.1-6.6)	High intakes
4-11	Boys	270	461 (434-494)	162	279	406 (382-432)	580	946	1100; 1500; 2000[a]	4-6 yr: 2.7 (1.3-3.9); 7-10 yr: 0.5 (0.2-1.0); 11 yr: 0.2 (0.0-0.4)	4-6 yr: high intakes; 7-11 yr: tolerable intakes
4-11	Girls	278	408 (387-443)	137	241	354 (336-380)	512	858	1100; 1500; 2000[a]	4-6 yr: 2.1 (0.8-3.3); 7-10 yr: 0.2 (0.0-0.6); 11 yr: 0.1 (0.0-0.2)	Tolerable intakes

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	UL	% (95%-CI) ≥UL	Evaluation UL
12-17	Boys	272	498 (466-528)	175	296	431 (405-456)	626	1050	2000; 2600[a]	12-14 yr: 0.2 (0.0-0.4); 15-17 yr: 0.0 (0.0-0.1)	Tolerable intakes
12-17	Girls	300	424 (389-443)	145	246	359 (334-372)	528	928	2000; 2600[a]	12-14 yr: 0.1 (0.0-0.2); 15-17 yr: 0.0 (0.0-0.1)	Tolerable intakes
18-50	Men	318	675 (615-715)	221	385	573 (522-608)	867	1455	3000	0.1 (0.0-0.2)	Tolerable intakes
18-50	Women	284	558 (504-585)	171	306	464 (419-487)	716	1247	3000	0.0 (0.0-0.1)	Tolerable intakes
51-64	Men	251	819 (766-872)	281	482	713 (661-753)	1035	1727	3000	0.2 (0.1-0.5)	Tolerable intakes
51-64	Women	287	588 (540-617)	188	329	492 (450-517)	750	1310	1500[b]	2.8 (1.3-3.7)	High intakes
65-79	Men	311	899 (850-976)	320	544	791 (744-856)	1136	1842	3000	0.3 (0.1-0.8)	Tolerable intakes
65-79	Women	296	611 (567-661)	199	346	508 (477-565)	768	1354	1500[b]	3.4 (1.6-4.4)	High intakes

[a] UL 4-6 years=1100 µg, 7-10 years=1500 µg, 11-14 years=2000 µg, 15-17 years=2600 µg.
[b] Postmenopausal women (51+ years), who are at greater risk of osteoporosis and fracture, are advised to restrict their intake to 1500 µg RE/day, because the tolerable upper level may not adequately address the possible risk of bone fracture in particularly vulnerable groups.[42]

4.3.2 *Vitamin B_1 (Thiamin)*

For vitamin B_1 both absolute intake and intake per MJ were calculated, as the recommendation for children is given in mg/day and for adults in mg/MJ/day (see Figures 4.3 and 4.4 and Tables 4.3 and 4.4).

The average habitual vitamin B_1 intake from foods and dietary supplements was 1.9 mg/day and the median intake was 1.1 mg/day (see Figure 4.3 and Table 4.3). This difference between average and median intake can mainly be explained by use of dietary supplements. The average vitamin B_1 intake from exclusively foods was 1.0 mg/day (see Appendix B).
The average habitual vitamin B_1 intake per MJ from foods and dietary supplements was 0.26 mg/MJ/day and median intake was 0.13 mg/MJ/day. Also, for the intake of vitamin B_1 per MJ, the difference between average and median intake can mainly be explained by use of dietary supplements. The average vitamin B_1 intake per MJ from exclusively foods was 0.12 mg/day (see Appendix B).

The vitamin B_1 intake from foods and dietary supplements by boys was equal to the intake by girls (1.1 mg/day) and the vitamin B_1 intake by men (2.2 mg/day) was almost equal to the intake by women (2.1 mg/day). When looking at the intake from exclusively foods, vitamin B_1 intake by boys (0.8 mg/day) was higher than the intake by girls (0.7 mg/day), and the intake by men (1.2 mg/day) was higher than the intake by women (0.9 mg/day).
The vitamin B_1 intake per MJ from foods and dietary supplements by boys was equal to the intake by girls (both 0.14 mg/MJ/day) and the vitamin B_1 intake per MJ by men (0.25 mg/MJ/day) did not differ significantly from the intake by women (0.34 mg/MJ/day).

Adults had a higher intake of vitamin B_1 from foods and dietary supplements than children (2.1 and 1.1 mg/day, respectively). This was seen in both boys/men and girls/women. The vitamin B_1 intake per MJ from foods and dietary supplements by adults (0.29 mg/MJ/day) was higher than the intake by children (0.14 mg/MJ/day). This was also seen in boys/men and did not significantly differ in girls/women. When looking at vitamin B_1 intake per MJ from exclusively foods, the intake by adults (0.12 mg/MJ/day) was almost equal to the intake by children (0.11 mg/MJ/day).

On average, the most important sources of vitamin B_1 were 'Bread, cereals, rice, pasta' (20%) and 'Meat (incl. substitutes)' (20%). Other food groups contributed 7% or less to vitamin B_1 intake. Dietary supplements were also an important source of vitamin B_1, with an average contribution of 11% (see section 4.6).

For children aged 1-13, the median intake of vitamin B_1 was equal to or higher than the AI, indicating that the intake seemed adequate. For children aged 14-17, no statement could be made about the adequacy of vitamin B_1 intake, because the median intake was below the AI. For adults, the prevalence of intake below the EAR of 0.072 mg/MJ/day was low (less than 1.5%).

Thus, vitamin B_1 intake seemed adequate for most age groups except for children aged 14-17, for whom no statement about adequacy can be made. As far as we know, no recent study is available on vitamin B_1 status in the general population in the Netherlands. However, there are no concrete indications of clinical signs of vitamin B_1 deficiencies, suggesting low priority for follow-up research.

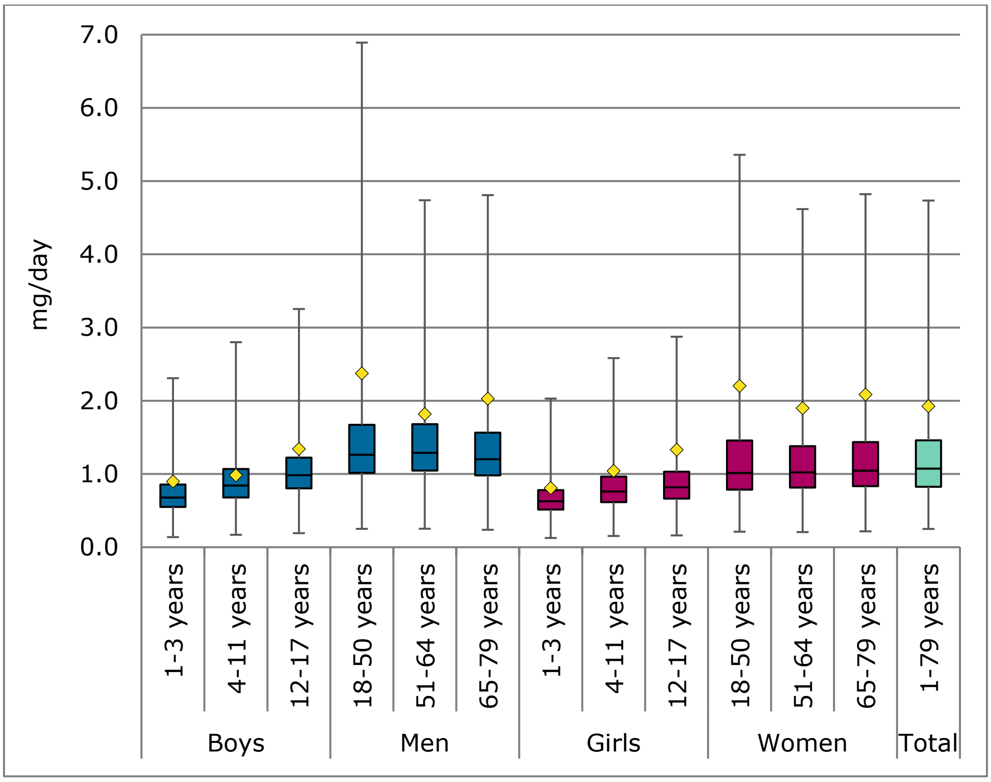


Figure 4.3 Habitual intake distribution of vitamin B_1 (mg/day) from foods and dietary supplements by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

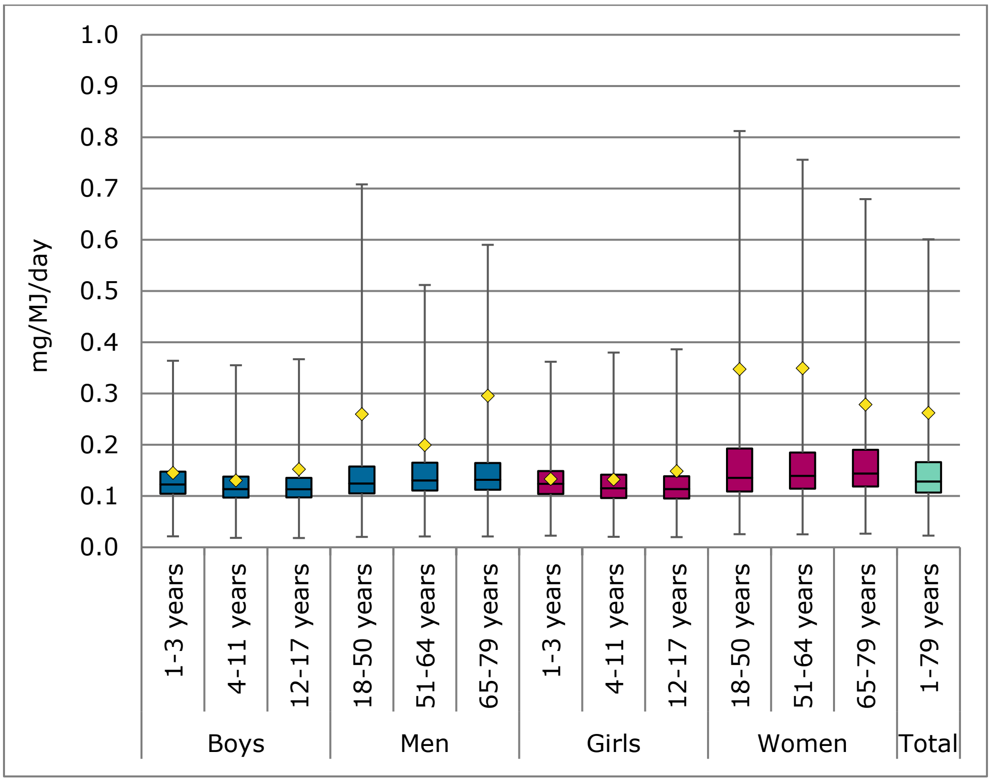


Figure 4.4 Habitual intake distribution of vitamin B_1 (mg/MJ/day) from foods and dietary supplements by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 4.3 Habitual intake distribution of vitamin B_1 (mg/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	AI	P50 related to AI	Evaluation AI
1-79	Total	3570	1.9 (1.6-2.2)	0.6	0.8	1.1 (1.0-1.1)	1.5	3.3			
1-17	Children	1823	1.1 (0.9-1.2)	0.5	0.6	0.8 (0.8-0.8)	1.0	1.7			
18-79	Adults	1747	2.1 (1.8-2.4)	0.6	0.9	1.1 (1.1-1.2)	1.6	3.8			
1-17	Boys	895	1.1 (0.8-1.1)	0.5	0.7	0.9 (0.8-0.9)	1.1	1.8			
1-17	Girls	928	1.1 (0.8-1.4)	0.5	0.6	0.8 (0.7-0.8)	1.0	1.7			
18-79	Men	880	2.2 (1.6-2.6)	0.8	1.0	1.3 (1.2-1.3)	1.7	4.0			
18-79	Women	867	2.1 (1.6-2.6)	0.6	0.8	1.0 (1.0-1.1)	1.4	3.7			
1-3	Boys	353	0.9 (0.6-0.9)	0.4	0.6	0.7 (0.6-0.7)	0.9	1.5	0.3	P50>AI	Seems adequate
1-3	Girls	350	0.8 (0.6-1.2)	0.4	0.5	0.6 (0.6-0.7)	0.8	1.3	0.3	P50>AI	Seems adequate
4-11	Boys	270	1.0 (0.8-1.1)	0.5	0.7	0.8 (0.8-0.9)	1.1	1.7	0.5;	P50>AI	Seems adequate
4-11	Girls	278	1.0 (0.6-1.6)	0.5	0.6	0.8 (0.7-0.8)	1.0	1.6	0.5; 0.8[a]	4-8 yr: P50>AI; 9-11 yr: P50<AI	Seems adequate[b]
12-17	Boys	272	1.3 (0.9-1.3)	0.6	0.8	1.0 (0.9-1.0)	1.2	2.0	0.8; 1.1[a]	12-13 yr: P50>AI; 14-17 yr: P50<AI	12-13 yr: seems adequate; 14-17 yr: no statement
12-17	Girls	300	1.3 (0.8-1.6)	0.5	0.7	0.8 (0.8-0.8)	1.0	1.8	0.8; 1.1[a]	P50<AI	12-13 yr: seems adequate[b]; 14-17 yr: no statement
18-50	Men	318	2.4 (1.3-3.0)	0.8	1.0	1.3 (1.2-1.3)	1.7	5.2			
18-50	Women	284	2.2 (1.5-2.9)	0.6	0.8	1.0 (1.0-1.1)	1.5	3.9			
51-64	Men	251	1.8 (1.5-2.4)	0.8	1.0	1.3 (1.2-1.3)	1.7	3.1			
51-64	Women	287	1.9 (1.3-2.8)	0.6	0.8	1.0 (1.0-1.1)	1.4	3.2			
65-79	Men	311	2.0 (1.4-2.6)	0.7	1.0	1.2 (1.2-1.3)	1.6	3.2			
65-79	Women	296	2.1 (1.4-2.6)	0.6	0.8	1.0 (1.0-1.1)	1.4	3.4			

[a] AI 4-8 years=0.5 mg, 9-13 years=0.8 mg, 14-18 years=1.1 mg, [b]P50<AI, however, AI within CI. Therefore, intake is evaluated as seems adequate.

Table 4.4 Habitual intake distribution of vitamin B₁ (mg/MJ/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	Evaluation EAR
1-79	Total	3570	0.26 (0.20-0.29)	0.08	0.11	0.13 (0.13-0.13)	0.17	0.43			
1-17	Children	1823	0.14 (0.12-0.18)	0.08	0.10	0.12 (0.11-0.12)	0.14	0.23			
18-79	Adults	1747	0.29 (0.22-0.33)	0.09	0.11	0.13 (0.13-0.14)	0.18	0.53			
1-17	Boys	895	0.14 (0.12-0.14)	0.08	0.10	0.12 (0.11-0.12)	0.14	0.22			
1-17	Girls	928	0.14 (0.11-0.23)	0.08	0.10	0.12 (0.11-0.12)	0.14	0.24			
18-79	Men	880	0.25 (0.17-0.29)	0.09	0.11	0.13 (0.12-0.13)	0.16	0.44			
18-79	Women	867	0.34 (0.22-0.41)	0.09	0.11	0.14 (0.13-0.14)	0.19	0.59			
1-3	Boys	353	0.15 (0.12-0.15)	0.08	0.10	0.12 (0.12-0.13)	0.15	0.22			
1-3	Girls	350	0.13 (0.10-0.21)	0.08	0.10	0.12 (0.11-0.13)	0.15	0.21			
4-11	Boys	270	0.13 (0.11-0.15)	0.08	0.10	0.11 (0.11-0.12)	0.14	0.22			
4-11	Girls	278	0.13 (0.08-0.27)	0.08	0.10	0.12 (0.11-0.12)	0.14	0.24			
12-17	Boys	272	0.15 (0.11-0.15)	0.08	0.10	0.11 (0.11-0.12)	0.14	0.23			
12-17	Girls	300	0.15 (0.11-0.23)	0.08	0.10	0.11 (0.11-0.12)	0.14	0.25			
18-50	Men	318	0.26 (0.15-0.33)	0.08	0.11	0.12 (0.12-0.13)	0.16	0.55	0.072	0.8 (0.3-1.3)	Adequate intakes
18-50	Women	284	0.35 (0.18-0.48)	0.08	0.11	0.14 (0.13-0.14)	0.19	0.62	0.072	1.3 (0.6-1.9)	Adequate intakes
51-64	Men	251	0.20 (0.14-0.29)	0.09	0.11	0.13 (0.13-0.14)	0.17	0.35	0.072	0.4 (0.1-0.7)	Adequate intakes
51-64	Women	287	0.35 (0.18-0.45)	0.09	0.11	0.14 (0.13-0.15)	0.18	0.57	0.072	0.6 (0.2-0.9)	Adequate intakes
65-79	Men	311	0.30 (0.14-0.34)	0.09	0.11	0.13 (0.13-0.14)	0.16	0.43	0.072	0.3 (0.0-0.5)	Adequate intakes
65-79	Women	296	0.28 (0.19-0.36)	0.09	0.12	0.14 (0.14-0.15)	0.19	0.49	0.072	0.4 (0.1-0.8)	Adequate intakes

4.3.3 *Vitamin B_2 (Riboflavin)*

The average habitual vitamin B_2 intake from foods and dietary supplements was 2.4 mg/day and the median intake was 1.5 mg/day (see Figure 4.5 and Table 4.5). This difference between average and median intake can mainly be explained by use of dietary supplements. The average vitamin B_2 intake from exclusively foods was 1.4 mg/day (see Appendix B).

The vitamin B_2 intake by boys (1.6 mg/day) was almost equal to the intake by girls (1.7 mg/day) and the vitamin B_2 intake by men was equal to the intake by women (2.6 mg/day). When looking at the intake from exclusively foods, vitamin B_2 intake by boys (1.3 mg/day) was higher than the intake by girls (1.1 mg/day), and the intake by men was higher (1.6 mg/day) than the intake by women (1.3 mg/day).
Adults had a higher intake of vitamin B_2 than children (2.6 and 1.6 mg/day, respectively). This was seen in both boys/men and girls/women.

On average, the most important sources of vitamin B_2 were 'Dairy (incl. substitutes)' (38%) and 'Meat (incl. substitutes)' (11%). Other food groups contributed 9% or less to vitamin B_2 intake. Dietary supplements were also an important source of vitamin B_2, with an average contribution of 11% (see section 4.6).

For boys aged 1-13 and girls aged 1-17, the median intake of vitamin B_2 was equal to or higher than the AI, indicating that the intake seemed adequate. For boys aged 14-17, no statement could be made about the prevalence of adequacy of vitamin B_2 intake, because the median intake was below the AI. For adults, up to 44% in the various age-gender groups had low intakes of vitamin B_2.

Thus, for adults, low intakes of vitamin B_2 were observed and for boys aged 14-17 no statement about adequacy can be made. Since it is unclear if health risks are associated with the current intake levels of vitamin B_2,[43] follow-up research on nutritional status, including the thresholds of the markers for vitamin B_2[44], should be performed, with priority for adults.

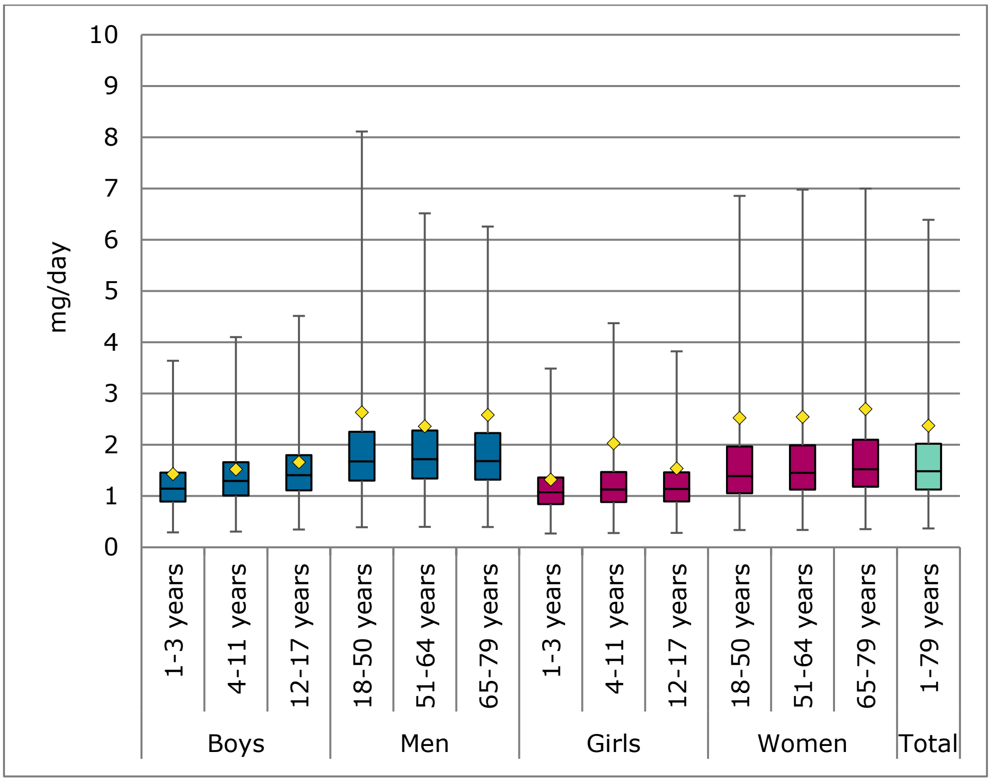


Figure 4.5 Habitual intake distribution of vitamin B_2 (mg/day) from foods and dietary supplements by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 4.5 Habitual intake distribution of vitamin B_2 (mg/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI) <EAR	AI[a]	P50 related to AI	Evaluation EAR/AI
1-79	Total	3570	2.4 (2.0-2.7)	0.8	1.1	1.5 (1.4-1.5)	2.0	4.4					
1-17	Children	1823	1.6 (1.3-1.7)	0.6	0.9	1.2 (1.2-1.2)	1.6	2.5					
18-79	Adults	1747	2.6 (2.2-2.9)	0.8	1.2	1.6 (1.5-1.6)	2.1	4.9					
1-17	Boys	895	1.6 (1.3-1.6)	0.7	1.0	1.3 (1.3-1.4)	1.7	2.5					
1-17	Girls	928	1.7 (1.1-1.9)	0.6	0.9	1.1 (1.1-1.2)	1.4	2.5					
18-79	Men	880	2.6 (2.0-3.1)	0.9	1.3	1.7 (1.6-1.7)	2.3	4.9					
18-79	Women	867	2.6 (2.1-3.1)	0.8	1.1	1.4 (1.4-1.5)	2.0	4.9					
1-3	Boys	353	1.4 (1.1-1.4)	0.6	0.9	1.1 (1.1-1.2)	1.5	2.2			0.5	P50>AI	Seems adequate
1-3	Girls	350	1.3 (1.0-1.6)	0.6	0.8	1.1 (1.0-1.1)	1.4	2.1			0.5	P50>AI	Seems adequate
4-11	Boys	270	1.5 (1.3-1.6)	0.7	1.0	1.3 (1.3-1.4)	1.7	2.4			0.7; 1.0[a]	P50>AI	Seems adequate
4-11	Girls	278	2.0 (1.0-2.1)	0.6	0.9	1.1 (1.1-1.2)	1.5	2.9			0.7; 1.0[a]	P50>AI	Seems adequate
12-17	Boys	272	1.7 (1.4-1.7)	0.8	1.1	1.4 (1.3-1.5)	1.8	2.7			1.0; 1.5[a]	12-13 yr: P50>AI; 14-17 yr: P50<AI	12-13 yr: seems adequate; 14-17 yr: no statement

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI) <EAR	AI[a]	P50 related to AI	Evalu-ation EAR/AI
12-17	Girls	300	1.5 (1.1-2.1)	0.6	0.9	1.1 (1.1-1.2)	1.5	2.4			1.0; 1.1[a]	P50>AI	Seems adequate
18-50	Men	318	2.6 (1.7-3.5)	0.9	1.3	1.7 (1.6-1.7)	2.3	5.9	1.3	24.9 (22.2-29.4)			Low intakes
18-50	Women	284	2.5 (1.8-3.4)	0.7	1.1	1.4 (1.3-1.5)	2.0	4.9	1.3	43.8 (39.3-48.8)			Low intakes
51-64	Men	251	2.4 (1.9-2.9)	0.9	1.3	1.7 (1.6-1.8)	2.3	4.2	1.3	22.0 (19.0-25.9)			Low intakes
51-64	Women	287	2.5 (1.8-3.2)	0.8	1.1	1.5 (1.4-1.5)	2.0	5.0	1.3	38.7 (34.9-43.7)			Low intakes
65-79	Men	311	2.6 (1.9-3.2)	0.9	1.3	1.7 (1.6-1.8)	2.2	4.0	1.3	23.7 (19.7-27.7)			Low intakes
65-79	Women	296	2.7 (2.0-3.2)	0.8	1.2	1.5 (1.4-1.6)	2.1	4.9	1.3	33.9 (29.5-38.6)			Low intakes

[a] AI 4-8 years=0.7 mg, 9-13 years=1.0 mg, boys 14-18 years=1.5 mg, girls 14-18 years=1.1 mg.

4.3.4 *Vitamin B_3 (Niacin)*

Vitamin B_3 has a biochemical function in energy metabolism, thus vitamin B_3 requirement is related to energy intake.[45] For adults, an EAR is set for vitamin B_3 intake per MJ. For children, an EAR is not available and evaluation was based on comparison of the absolute intake with an AI. Therefore, for vitamin B_3, both absolute intake and intake per MJ were calculated. A comparison with the upper level of EFSA could not be made as the upper level was set for nicotinamide and for nicotinic acid[42] and no data are available on these compounds in NEVO[17] and NES[46].

The average habitual vitamin B_3 intake from foods and dietary supplements was 20.3 mg/day and the median intake was 17.7 mg/day (see Figure 4.6 and Table 4.6). This difference between average and median intake can mainly be explained by use of dietary supplements. The average vitamin B_3 intake from exclusively foods was 16.6 mg/day (see Appendix B).
The average habitual vitamin B_3 intake per MJ from foods and dietary supplements was 2.51 mg/MJ/day and the median intake was 2.13 mg/MJ/day (see Figure 4.7 and Table 4.7). Also, for the intake of vitamin B_3 per MJ, the difference between average and median intake can mainly be explained by use of dietary supplements. The average vitamin B_3 intake per MJ from foods only was 1.99 mg/MJ/day (see Appendix B).

The vitamin B_3 intake by boys (14.5 mg/day) was higher than the intake by girls (11.9 mg/day), and the vitamin B_3 intake by men (24.8 mg/day) was higher than the intake by women (19.5 mg/day). The vitamin B_3 intake per MJ by boys (1.89 mg/MJ/day) was almost equal to the intake by girls (1.84 mg/MJ/day), and the vitamin B_3 intake per MJ by men (2.63 mg/MJ/day) was almost equal to the intake by women (2.72 mg/MJ/day).
Adults had a higher intake of vitamin B_3 than children (22.1 and 13.2 mg/day, respectively). This was seen in both boys/men and girls/women. The vitamin B_3 intake per MJ by adults (2.68 mg/MJ/day) was higher than the intake by children (1.87 mg/MJ/day). This was seen in both boys/men and girls/women.

On average, the most important sources of vitamin B_3 were 'Meat (incl. substitutes)' (30%), 'Bread, cereals, rice, pasta' (17%) and 'Non-alcoholic beverages' (10%). Other food groups contributed 8% or less to vitamin B_3 intake. Dietary supplements were also an important source of vitamin B_3, with an average contribution of 10% (see section 4.6).

For boys and girls aged 1-17, the median intake of vitamin B_3 was equal to or higher than the AI (or, for the 14-17-year-olds, the AI was within the confidence interval of the median), indicating that the intake seemed adequate. For adults, the prevalence of intake below the EAR of 1.3 mg/MJ/day was low (7.2% at most) indicating the intake was adequate. Thus, vitamin B_3 intake was adequate in adults and probably also in children.

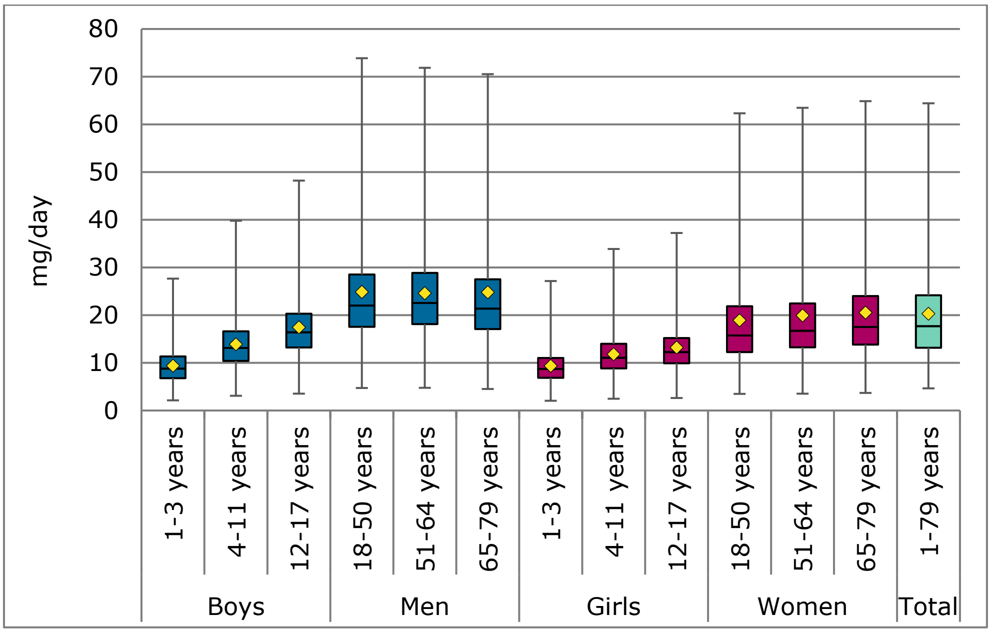


Figure 4.6 Habitual intake distribution of vitamin B_3 (mg/day) from foods and dietary supplements by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

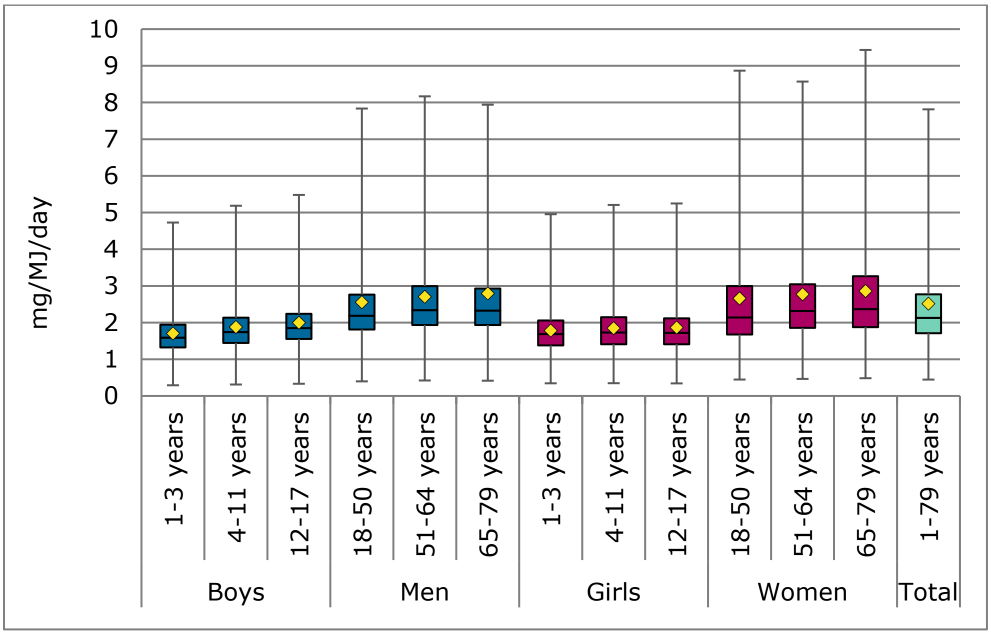


Figure 4.7 Habitual intake distribution of vitamin B_3 (mg/MJ/day) from foods and dietary supplements by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 4.6 Habitual intake distribution of vitamin B_3 (mg/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	AI	P50 related to AI	Evaluation AI
1-79	Total	3570	20.3 (19.7-20.8)	8.5	13.2	17.7 (17.3-18.1)	24.2	40.3			
1-17	Children	1823	13.2 (12.9-13.5)	6.3	9.4	12.2 (11.9-12.5)	15.9	23.2			
18-79	Adults	1747	22.1 (21.4-22.8)	10.2	14.7	19.3 (18.9-19.8)	26.0	42.7			
1-17	Boys	895	14.5 (13.9-15.0)	6.5	10.3	13.6 (13.2-14.1)	17.6	25.0			
1-17	Girls	928	11.9 (11.5-12.4)	6.1	8.8	11.1 (10.8-11.5)	14.1	20.3			
18-79	Men	880	24.8 (23.6-26.0)	12.9	17.6	22.0 (21.3-22.7)	28.4	44.2			
18-79	Women	867	19.5 (18.5-20.3)	9.2	12.8	16.4 (15.8-17.1)	22.4	40.7			
1-3	Boys	353	9.4 (9.1-9.9)	4.6	6.8	8.8 (8.4-9.1)	11.3	16.3	4	P50>AI	Seems adequate
1-3	Girls	350	9.4 (8.8-9.7)	4.8	6.9	8.7 (8.2-8.9)	11.0	16.1	4	P50>AI	Seems adequate
4-11	Boys	270	13.9 (13.3-14.5)	7.3	10.4	13.1 (12.6-13.6)	16.6	23.2	7; 11[a]	P50>AI	Seems adequate
4-11	Girls	278	11.8 (11.3-12.4)	6.4	8.8	11.1 (10.6-11.5)	14.0	19.9	7; 11[a]	P50>AI	Seems adequate
12-17	Boys	272	17.4 (16.6-18.1)	9.7	13.2	16.4 (15.8-17.0)	20.3	27.9	11; 17[a]	12-13 yr: P50>AI; 14-17 yr: P50<AI	Seems adequate[b]
12-17	Girls	300	13.2 (12.6-14.0)	7.3	9.9	12.2 (11.8-12.9)	15.2	22.0	11; 13[a]	12-13 yr: P50>AI; 14-17 yr: P50<AI	Seems adequate[b]
18-50	Men	318	24.8 (23.0-26.5)	12.8	17.5	22.0 (21.0-22.9)	28.5	45.4			
18-50	Women	284	18.9 (17.7-20.5)	8.8	12.2	15.7 (15.2-17.0)	21.9	40.5			
51-64	Men	251	24.6 (23.7-25.9)	13.3	18.1	22.5 (21.8-23.5)	28.9	43.0			
51-64	Women	287	19.9 (18.2-20.7)	9.7	13.2	16.7 (16.0-17.5)	22.5	41.0			
65-79	Men	311	24.8 (22.5-27.6)	12.6	17.1	21.4 (20.5-22.4)	27.5	43.0			
65-79	Women	296	20.5 (18.7-21.6)	10.1	13.8	17.5 (15.8-18.3)	24.0	40.9			

[a] AI 4-8 years=7 mg, 9-13 years=11 mg, boys 14-17 years=17 mg, girls 14-17 years=13 mg.
[b] P50<AI, however AI within CI. Therefore, intake is evaluated as seems adequate.

Table 4.7 Habitual intake distribution of vitamin B_3 (mg/MJ/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	Evaluation EAR
1-79	Total	3570	2.51 (2.42-2.58)	1.26	1.71	2.13 (2.09-2.17)	2.77	5.04			
1-17	Children	1823	1.87 (1.82-1.90)	1.09	1.43	1.74 (1.70-1.76)	2.13	3.07			
18-79	Adults	1747	2.68 (2.56-2.76)	1.36	1.81	2.24 (2.19-2.29)	2.95	5.47			
1-17	Boys	895	1.89 (1.82-1.94)	1.14	1.46	1.76 (1.71-1.80)	2.15	3.09			
1-17	Girls	928	1.84 (1.79-1.90)	1.06	1.40	1.72 (1.67-1.75)	2.12	3.06			
18-79	Men	880	2.63 (2.48-2.74)	1.45	1.86	2.25 (2.19-2.32)	2.85	5.09			
18-79	Women	867	2.72 (2.56-2.86)	1.29	1.76	2.23 (2.15-2.31)	3.06	5.87			
1-3	Boys	353	1.70 (1.61-1.77)	1.03	1.32	1.59 (1.52-1.62)	1.94	2.79			
1-3	Girls	350	1.78 (1.70-1.82)	1.03	1.38	1.69 (1.60-1.71)	2.06	2.90			
4-11	Boys	270	1.88 (1.79-1.95)	1.13	1.44	1.74 (1.69-1.80)	2.13	3.05			
4-11	Girls	278	1.85 (1.78-1.92)	1.06	1.41	1.73 (1.67-1.77)	2.15	3.06			
12-17	Boys	272	1.99 (1.89-2.07)	1.22	1.55	1.85 (1.78-1.92)	2.24	3.24			
12-17	Girls	300	1.86 (1.79-1.97)	1.07	1.41	1.72 (1.67-1.78)	2.12	3.13			
18-50	Men	318	2.55 (2.34-2.71)	1.41	1.81	2.19 (2.11-2.28)	2.76	5.07	1.3	2.4 (1.3-3.7)	Adequate intakes
18-50	Women	284	2.66 (2.44-2.89)	1.23	1.67	2.14 (2.04-2.24)	2.99	5.87	1.3	7.2 (5.1-8.5)	Adequate intakes
51-64	Men	251	2.70 (2.50-2.79)	1.51	1.93	2.34 (2.24-2.43)	2.99	5.17	1.3	1.3 (0.5-2.0)	Adequate intakes
51-64	Women	287	2.77 (2.50-2.93)	1.39	1.86	2.32 (2.20-2.41)	3.04	5.53	1.3	3.1 (1.8-4.5)	Adequate intakes
65-79	Men	311	2.79 (2.49-3.14)	1.52	1.93	2.33 (2.22-2.40)	2.93	5.01	1.3	1.0 (0.4-2.1)	Adequate intakes
65-79	Women	296	2.86 (2.62-3.03)	1.39	1.88	2.37 (2.23-2.50)	3.26	6.17	1.3	3.0 (1.6-4.4)	Adequate intakes

4.3.5 *Vitamin B_6*

The average habitual vitamin B_6 intake from foods and dietary supplements was 2.0 mg/day and the median intake was 1.6 mg/day (see Figure 4.8 and Table 4.8). This difference between average and median intake can mainly be explained by use of dietary supplements. The average vitamin B_6 intake from exclusively foods was 1.5 mg/day (see Appendix B).

The vitamin B_6 intake by boys (1.4 mg/day) was almost equal to the intake by girls (1.2 mg/day), and the vitamin B_6 intake by men (2.3 mg/day) was almost equal to the intake by women (2.1 mg/day). When looking at the intake from exclusively foods, vitamin B_6 intake by boys was higher (1.3 mg/day) than the intake by girls (1.1 mg/day), and the intake by men (1.8 mg/day) was higher than the intake by women (1.4 mg/day).
Adults had a higher intake of vitamin B_6 than children (2.2 and 1.3 mg/day, respectively). This was seen in both boys/men and girls/women.

On average, the most important source of vitamin B_6 was 'Meat (incl. substitutes)' (21%). Another important source was 'Bread, cereals, rice, pasta' (10%). Other food groups contributed 9% or less to vitamin B_6 intake. Dietary supplements were also an important source of vitamin B_6, with an average contribution of 11% (see section 4.6).

For boys aged 1-17 and girls aged 1-13 the median intake of vitamin B_6 was equal to or higher than the AI (or, for boys aged 14-17, the AI was within the confidence interval of the median), indicating that the intake seemed adequate. For girls aged 14-17, no statement could be made about the prevalence of adequacy of vitamin B_6 intake, because the median intake was below the AI. For all adults, except for men aged 18-50, low intakes of vitamin B_6 were observed. In all other age-gender categories levels of vitamin B_6 intake were tolerable, with 0.5% or less of the population exceeding the UL.

Thus, for women and for men aged 51-79, low intakes were observed. As far as we know, no recent studies on vitamin B_6 status are available to confirm these results. Follow-up research on nutritional status (e.g. certain blood values) should be performed, since it is unclear if health risks are associated with the current intake levels of vitamin B_6 and the percentage of the population with low intakes increased compared to previous DNFCs (see section 4.9).

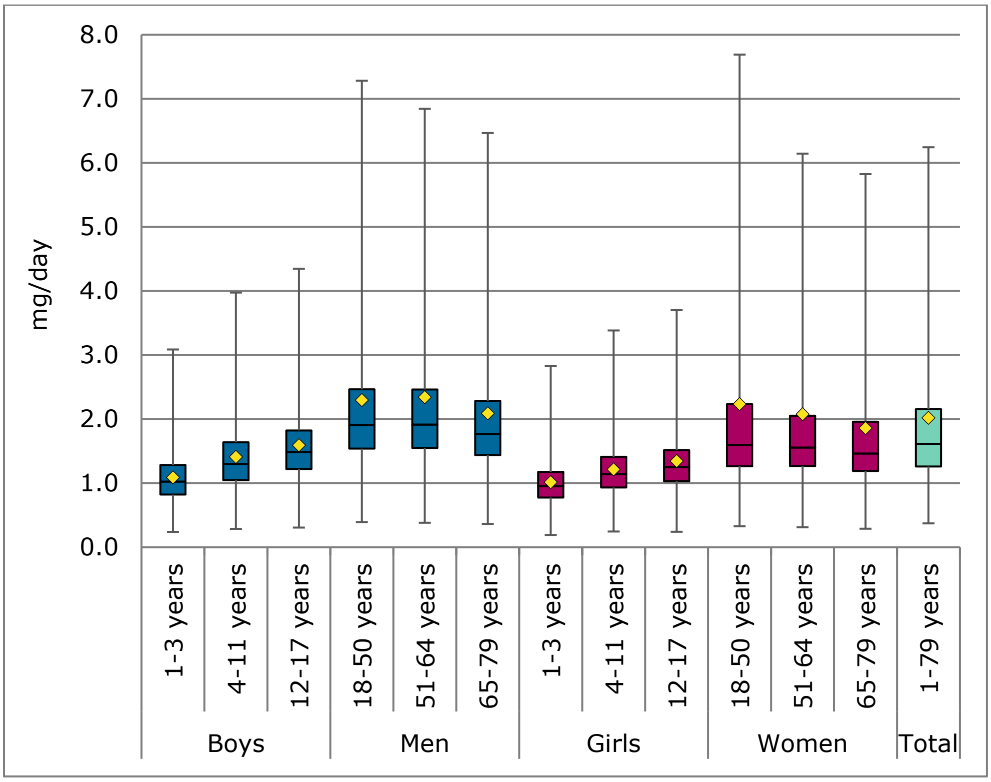


Figure 4.8 Habitual intake distribution of vitamin B_6 (mg/day) from foods and dietary supplements by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic charactersitics, season and day of the week (n=3570).

Table 4.8 Habitual intake distribution of vitamin B_6 (mg/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI) <EAR	AI	P50 related to AI	Evalu-ation EAR/AI	UL	% (95%-CI) ≥UL	Evalu-ation UL
1-79	Total	3570	2.0 (1.9-2.1)	0.9	1.3	1.6 (1.6-1.6)	2.2	4.1								
1-17	Children	1823	1.3 (1.3-1.4)	0.7	1.0	1.2 (1.2-1.3)	1.5	2.2								
18-79	Adults	1747	2.2 (2.1-2.3)	1.0	1.4	1.7 (1.7-1.8)	2.3	4.6								
1-17	Boys	895	1.4 (1.3-1.6)	0.7	1.1	1.3 (1.3-1.4)	1.7	2.4								
1-17	Girls	928	1.2 (1.2-1.4)	0.7	0.9	1.1 (1.1-1.2)	1.4	2.0								
18-79	Men	880	2.3 (2.1-2.4)	1.1	1.5	1.9 (1.8-1.9)	2.4	4.5								
18-79	Women	867	2.1 (1.9-2.3)	0.9	1.2	1.6 (1.5-1.6)	2.1	4.7								
1-3	Boys	353	1.1 (1.0-1.2)	0.6	0.8	1.0 (1.0-1.1)	1.3	1.8			0.4	P50>AI	Seems adequate	5	0.0 (0.0-0.4)	Tolerable intakes
1-3	Girls	350	1.0 (0.9-1.2)	0.6	0.8	1.0 (0.9-1.0)	1.2	1.7			0.4	P50>AI	Seems adequate	5	0.0 (0.0-1.0)	Tolerable intakes
4-11	Boys	270	1.4 (1.3-1.5)	0.8	1.0	1.3 (1.3-1.4)	1.6	2.3			0.7; 1.1[a]	P50>AI	Seems adequate	7; 10; 15[c]	4-6 yr: 0.5 (0.0-0.8); 7-10 yr: 0.0 (0.0-0.3); 11 yr: 0.0 (0.0-0.5)	Tolerable intakes
4-11	Girls	278	1.2 (1.1-1.4)	0.7	0.9	1.1 (1.1-1.2)	1.4	2.0			0.7; 1.1[a]	P50>AI	Seems adequate	7; 10; 15[c]	4-6 yr: 0.0 (0.0-0.8); 7-10 yr: 0.0	Tolerable intakes

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI) <EAR	AI	P50 related to AI	Evalu-ation EAR/AI	UL	% (95%-CI) ≥UL	Evalu-ation UL
															(0.0-0.9); 11 yr: 0.0 (0.0-0.3)	
12-17	Boys	272	1.6 (1.4-1.9)	0.9	1.2	1.5 (1.5-1.6)	1.8	2.5			1.1; 1.5[a]	12-13 yr: P50>AI; 14-17 yr: P50<AI	Seems adequate[b]	15; 20[c]	12-14 yr: 0.0 (0.0-0.5); 15-17 yr: 0.0 (0.0-0.7)	Tolerable intakes
12-17	Girls	300	1.3 (1.2-1.5)	0.8	1.0	1.2 (1.2-1.3)	1.5	2.2			1.1; 1.5[a]	12-13 yr: P50>AI; 14-17 yr: P50<AI	12-13 yr: seems adequate; 14-17 yr: no statement	15; 20[c]	12-14 yr: 0.0 (0.0-0.3); 15-17 yr: 0.0 (0.0-0.4)	Tolerable intakes
18-50	Men	318	2.3 (2.0-2.5)	1.1	1.5	1.9 (1.8-2.0)	2.5	4.8	1.1	3.7 (2.8-5.6)			Adequate intakes	25	0.0 (0.0-0.2)	Tolerable intakes
18-50	Women	284	2.2 (1.9-2.5)	0.9	1.3	1.6 (1.5-1.7)	2.2	5.5	1.1	13.0 (10.3-17.0)			Low intakes	25	0.2 (0.0-0.6)	Tolerable intakes
51-64	Men	251	2.3 (2.0-2.7)	1.2	1.6	1.9 (1.8-2.0)	2.5	4.4	1.3	10.1 (8.3-13.3)			Low intakes	25	0.2 (0.0-1.0)	Tolerable intakes
51-64	Women	287	2.1 (1.7-2.4)	1.0	1.3	1.6 (1.5-1.6)	2.1	4.1	1.1	12.3 (9.3-15.4)			Low intakes	25	0.3 (0.0-0.9)	Tolerable intakes
65-79	Men	311	2.1 (2.0-2.3)	1.1	1.4	1.8 (1.7-1.9)	2.3	4.2	1.3	15.4 (11.3-18.6)			Low intakes	25	0.0 (0.0-0.1)	Tolerable intakes
65-79	Women	296	1.9 (1.7-2.0)	0.9	1.2	1.5 (1.4-1.5)	2.0	3.9	1.1	17.2 (12.0-21.3)			Low intakes	25	0.1 (0.0-0.3)	Tolerable intakes

[a] AI 4-8 years=0.7 mg, 9-13 years=1.1 mg, 14-18 years=1.5 mg.
[b] P50<AI, however AI within CI. Therefore, intake is evaluated as seems adequate.
[c] UL 4-6 years=7 mg, 7-10 years=10 mg, 11-14 years=15 mg, 15-17 years=20 mg.

4.3.6 *Folate equivalents/folic acid (vitamin B_{11})*

Folic acid is the synthetic form of folate added to enriched foods and dietary supplements. This section presents the intake of folate equivalents (µg) and folic acid (µg). The amount of folate equivalents was calculated using the amount of folate naturally present in foods (in µg) plus 1.7 times the amount of folic acid in enriched foods (in µg) plus 2.0 times the amount of folic acid in dietary supplements (in µg).[47]

The average habitual folate equivalent intake from foods and dietary supplements was 350 µg/day and the median intake was 286 µg/day (see Figure 4.9 and Table 4.9). This difference between average and median intake can mainly be explained by use of dietary supplements. The average folate equivalent intake from exclusively foods was 262 µg/day (see Appendix B).
For folic acid, the average habitual intake from foods and dietary supplements was 56 µg/day and the median intake was 12 µg/day (see Figure 4.10 and Table 4.10). This difference between average and median intake can mainly be explained by high intakes from foods by parts of the population. The average folic acid intake from exclusively foods was 13 µg/day (see Appendix B).

The folate equivalent intake by boys (254 µg/day) was higher than the intake by girls (231 µg/day), and the folate equivalent intake by men (389 µg/day) was almost equal to the intake by women (366 µg/day). When looking at the intake from exclusively foods, folate equivalent intake by boys (217 µg/day) was higher than the intake by girls (196 µg/day), and the intake by men was higher (303 µg/day) than the intake by women (250 µg/day).
For folic acid, the intake by boys (33 µg/day) was almost equal to the intake by girls (32 µg/day), and the folic acid intake by men (60 µg/day) was almost equal to the intake by women (64 µg/day). When looking at the intake from exclusively foods, folic acid intake by boys (14 µg/day) was almost equal to the intake by girls (13 µg/day), and the intake by men (17 µg/day) was higher than the intake by women (9 µg/day) (see Appendix B).

Adults had a higher intake of folate equivalents than children (377 and 242 µg/day, respectively). This was seen in both boys/men and girls/women. Also, the folic acid intake by adults (62 µg/day) was higher than the intake by children (32 µg/day) and seen in boys/men and girls/women. When looking at folic acid intake from exclusively foods, the intake by boys (14 µg/day) was almost equal to the intake by men (17 µg/day). The intake by girls (13 µg/day) was higher than the intake by women (9 µg/day).

On average, the most important sources of folate equivalent were 'Bread, cereals, rice, pasta' (20%), 'Vegetables' (17%) and 'Dairy (incl. substitutes)' (12%). Other food groups contributed 8% or less to folate equivalent intake. Dietary supplements were also an important source of folate equivalents, with an average contribution of 12% (see section 4.6).
For folic acid, dietary supplements were the most important source, with an average contribution of 45% (see section 4.6). The most important

food source of folic acid was ‘Fats and oils’ (44%). Other food groups contributed 5% or less to folic acid intake.

For boys and girls aged 1-13, the median intake of folate equivalent was equal to or higher than the AI (or, for the girls aged 9-11, the AI was within the confidence interval of the median) indicating that the intake seemed adequate. For boys and girls aged 14-17, no statement could be made about the adequacy of folate equivalent intake, because the median intake was below the AI. For men, folate equivalent intake was considered adequate, because less than 10% in each age group had an intake below the EAR. For women, low intakes of folate equivalents (up to 19%) was observed in each age group.
The required intake of folate equivalents for women is higher just before and during early pregnancy. This could not be taken into account in the evaluation because information on pregnancy wish was not assessed and pregnant women were excluded from the study. Therefore, the proportion of inadequacy in girls and women of fertile age might be underestimated.
For boys/men and girls/women, intake of folic acid did not exceed the UL in all age groups.

Thus, low intakes of folate equivalents were observed for women and no statement about adequacy could be made for teenagers aged 14-17. As far as we know, no recent studies on nutritional status are available to confirm these results. In 2009, Dhonukshe-Rutten reported low intakes as well as low status in several European countries including the Netherlands.[48] More research could be done to confirm the current low intake and status, especially in women of fertile age, and whether this is related to the prevalence of clinical effects, such as megaloblastic anaemia (associated with folate and/or vitamin B_{12} deficiency).

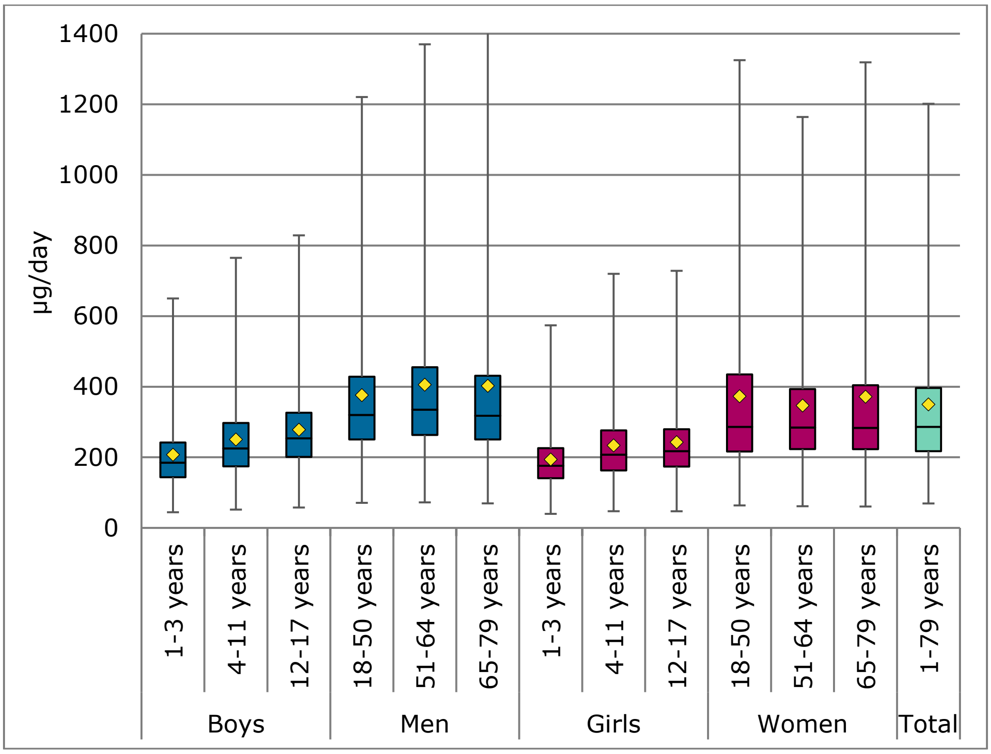


Figure 4.9 Habitual intake distribution of folate equivalents (µg/day) from foods and dietary supplements by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

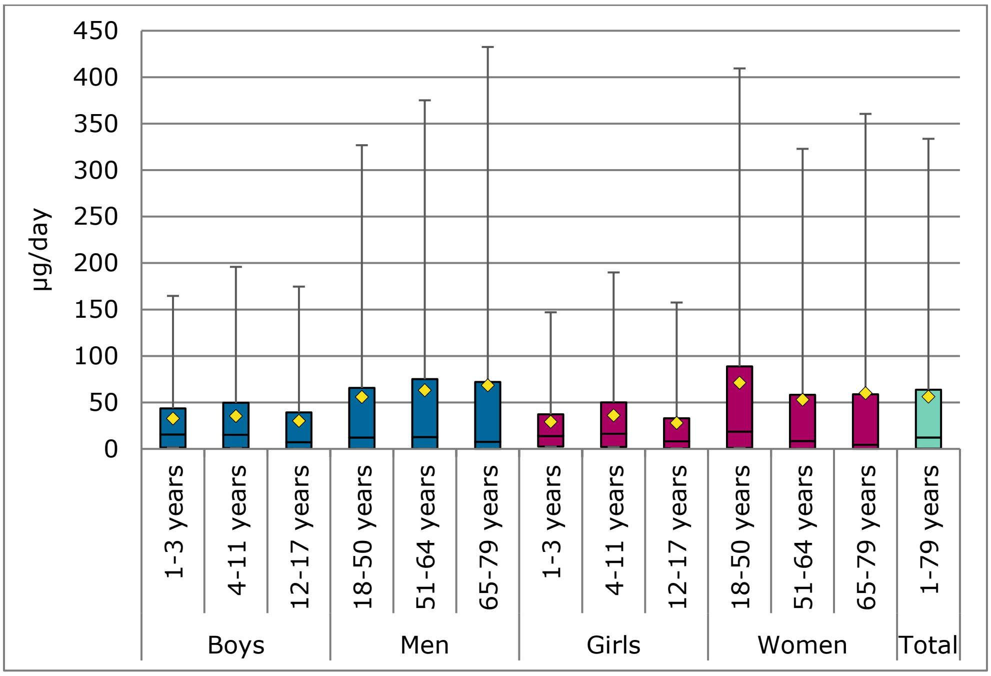


Figure 4.10 Habitual intake distribution of folic acid (µg/day) from foods and dietary supplements by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 4.9 Habitual intake distribution of folate equivalents (µg/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI
1-79	Total	3570	350 (339-359)	148	217	286 (280-292)	396	805					
1-17	Children	1823	242 (237-250)	118	168	217 (213-223)	287	455					
18-79	Adults	1747	377 (364-388)	166	235	306 (297-312)	428	862					
1-17	Boys	895	254 (246-266)	121	177	229 (223-238)	302	476					
1-17	Girls	928	231 (223-240)	115	162	206 (199-214)	269	432					
18-79	Men	880	389 (372-404)	182	254	323 (313-333)	436	861					
18-79	Women	867	366 (343-382)	157	219	285 (274-295)	417	863					
1-3	Boys	353	207 (196-216)	99	143	185 (177-192)	242	408			85	P50>AI	Seems adequate
1-3	Girls	350	194 (183-201)	101	141	176 (166-182)	226	348			85	P50>AI	Seems adequate
4-11	Boys	270	250 (239-263)	122	174	225 (218-236)	297	468			150; 225[a]	P50>AI	Seems adequate
4-11	Girls	278	234 (222-245)	115	163	207 (199-219)	276	444			150; 225[a]	4-8 yr: P50>AI; 9-11 yr: P50<AI	Seems adequate[b]

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI
12-17	Boys	272	278 (265-303)	144	201	254 (244-265)	326	502			225; 300[a]	12-13 yr: P50>AI; 14-17 yr: P50<AI	12-13 yr: seems adequate; 14-17 yr: no statement
12-17	Girls	300	243 (232-260)	127	174	217 (209-229)	279	449			225; 300[a]	P50<AI	12-13 yr: seems adequate[b]; 14-17 yr: no statement
18-50	Men	318	376 (353-398)	180	251	320 (306-332)	428	792	200	9.2 (7.6-11.3)			Adequate intakes
18-50	Women	284	373 (338-399)	153	216	286 (270-300)	435	890	200	18.9 (16.1-21.6)			Low intakes
51-64	Men	251	406 (379-429)	191	263	335 (321-347)	455	915	200	6.7 (5.4-8.7)			Adequate intakes
51-64	Women	287	347 (323-373)	162	223	284 (269-297)	393	771	200	15.6 (13.0-19.5)			Low intakes
65-79	Men	311	402 (375-435)	181	251	318 (306-334)	431	987	200	8.8 (6.4-11.0)			Adequate intakes
65-79	Women	296	371 (332-401)	162	223	283 (268-300)	404	915	200	15.9 (12.2-19.8)			Low intakes

[a] AI 4-8 years=150 µg, 9-13 years=225 µg, 14-18 years=300 µg.
[b] P50<AI, however AI within CI. Therefore, intake is evaluated as seems adequate.

Table 4.10 Habitual intake distribution of folic acid (µg/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	UL	% (95%-CI)≥UL	Evaluation UL
1-79	Total	3570	56 (52-61)	0	0	12 (10-15)	64	270			
1-17	Children	1823	32 (30-35)	0	1	13 (10-15)	43	134			
18-79	Adults	1747	62 (57-69)	0	0	12 (9-15)	73	297			
1-17	Boys	895	33 (30-38)	0	0	12 (10-17)	45	139			
1-17	Girls	928	32 (27-35)	0	1	13 (10-15)	41	130			
18-79	Men	880	60 (53-68)	0	0	11 (7-17)	69	294			
18-79	Women	867	64 (56-74)	0	0	13 (9-17)	77	299			
1-3	Boys	353	33 (26-36)	0	1	16 (11-20)	44	121	200	1.4 (0.3-1.8)	Tolerable intakes
1-3	Girls	350	29 (24-32)	0	3	14 (11-18)	37	110	200	1.1 (0.1-1.1)	Tolerable intakes
4-11	Boys	270	35 (30-40)	0	1	15 (11-20)	50	146	300; 400; 600[a]	4-6 yr: 0.0 (0.0-0.3); 7-10 yr: 0.0 (0.0-0.2); 11 yr: 0.0 (0.0-0.2)	Tolerable intakes

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	UL	% (95%-CI)≥UL	Evaluation UL
4-11	Girls	278	36 (29-40)	0	2	16 (12-20)	50	140	300; 400; 600[a]	4-6 yr: 0.0 (0.0-0.5); 7-10 yr: 0.0 (0.0-0.1); 11 yr: 0.0 (0.0-0.0)	Tolerable intakes
12-17	Boys	272	30 (25-42)	0	0	7 (4-13)	39	135	600; 800[a]	12-14 yr: 0.0 (0.0-0.2); 15-17 yr: 0.0 (0.0-0.0)	Tolerable intakes
12-17	Girls	300	28 (22-34)	0	1	8 (5-11)	33	125	600; 800[a]	12-14 yr: 0.0 (0.0-0.0); 15-17 yr: 0.0 (0.0-0.0)	Tolerable intakes
18-50	Men	318	56 (45-69)	0	0	12 (7-20)	66	261	1000	0.0 (0.0-0.0)	Tolerable intakes
18-50	Women	284	71 (58-87)	0	1	19 (11-27)	89	321	1000	0.2 (0.0-0.4)	Tolerable intakes
51-64	Men	251	63 (52-78)	0	0	13 (6-21)	75	300	1000	0.0 (0.0-0.0)	Tolerable intakes
51-64	Women	287	53 (42-65)	0	0	8 (4-13)	58	265	1000	0.0 (0.0-0.0)	Tolerable intakes
65-79	Men	311	68 (51-81)	0	0	8 (1-14)	72	361	1000	0.0 (0.0-0.0)	Tolerable intakes
65-79	Women	296	60 (46-74)	0	0	4 (1-9)	59	302	1000	0.0 (0.0-0.0)	Tolerable intakes

[a] UL 4-6 years=300 µg, 7-10 years=400 µg, 11-14 years=600 µg, 15-17 years=800 µg.

4.3.7 *Vitamin B_{12}*

The average habitual intake of vitamin B_{12} was 20.9 µg/day and the median intake was 4.3 µg/day (see Figure 4.11 and Table 4.11). This large difference between average and median intake can mainly be explained by a relatively small number of users of high-dosed supplements. The average vitamin B_{12} intake from exclusively foods was 4.0 µg/day (see Appendix B). Because of these large differences between average and median intakes, comparison of the medians across age-gender groups instead of averages might result in different conclusions.

The average intake of vitamin B_{12} by boys (8.0 µg/day) was almost equal to the intake by girls (8.2 µg/day), and the intake of vitamin B_{12} by men (14.7 µg/day) did not differ significantly from the intake by women (33.5 µg/day). When looking at the intake from exclusively foods, vitamin B_{12} intake by boys (3.6 µg/day) was higher than the intake by girls (2.9 µg/day), and the intake by men (4.8 µg/day) was higher than the intake by women (3.7 µg/day).
Adults had a higher intake of vitamin B_{12} than children (24.2 and 8.1 µg/day, respectively). This was seen specifically in girls/women.

On average, the most important food sources of vitamin B_{12} were 'Dairy (incl. substitutes)' (39%) and 'Meat (incl. substitutes)' (26%). Other food groups contributed 8% or less to vitamin B_{12} intake. Dietary supplements were also an important source of vitamin B_{12}, with an average contribution of 12% (see section 4.6).

For children, the vitamin B_{12} intake seemed adequate with median intakes above the AI. Also, for adults, the vitamin B_{12} intake was considered adequate, because less than 10% had an intake below the EAR. Without the intake from dietary supplements, no statement about the adequacy of vitamin B_{12} intake could be made for girls aged 14-17. And for women aged 18-50, low intakes of vitamin B_{12} from exclusively foods were observed; 15% of these women had a vitamin B_{12} intake from exclusively foods that was below the EAR. Among the other adult age-gender groups vitamin B_{12} intake from exclusively foods was adequate (<8% had intakes below the EAR).

Thus, vitamin B_{12} intake was adequate in adults and probably also in children. However, despite an adequate intake, vitamin B_{12} deficiency can occur because of malabsorption associated with lack of intrinsic factor. This is more likely to occur among older adults.[45] Megaloblastic anaemia is a clinical sign of vitamin B_{12} and/or folate deficiency. Furthermore, it is known that vegans are a risk group[45], however this could not be investigated since there were only a few vegans in the study population.

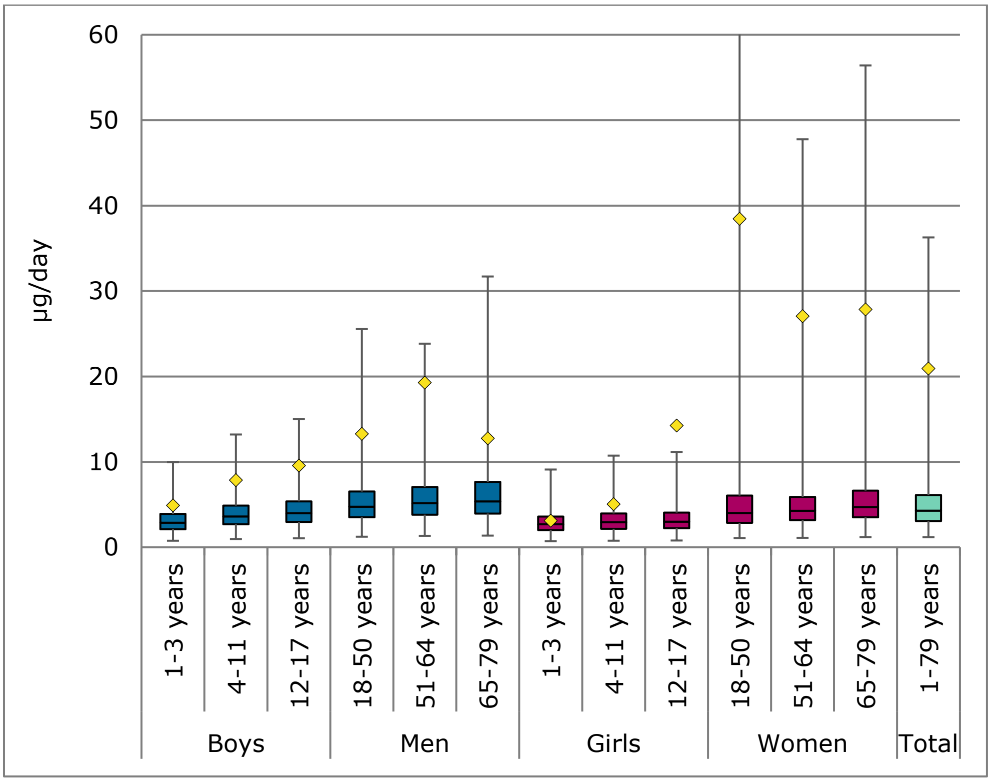


Figure 4.11 Habitual intake distribution of vitamin B_{12} (µg/day) from foods and dietary supplements by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 4.11 Habitual intake distribution of vitamin B_{12} (µg/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI) <EAR	AI	P50 related to AI	Evaluation EAR/AI
1-79	Total	3570	20.9 (14.3-25.2)	1.9	3.1	4.3 (4.2-4.4)	6.1	30.2					
1-17	Children	1823	8.1 (4.3-9.4)	1.5	2.4	3.2 (3.1-3.3)	4.4	7.8					
18-79	Adults	1747	24.2 (16.5-29.6)	2.1	3.3	4.6 (4.4-4.7)	6.6	45.6					
1-17	Boys	895	8.0 (4.2-9.9)	1.7	2.7	3.6 (3.4-3.7)	4.9	8.6					
1-17	Girls	928	8.2 (2.2-11.0)	1.4	2.2	2.9 (2.8-3.0)	3.9	6.6					
18-79	Men	880	14.7 (9.3-21.9)	2.4	3.7	5.0 (4.8-5.2)	6.9	19.8					
18-79	Women	867	33.5 (18.5-42.3)	1.9	3.1	4.2 (4.0-4.4)	6.1	100.5					
1-3	Boys	353	4.9 (2.1-6.9)	1.3	2.1	2.9 (2.7-3.1)	3.9	6.1			0.7	P50>AI	Seems adequate
1-3	Girls	350	3.1 (1.8-7.0)	1.3	2.0	2.7 (2.6-2.8)	3.6	5.5			0.7	P50>AI	Seems adequate
4-11	Boys	270	7.9 (2.6-10.9)	1.7	2.7	3.6 (3.3-3.7)	4.9	8.3			1.3; 2.0[a]	P50>AI	Seems adequate
4-11	Girls	278	5.1 (0.5-12.0)	1.4	2.2	2.9 (2.8-3.1)	4.0	6.8			1.3; 2.0[a]	P50>AI	Seems adequate
12-17	Boys	272	9.6 (4.3-12.9)	1.9	3.0	4.0 (3.6-4.2)	5.4	9.6			2.0; 2.8[a]	P50>AI	Seems adequate

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI) <EAR	AI	P50 related to AI	Evaluation EAR/AI
12-17	Girls	300	14.3 (0.0-16.2)	1.4	2.2	3.0 (2.9-3.1)	4.1	7.1			2.0; 2.8[a]	P50>AI	Seems adequate
18-50	Men	318	13.3 (5.7-20.2)	2.3	3.5	4.8 (4.5-5.0)	6.5	19.0	2.0	2.8 (1.3-4.6)			Adequate intakes
18-50	Women	284	38.5 (16.5-55.9)	1.8	2.9	4.0 (3.7-4.2)	6.1	198.0	2.0	7.9 (6.2-10.0)			Adequate intakes
51-64	Men	251	19.3 (8.1-35.5)	2.5	3.8	5.2 (4.9-5.5)	7.1	16.8	2.0	1.7 (0.8-2.4)			Adequate intakes
51-64	Women	287	27.1 (5.6-39.0)	2.1	3.2	4.3 (4.0-4.5)	5.9	41.9	2.0	4.3 (2.8-5.7)			Adequate intakes
65-79	Men	311	12.8 (5.5-24.2)	2.6	4.0	5.4 (5.0-5.9)	7.7	24.1	2.0	1.3 (0.5-2.1)			Adequate intakes
65-79	Women	296	27.8 (7.3-41.5)	2.3	3.5	4.7 (4.4-5.0)	6.6	49.8	2.0	2.5 (1.4-3.5)			Adequate intakes

[a] AI 4-8 years=1.3 µg, 9-13 years=2.0 µg, 14-18 years=2.8 µg.

4.3.8 *Vitamin C*

The average habitual vitamin C intake from foods and dietary supplements was 159 mg/day and the median intake was 98 mg/day (see Figure 4.12 and Table 4.12). This difference between average and median intake can mainly be explained by use of dietary supplements. The average vitamin C intake from exclusively foods was 87 mg/day (see Appendix B).

The intake of vitamin C by boys (107 mg/day) was almost equal to the intake by girls (104 mg/day). The intake by women (195 mg/day) was higher than the intake by men (151 mg/day). When looking at the intake from exclusively foods, vitamin C intake by boys was almost equal to the intake by girls (78 and 75 mg/day, respectively), and the intake by men was almost equal to the intake by women (92 and 88 mg/day, respectively).
Adults had a higher intake of vitamin C than children (173 and 105 mg/day, respectively). This was seen in both boys/men and girls/women.

On average, the most important sources of vitamin C were 'Vegetables' (24%), 'Fruits, nuts, olives' (22%), 'Non-alcoholic beverages' (12%) and 'Potatoes' (10%). Other food groups contributed 9% or less to vitamin C intake. Dietary supplements were also an important source of vitamin C, with an average contribution of 16% (see section 4.6).

For children aged 1-13, the vitamin C intake seemed adequate with median intakes above the AI. Also, for women aged 51-79, the vitamin C intake was considered adequate, because less than 10% had an intake below the EAR. For boys/men aged 14-79 and girls/women aged 14-50, up to 26% in the separate age-gender groups had low intakes of vitamin C.

Thus, for parts of the population, low intake of vitamin C was observed. As far as we know, no recent studies on nutritional status are available to confirm these results. Follow-up research on nutritional status (e.g. certain blood values) could be performed, since it is unclear if health risks are associated with the current intake levels of vitamin C.

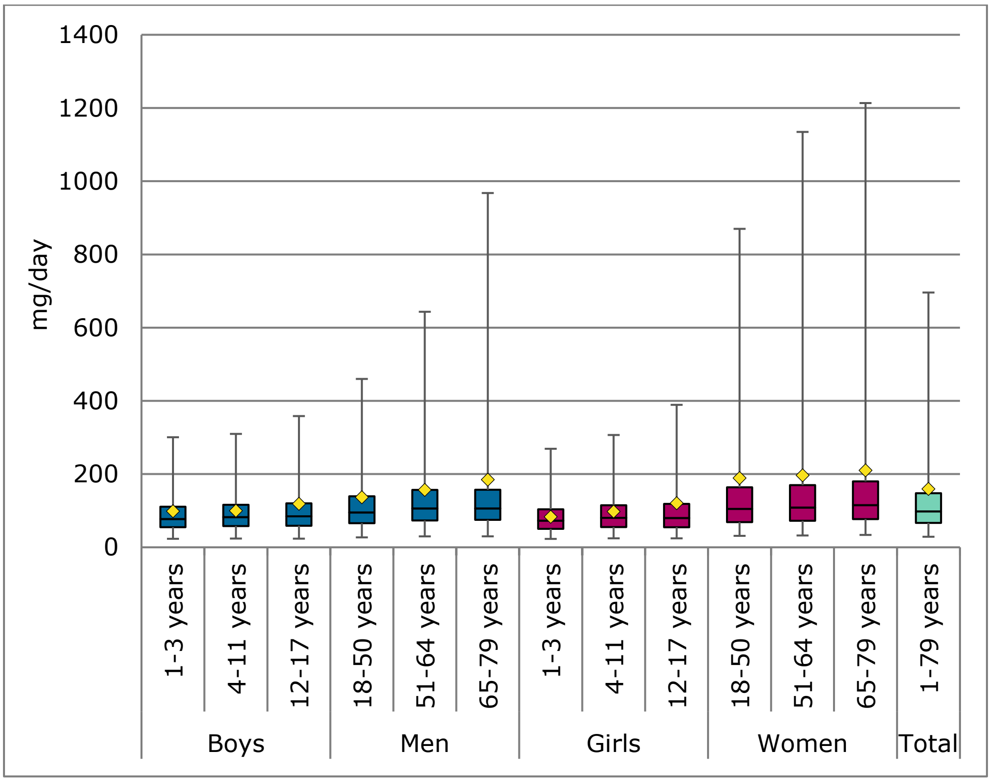


Figure 4.12 Habitual intake distribution of vitamin C (mg/day) from foods and dietary supplements by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 4.12 Habitual intake distribution of vitamin C (mg/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI
1-79	Total	3570	159 (149-172)	38	66	98 (95-101)	147	528					
1-17	Children	1823	105 (96-114)	32	56	81 (78-83)	116	204					
18-79	Adults	1747	173 (161-188)	40	70	103 (100-107)	157	651					
1-17	Boys	895	107 (94-116)	34	58	82 (79-86)	117	204					
1-17	Girls	928	104 (91-121)	30	54	79 (75-83)	114	204					
18-79	Men	880	151 (139-167)	41	69	100 (96-105)	147	412					
18-79	Women	867	195 (170-220)	39	71	108 (100-113)	169	873					
1-3	Boys	353	99 (79-103)	32	55	77 (71-81)	109	182			25;30[a]	P50>AI	Seems adequate
1-3	Girls	350	83 (77-94)	29	51	73 (69-78)	103	168			25;30[a]	P50>AI	Seems adequate
4-11	Boys	270	100 (88-112)	34	58	82 (78-87)	116	201			30;40;50[a]	P50>AI	Seems adequate
4-11	Girls	278	98 (81-121)	30	55	81 (76-85)	116	199			30;40;50[a]	P50>AI	Seems adequate
12-17	Boys	272	119 (93-140)	35	59	85 (80-90)	121	264	60[b]	14-17 yr: 26.5 (21.4-29.7)	50[a]	12-13 yr: P50>AI	12-13 yr: seems adequate; 14-17 yr: low intakes
12-17	Girls	300	121 (97-144)	30	54	80 (75-84)	119	299	50[b]	14-17 yr: 19.4 (17.1-23.1)	50[a]	12-13 yr: P50>AI	12-13 yr: seems adequate; 14-17 yr: low intakes
18-50	Men	318	137 (124-159)	39	66	95 (91-103)	139	337	60	19.8 (15.5-21.5)			Low intakes
18-50	Women	284	189 (150-226)	37	68	103 (95-110)	158	672	50	11.7 (9.9-14.7)			Low intakes
51-64	Men	251	157 (133-182)	44	73	106 (99-112)	156	518	60	14.5 (11.6-17.3)			Low intakes
51-64	Women	287	197 (159-236)	40	72	107 (100-116)	165	887	50	9.7 (7.2-12.3)			Adequate intakes
65-79	Men	311	185 (152-214)	45	75	106 (97-113)	157	709	60	13.6 (10.2-18.3)			Low intakes
65-79	Women	296	210 (179-249)	43	77	117 (107-128)	185	1044	50	8.3 (5.1-10.4)			Adequate intakes

[a] AI 1 year=25 mg, 2-5 years=30 mg, 6-9 years=40 mg, 10-13 years=50 mg.
[b] EAR boys/men 14+ years=60 mg, girls/women 14+ years=50 mg.

4.3.9 *Vitamin D*

The average habitual intake of vitamin D was 8.5 µg/day and the median intake was 3.9 µg/day (see Figure 4.13 and Table 4.13). This difference between average and median intake can mainly be explained by use of dietary supplements. The average vitamin D intake from exclusively foods was 2.7 µg/day (see Appendix B).

The intake of vitamin D by boys (6.1 µg/day) was almost equal to the intake by girls (5.4 µg/day), and the intake of vitamin D by men (7.7 µg/day) was lower than the intake by women (10.6 µg/day). When looking at the intake from exclusively foods, vitamin D intake by boys (2.3 µg/day) was higher than the intake by girls (2.0 µg/day), and the intake by men (3.2 µg/day) was higher than the intake by women (2.5 µg/day).
Adults had a higher intake of vitamin D than children (9.2 and 5.7 µg/day, respectively). This was seen in both boys/men and girls/women. Vitamin D intake was highest among 1-3 year-old children, women and men over 50 years old.

On average, dietary supplements were the most important source of vitamin D intake (28%). The most important sources from foods were 'Fats and oils' (22%) and 'Meat (incl. substitutes)' (18%). Other food groups contributed 9% or less to vitamin D intake (see section 4.6).

For children aged 1-3, the AI was lower or within the confidence interval of the median vitamin D intake, indicating that intake seemed adequate. For children aged 4-17 and adults aged 18-69, no statement about the adequacy of vitamin D intake could be made, because median intake was below the AI of 10 µg/day. For adults aged 70-79, the majority had a level of vitamin D intake below the EAR of 10 µg/day (67% in men and 58% in women, respectively).
However, the recommendation of 10 µg/day does take into account vitamin D production in the skin due to sunlight exposure. When the lower recommendation of 3 µg/day is used (assuming that two thirds of the requirement is covered by vitamin D production in the skin by sunlight exposure with light skin types[22]) still no statement could be made about the adequacy of vitamin D intake for 12-17 year-old girls. In all other age-gender groups until 69 years, the recommendation of 3 µg/day was lower or within the confidence interval of the median intake, indicating that vitamin D intake seemed adequate. For women aged 70-79, 21% had a vitamin D intake below the EAR of 3 µg/day. This was 16% for men aged 70-79. When evaluating the intake from exclusively foods, with a recommendation of 3 µg/day, no statement could be made about the adequacy of intake either low intakes were observed in most age-gender groups (see Appendix B).
If we apply the recommended dose of 3 µg/day, we may underestimate the prevalence of low intakes, because the recommendation assumes light skin types and sufficient sunlight exposure. If we apply the recommended dose of 10 µg/day, we may overestimate prevalence of low vitamin D intake. The truth may be found in the middle.

Vitamin D supplementation is recommended for those with a dark skin or insufficient sunlight exposure, for young children under the age of 4, for women over 50 and men over 70.[45] About two thirds of the young children were compliant with this recommendation, in women over 50 this was 37% and in men older than 70 this was 25%, with higher compliance during the winter than during the rest of the year (see Report 1, Chapter 4, Figure 4.4).[9] High intakes of vitamin D were rarely observed (less than 1% in each age-gender group).

Thus, low vitamin D intakes were observed for the older adults aged 70-79. This has also been found in previously conducted nutritional status studies.[49, 50] The findings endorse the importance of sun exposure and vitamin D supplementation as advised by the Health Council, in combination with a sufficient intake of calcium through diet. There is strong evidence that this reduces the risk of fractures in older adults.[45] For some other groups, low median intake was observed. However, as vitamin D status is affected by several factors, it is not clear yet if this intake is worrying from a public health point of view. Several studies suggest that a low vitamin D status is related to several adverse health outcomes.[51, 52] No problems are expected for adults with a light skin colour who get enough sun exposure. Further research should be performed to confirm whether this is also the case for the Netherlands. Research about the vitamin D status of adults and older adults in the Netherlands has already started. Also, additional research about the vitamin D status of people with a darker skin colour is recommended and is planned in 2024. Further research about the vitamin D status of children is also recommended.

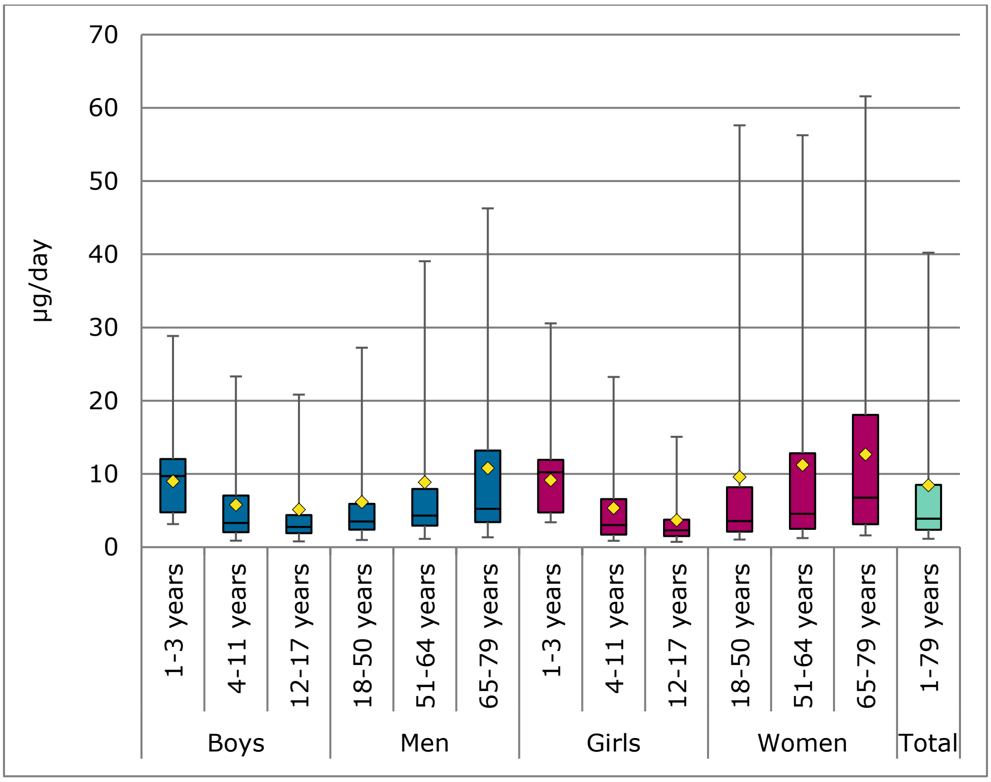


Figure 4.13 Habitual intake distribution of vitamin D (µg/day) from foods and dietary supplements by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 4.13 Habitual intake distribution of vitamin D (µg/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI) <EAR	AI	P50 related to AI	Evalu-ation EAR/AI	UL	% (95%-CI)≥UL	Evalu-ation UL
1-79	Total	3570	8.5 (7.8-9.0)	1.2	2.4	3.9 (3.7-4.1)	8.5	31.7								
1-17	Children	1823	5.7 (5.3-6.1)	1.0	1.9	3.2 (3.0-3.4)	7.3	16.0								
18-79	Adults	1747	9.2 (8.4-9.9)	1.3	2.5	4.1 (3.8-4.3)	8.9	36.1								
1-17	Boys	895	6.1 (5.4-6.6)	1.2	2.1	3.4 (3.2-3.7)	7.7	16.6								
1-17	Girls	928	5.4 (4.9-5.9)	0.9	1.7	3.0 (2.7-3.3)	7.0	15.4								
18-79	Men	880	7.7 (7.0-8.8)	1.6	2.7	4.0 (3.8-4.3)	7.2	27.2								
18-79	Women	867	10.6 (9.2-11.5)	1.2	2.3	4.2 (3.7-4.6)	11.4	48.0								
1-3	Boys	353	9.0 (8.5-9.8)	1.6	4.8	9.7 (8.7-10.8)	12.0	16.8			10	P50<AI	Seems adequate[a]	50	0.2 (0.0-0.7)	Tolerable intakes
1-3	Girls	350	9.1 (8.5-9.8)	1.3	4.7	10.2 (9.3-11.0)	11.9	18.6			10	P50>AI	Seems adequate	50	0.0 (0.0-0.4)	Tolerable intakes
4-11	Boys	270	5.8 (5.0-7.0)	1.2	2.0	3.3 (2.9-3.8)	7.1	16.3			10	P50<AI	No statement	50; 100[b]	0.7 (0.0-1.8)	Tolerable intakes
4-11	Girls	278	5.4 (4.6-6.3)	0.8	1.7	3.0 (2.6-3.4)	6.6	16.7			10	P50<AI	No statement	50; 100[b]	0.0 (0.0-0.7)	Tolerable intakes
12-17	Boys	272	5.1 (3.7-5.6)	1.1	1.9	2.8 (2.6-3.0)	4.4	16.5			10	P50<AI	No statement	100	0.3[c] (0.0-0.2)	Tolerable intakes
12-17	Girls	300	3.7 (3.2-4.1)	0.8	1.5	2.3 (2.1-2.5)	3.8	11.3			10	P50<AI	No statement	100	0.0 (0.0-0.0)	Tolerable intakes
18-50	Men	318	6.1 (5.0-7.6)	1.4	2.4	3.5 (3.3-3.9)	5.9	21.3			10	P50<AI	No statement	100	0.0 (0.0-0.1)	Tolerable intakes

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI) <EAR	AI	P50 related to AI	Evalu-ation EAR/AI	UL	% (95%-CI)≥UL	Evalu-ation UL
18-50	Women	284	9.6 (7.4-11.0)	1.1	2.1	3.6 (3.1-3.9)	8.2	49.4			10	P50<AI	No statement	100	0.4 (0.0-0.6)	Tolerable intakes
51-64	Men	251	8.9 (7.1-10.9)	1.8	2.9	4.3 (4.0-4.7)	8.0	31.1			10	P50<AI	No statement	100	0.2 (0.0-0.8)	Tolerable intakes
51-64	Women	287	11.2 (9.3-13.4)	1.3	2.5	4.6 (3.8-5.1)	12.8	43.4			10	P50<AI	No statement	100	0.2 (0.0-0.5)	Tolerable intakes
65-79	Men	311	10.8 (9.3-12.8)	2.1	3.4	5.2 (4.6-5.8)	13.2	33.1	10	70-79 yr: 66.7 (60.2-73.0)	10	65-69 yr: P50<AI	65-69 yr: no statement; 70-79 yr: low intakes	100	0.1 (0.0-0.5)	Tolerable intakes
65-79	Women	296	12.7 (10.6-14.1)	1.5	3.1	6.8 (5.5-8.4)	18.1	43.5	10	70-79 yr: 57.5 (49.0-63.9)	10	65-69 yr: P50<AI	65-69 yr: no statement; 70-79 yr: low intakes	100	0.0 (0.0-0.1)	Tolerable intakes

[a] P50<AI, however AI within CI. Therefore, intake is evaluated as seems adequate.
[b] UL 1-10 years=50 µg, 11+ years=100 µg.
[c] The proportion of this age group with an intake above the UL was very close to zero. Therefore the variance could not be properly estimated, resulting in a 95%-CI that is too narrow.

4.3.10 Vitamin E

The average habitual vitamin E intake from foods and dietary supplements was 15.9 mg/day and the median intake was 13.6 mg/day (see Figure 4.14 and Table 4.14). This difference between average and median intake can mainly be explained by use of dietary supplements. The average vitamin E intake from exclusively foods was 12.7 mg/day (see Appendix B).

The intake of vitamin E by boys (12.4 mg/day) was higher than the intake by girls (10.8 mg/day), and the intake by men (17.9 mg/day) was higher than the intake by women (16.0 mg/day).
Adults had a higher intake of vitamin E than children (17.0 and 11.6 mg/day, respectively). This was seen in both boys/men and girls/women.

The food groups 'Fats and oils' (19%) and 'Fruits, nuts, olives' (11%) were the most important sources of vitamin E. Other food groups contributed 10% or less to vitamin E intake. Dietary supplements contributed on average 10% to the vitamin E intake (see section 4.6).

For vitamin E, reference values are weakly substantiated and there appeared to be no deficiencies in the general population.[22] The Health Council of the Netherlands therefore advises not to use these reference values for evalution of the intake of groups. The prevalence of vitamin E intakes above the UL was low (less than 0.5% in all age-gender groups).

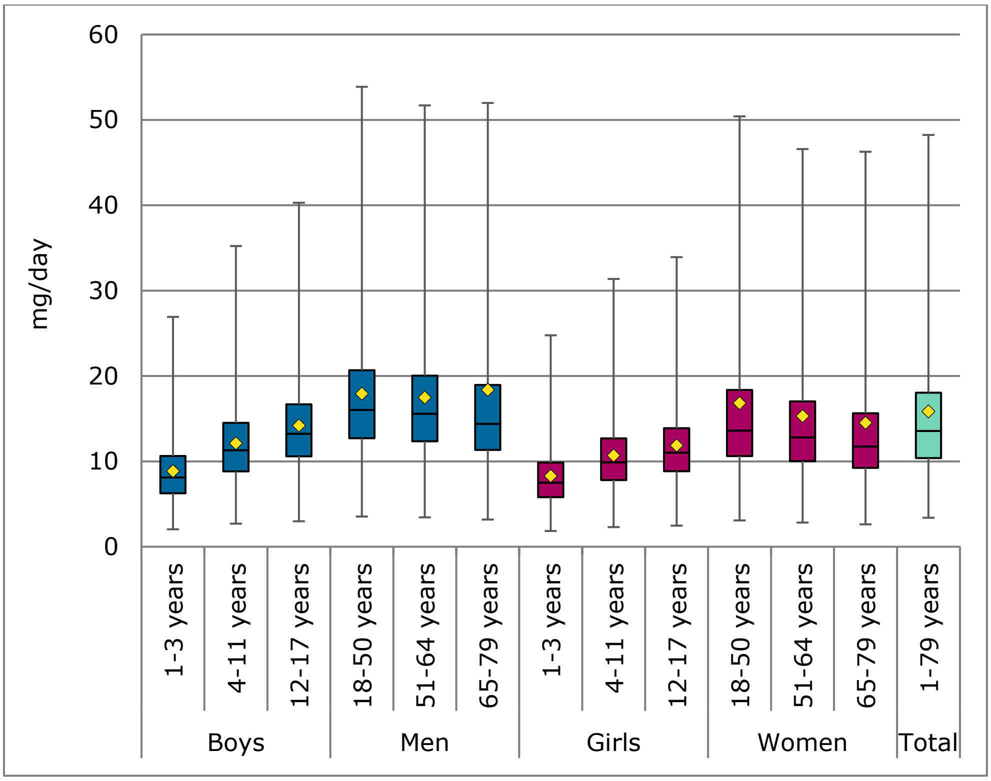


Figure 4.14 Habitual intake distribution of vitamin E (mg/day) from foods and dietary supplements by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 4.14 Habitual intake distribution of vitamin E (mg/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	UL	% (95%-CI)≥UL	Evaluation UL
1-79	Total	3570	15.9 (15.1-16.3)	7.0	10.4	13.6 (13.2-13.8)	18.0	30.2			
1-17	Children	1823	11.6 (11.3-12.0)	5.4	8.2	10.7 (10.5-11.0)	13.9	20.4			
18-79	Adults	1747	17.0 (16.0-17.5)	7.8	11.1	14.4 (13.9-14.6)	19.1	32.1			
1-17	Boys	895	12.4 (12.0-13.1)	5.8	8.8	11.5 (11.2-12.0)	15.0	21.6			
1-17	Girls	928	10.8 (10.3-11.1)	5.2	7.7	10.0 (9.6-10.3)	12.8	18.8			
18-79	Men	880	17.9 (16.9-18.6)	8.9	12.3	15.6 (15.0-16.1)	20.2	32.8			
18-79	Women	867	16.0 (14.5-16.9)	7.2	10.2	13.0 (12.5-13.4)	17.6	31.2			
1-3	Boys	353	8.9 (8.5-9.6)	4.2	6.3	8.1 (7.8-8.6)	10.6	16.3	100	0.0 (0.0-0.0)	Tolerable intakes
1-3	Girls	350	8.3 (7.8-8.7)	4.0	5.8	7.5 (7.2-7.9)	9.9	14.9	100	0.0 (0.0-0.0)	Tolerable intakes
4-11	Boys	270	12.1 (11.6-13.0)	6.1	8.8	11.3 (10.9-11.9)	14.5	20.7	120; 160; 220[a]	4-6 yr: 0.0 (0.0-0.0); 7-10 yr: 0.0 (0.0-0.0); 11 yr: 0.0 (0.0-0.0)	Tolerable intakes
4-11	Girls	278	10.7 (10.1-11.3)	5.5	7.8	9.9 (9.5-10.4)	12.7	18.7	120; 160; 220[a]	4-6 yr: 0.0 (0.0-0.0); 7-10 yr: 0.0 (0.0-0.0); 11 yr: 0.0 (0.0-0.0)	Tolerable intakes
12-17	Boys	272	14.2 (13.5-15.2)	7.6	10.6	13.2 (12.8-13.8)	16.7	23.6	220; 260[a]	12-14 yr: 0.0 (0.0-0.0); 15-17 yr: 0.0 (0.0-0.0)	Tolerable intakes

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	UL	% (95%-CI)≥UL	Evaluation UL
12-17	Girls	300	11.9 (11.3-12.5)	6.4	8.8	11.0 (10.6-11.4)	13.9	20.0	220; 260[a]	12-14 yr: 0.0 (0.0-0.0); 15-17 yr: 0.0 (0.0-0.0)	Tolerable intakes
18-50	Men	318	17.9 (16.7-18.6)	9.2	12.7	16.0 (15.2-16.6)	20.7	33.2	300	0.0 (0.0-0.0)	Tolerable intakes
18-50	Women	284	16.8 (14.5-18.5)	7.5	10.6	13.6 (12.9-14.1)	18.4	32.0	300	0.0 (0.0-0.0)	Tolerable intakes
51-64	Men	251	17.5 (16.6-18.7)	8.9	12.4	15.6 (14.9-16.2)	20.0	31.7	300	0.0 (0.0-0.0)	Tolerable intakes
51-64	Women	287	15.3 (13.9-16.2)	7.2	10.0	12.8 (12.3-13.2)	17.0	29.6	300	0.0 (0.0-0.0)	Tolerable intakes
65-79	Men	311	18.4 (15.9-20.8)	8.2	11.3	14.4 (13.8-15.1)	18.9	33.0	300	0.4 (0.0-0.8)	Tolerable intakes
65-79	Women	296	14.5 (12.8-15.9)	6.6	9.2	11.7 (11.2-12.4)	15.6	30.6	300	0.0 (0.0-0.0)	Tolerable intakes

[a] UL 4-6 years=120 mg, 7-10 years=160 mg, 11-14 years=220 mg, 15-17 years=260 mg.

4.3.11 *Vitamin K_1*

The vitamin K_1 intake was based on the intake of exclusively foods, because for supplements the distinction between vitamins K_1 and K_2 is usually unknown.

The average vitamin K_1 intake from exclusively foods was 86.6 µg/day and the median intake was 65.7 µg/day (see Figure 4.15 and Table 4.15). This difference between average and median intake can mainly be explained by high consumption of 'Cabbages' and 'Leafy vegetables' by a few people.

The intake of vitamin K_1 by boys (57.6 µg/day) was almost equal to the intake by girls (60.8 µg/day), and the intake by men (92.8 µg/day) was almost equal to the intake by women (94.2 µg/day).
Adults had a higher intake of vitamin K_1 than children (93.5 and 59.2 µg/day, respectively). This was seen in both boys/men and girls/women.

Vegetables were the major source of vitamin K_1 (65%). 'Fruits, nuts, olives' contributed 10% to vitamin K_1 intake. The other food groups contributed 7% or less (see section 4.6).

For most age-gender groups vitamin K_1 intake seemed adequate, as the median intake was equal to or higher than the AI (or the AI was within the confidence interval of the median intake). Only for boys and girls aged 15-17, no statement could be made about the prevalence of inadequacy of vitamin K_1 intake, as the median intake was below the AI. However, the vitamin K1 intake may have been underestimated due to missing values for this nutrient in NEVO. For a good estimate, it is important to first expand the NEVO for vitamin K. Then follow-up research into possible health effects can be done, as no recent study is available on vitamin K_1 status in the general population in the Netherlands. As far as we know, it is unclear if health risks are associated with the current intake levels of vitamin K_1, suggesting low priority for follow-up research.

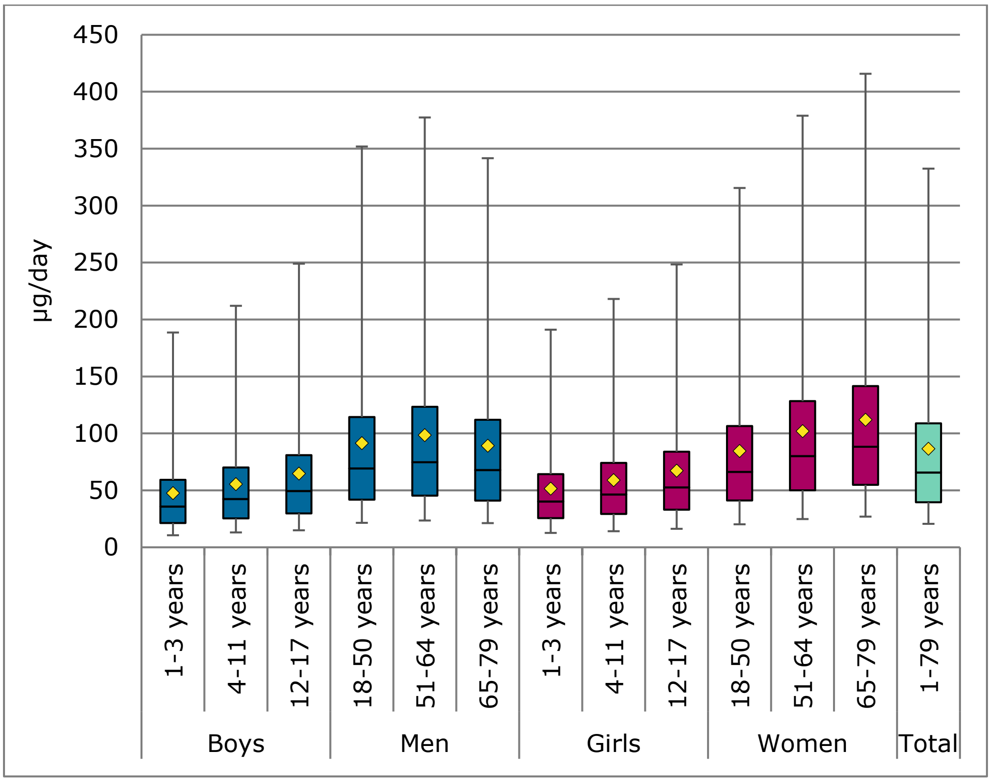


Figure 4.15 Habitual intake distribution of vitamin K_1 (µg/day) from exclusively foods by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 4.15 Habitual intake distribution of vitamin K₁ (µg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	AI	P50 related to AI	Evaluation EAR/AI
1-79	Total	3570	86.6 (81.0-91.5)	18.9	39.5	65.7 (61.4-69.6)	108.8	223.6			
1-17	Children	1823	59.2 (55.7-63.4)	13.8	28.0	45.6 (42.9-48.6)	74.4	149.3			
18-79	Adults	1747	93.5 (87.0-99.0)	21.6	43.9	71.9 (66.8-76.3)	117.4	237.6			
1-17	Boys	895	57.6 (53.4-63.5)	12.7	26.1	43.6 (40.5-47.4)	72.5	149.0			
1-17	Girls	928	60.8 (54.6-66.7)	15.2	29.8	47.6 (42.8-52.1)	76.2	149.8			
18-79	Men	880	92.8 (84.2-99.0)	20.5	42.5	70.4 (63.9-74.8)	116.1	240.6			
18-79	Women	867	94.2 (85.1-103.8)	22.8	45.4	73.4 (66.2-81.2)	118.6	234.8			
1-3	Boys	353	47.6 (42.3-52.9)	10.7	21.3	35.8 (32.6-39.7)	59.2	129.4	12	P50>AI	Seems adequate
1-3	Girls	350	51.6 (45.7-58.6)	13.0	25.6	40.2 (35.9-46.0)	64.2	126.8	12	P50>AI	Seems adequate
4-11	Boys	270	55.4 (50.9-60.9)	12.3	25.3	42.4 (39.0-45.8)	70.1	141.9	20; 30; 45[a]	P50>AI	Seems adequate
4-11	Girls	278	59.0 (52.2-64.5)	15.1	29.3	46.4 (41.1-50.7)	74.1	143.9	20; 30; 45[a]	P50>AI	Seems adequate
12-17	Boys	272	64.7 (60.0-72.4)	14.9	29.8	49.4 (45.7-54.8)	81.0	168.0	45; 65[a]	12-14 yr: P50>AI; 15-17 yr: P50<AI	12-14 yr: seems adequate; 15-17 yr: no statement
12-17	Girls	300	67.2 (58.5-75.8)	16.8	33.0	52.6 (46.0-59.7)	84.0	164.4	45; 65[a]	12-14 yr: P50>AI; 15-17 yr: P50<AI	12-14 yr: seems adequate; 15-17 yr: no statement
18-50	Men	318	91.4 (81.5-98.4)	20.3	41.8	69.3 (61.7-74.4)	114.4	237.5	70	P50<AI	Seems adequate[b]
18-50	Women	284	84.6 (75.4-96.6)	20.9	41.1	66.2 (59.0-75.8)	106.5	209.0	70	P50<AI	Seems adequate[b]
51-64	Men	251	98.5 (87.6-105.4)	21.8	45.3	74.8 (66.7-79.9)	123.4	254.0	70	P50>AI	Seems adequate
51-64	Women	287	102.0 (90.9-112.7)	25.2	50.0	80.1 (71.4-88.7)	128.4	250.6	70	P50>AI	Seems adequate
65-79	Men	311	89.2 (78.5-101.1)	19.8	41.0	67.8 (59.5-76.7)	112.0	229.7	70	P50<AI	Seems adequate[b]
65-79	Women	296	111.9 (95.6-123.0)	27.9	54.9	88.3 (75.2-96.9)	141.6	274.2	70	P50>AI	Seems adequate

[a] AI 4-6 years=20 µg, 7-10 years=30 µg, 11-14 years=45 µg, 15-17 years=65 µg.
[b] P50<AI, however AI within CI. Therefore, intake is evaluated as seems adequate.

4.4 Intake of minerals and trace elements

4.4.1 Calcium

The average habitual calcium intake from foods and dietary supplements was 985 mg/day and the median intake was 943 mg/day (see Figure 4.16 and Table 4.16). The average calcium intake from exclusively foods was 956 mg/day (see Appendix B).

The intake of calcium by boys (871 mg/day) was higher than the intake by girls (748 mg/day), and the intake by men (1100 mg/day) was higher than the intake by women (960 mg/day).
Adults had a higher intake of calcium than children (1030 and 809 mg/day, respectively). This was seen in both boys/men and girls/women.

On average, the most important source of calcium was ‘Dairy (incl. substitutes)’ (57%). In addition, ‘Non-alcoholic beverages’ contributed 11% to the calcium intake. The other food groups contributed 7% or less. Dietary supplements contributed on average 3% to the intake of calcium (see section 4.6).

For children aged 1-8, calcium intake seemed adequate with median intake above the AI. For children aged 9-17, women aged 50-79 and men aged 70-79, no statement could be made about the prevalence of inadequacy of calcium intake, because the median intake was below the AI. Low intakes were observed for men aged 18-69 and women aged 18-49 (prevalence of calcium intake below the EAR up to 18% in men and 37% in women).

Intake levels above the UL for adults of 2500 mg/day were rarely observed. The prevalence was 0.1% or less in all age-gender groups. A UL could not be determined for children due to limited data in these age groups, and it could also not be based on the UL of adults with corrections, because of calcium deposition in bone during the growth period.[42]

Thus, for a large part of the population, a low intake of calcium was observed or it was unclear whether the intake was adequate. Among older adults, sufficient intake of calcium is necessary for the uptake of vitamin D. For other age groups, the reference values are based on the maintenance of the body’s supply. Measuring the nutritional status of calcium is not yet possible, therefore follow-up research into the clinical signs associated with low calcium intake should be performed.

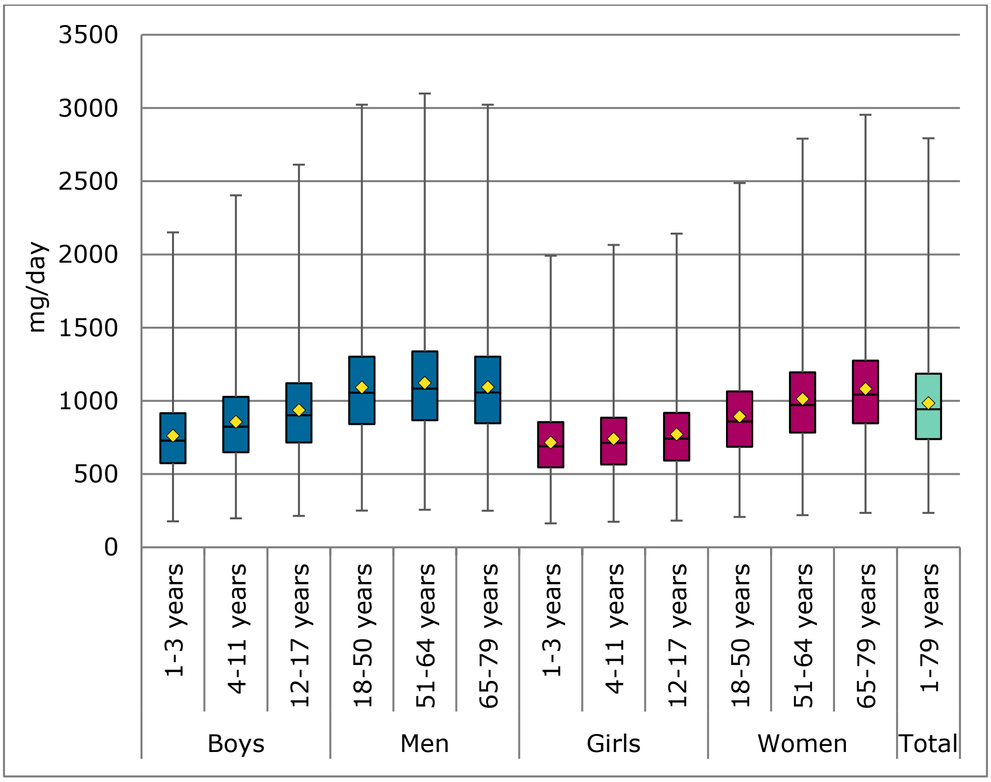


Figure 4.16 Habitual intake distribution of calcium (mg/day) from foods and dietary supplements by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 4.16 Habitual intake distribution of calcium (mg/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI) <EAR	AI	P50 related to AI	Evaluation EAR/AI	UL	% (95%-CI) ≥UL	Evaluation UL
1-79	Total	3570	985 (972-1004)	504	739	943 (930-963)	1186	1608								
1-17	Children	1823	809 (791-825)	419	608	775 (756-790)	970	1320								
18-79	Adults	1747	1030 (1014-1054)	547	785	989 (973-1.013)	1231	1651								
1-17	Boys	895	871 (840-892)	453	657	835 (806-857)	1046	1412								
1-17	Girls	928	748 (727-774)	395	572	721 (699-746)	894	1194								
18-79	Men	880	1100 (1073-1136)	597	849	1064 (1037-1098)	1312	1732								
18-79	Women	867	960 (940-989)	514	735	921 (902-951)	1142	1534								
1-3	Boys	353	761 (735-797)	397	575	729 (705-765)	916	1234			500	P50>AI	Seems adequate			
1-3	Girls	350	716 (672-736)	382	546	690 (645-708)	855	1136			500	P50>AI	Seems adequate			
4-11	Boys	270	857 (820-880)	452	649	824 (787-847)	1027	1377			700; 1200[a]	4-8yr: P50>AI; 9-11 yr: P50<AI	4-8 yr: seems adequate; 9-11 yr: no statement			
4-11	Girls	278	741 (718-768)	391	566	714 (691-739)	885	1180			700; 1100[a]	4-8 yr: P50>AI; 9-11 yr: P50<AI	4-8 yr: seems adequate; 9-11 yr: no statement			

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI) <EAR	AI	P50 related to AI	Evaluation EAR/AI	UL	% (95%-CI) ≥UL	Evalu-ation UL
12-17	Boys	272	936 (893-966)	501	716	901 (860-931)	1121	1492			1200	P50<AI	No statement			
12-17	Girls	300	771 (744-816)	410	592	743 (714-790)	918	1224			1100	P50<AI	No statement			
18-50	Men	318	1092 (1055-1133)	591	841	1056 (1020-1095)	1302	1720	750; 860[b]	17.7 (14.9-20.8)			Low intakes	2500	0.1 (0.0-0.2)	Tolerable intakes
18-50	Women	284	894 (872-937)	479	687	859 (838-903)	1065	1423	750; 860[b]	18-49 yr: 37.4 (31.6-40.5)	1100[a]	50 yr: P50<AI	18-49 yr: low intakes; 50 yr: no statement	2500	0.0 (0.0-0.0)	Tolerable intakes
51-64	Men	251	1122 (1093-1177)	611	868	1085 (1056-1140)	1337	1761	750	13.7 (10.0-16.4)			Low intakes	2500	0.1 (0.0-0.3)	Tolerable intakes
51-64	Women	287	1013 (986-1056)	564	784	972 (946-1014)	1195	1596			1100	P50<AI	No statement	2500	0.1 (0.0-0.3)	Tolerable intakes
65-79	Men	311	1094 (1048-1139)	597	847	1059 (1009-1103)	1302	1720	750[b]	65-69 yr: 15.5 (11.4-18.7)	1200[a]	70-79 yr: P50<AI	65-69 yr: low intakes; 70-79 yr: no statement	2500	0.1 (0.0-0.2)	Tolerable intakes
65-79	Women	296	1082 (1017-1114)	612	847	1043 (980-1075)	1275	1679			1100; 1200[a]	P50<AI	No statement	2500	0.1 (0.0-0.2)	Tolerable intakes

[a] AI 4-8 years=700 mg, boys 9-17 years=1200 mg, girls 9-17 years=1100 mg, women 50-69 years=1100 mg, 70+ years=1200 mg.
[b] EAR 18-24 years=860 mg, men 25-69 years and women 25-49 years=750 mg.

4.4.2 *Copper*

The average habitual copper intake from foods and dietary supplements was 1.5 mg/day and the median intake was 1.4 mg/day (see Figure 4.17 and Table 4.17). The average copper intake from exclusively foods was 1.3 mg/day (see Appendix B).

The intake of copper by boys (1.2 mg/day) was higher than the intake by girls (1.1 mg/day), and the intake by men (1.7 mg/day) was higher than the intake by women (1.5 mg/day).
Adults had a higher intake of copper than children (1.6 and 1.1 mg/day, respectively). This was seen in both boys/men and girls/women.

On average, the most important sources of copper were 'Bread, cereals, rice, pasta' (24%), 'Non-alcoholic beverages' (17%) and 'Fruits, nuts, olives' (12%). Other food groups contributed 8% or less to the copper intake. Dietary supplements contributed on average 6% to the copper intake (see section 4.6).

For children up to the age of 13, copper intake seemed adequate with median intakes above the AI. For adolescents (aged 14-17) and adults, copper intake was adequate. The prevalence of intake below the EAR of 0.7 mg/day was low (0.1-1.8% in each age-gender group).

In young children aged 1-3, high intake levels of copper were observed. 25% of the boys and 17% of the girls exceeded the UL. When the contribution of dietary supplements was not considered, these percentages were still high with 22% for boys aged 1-3 and 14% for girls aged 1-3**.** In all other age-gender categories levels of copper intake were tolerable, with less than 0.5% of the population exceeding the UL.

Thus, copper intake seemed adequate in all age groups. However, in the youngest children aged 1-3, high intakes were observed. Failure to meet all assumptions in the SPADE modelling might have influenced these percentages with high intakes. This impact is further investigated within RIVM. It is advised to prioritise this follow-up research on assumptions and after this, if necessary, conduct a nutritional status study for copper in young children.

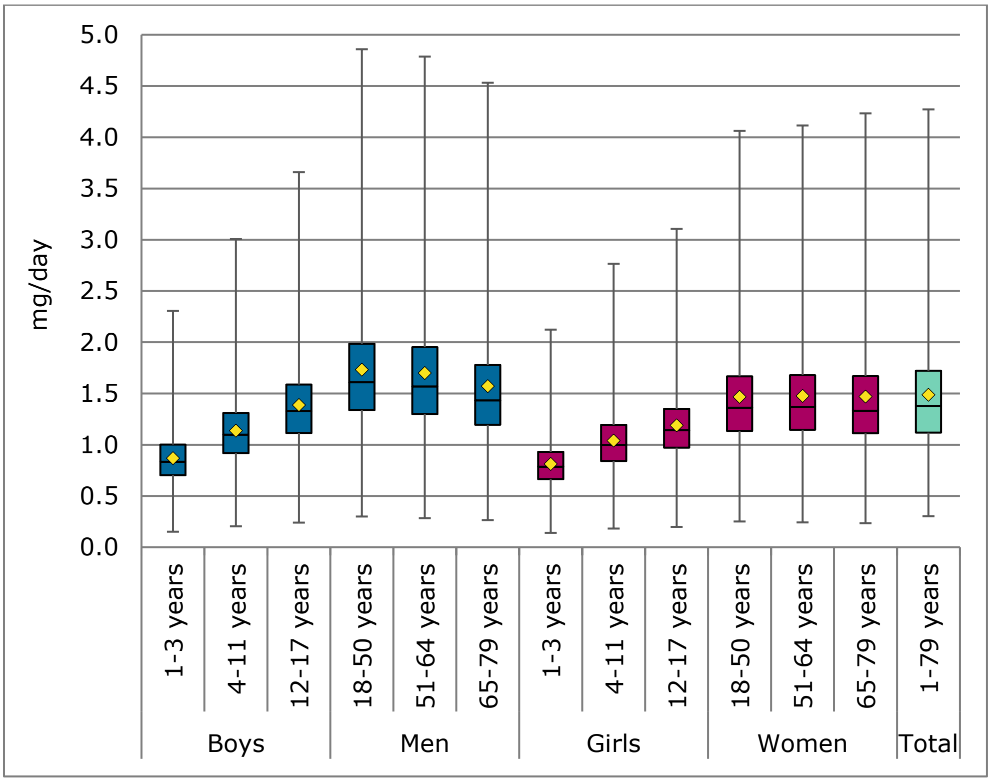


Figure 4.17 Habitual intake distribution of copper (mg/day) from foods and dietary supplements by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 4.17 Habitual intake distribution of copper (mg/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI) <EAR	AI	P50 related to AI	Evaluation EAR/AI	UL	% (95%-CI) ≥UL	Evalu-ation UL
1-79	Total	3570	1.5 (1.5-1.5)	0.8	1.1	1.4 (1.4-1.4)	1.7	2.5								
1-17	Children	1823	1.1 (1.1-1.1)	0.7	0.9	1.1 (1.1-1.1)	1.3	1.8								
18-79	Adults	1747	1.6 (1.6-1.6)	0.9	1.2	1.5 (1.4-1.5)	1.8	2.7								
1-17	Boys	895	1.2 (1.2-1.2)	0.7	0.9	1.1 (1.1-1.2)	1.4	1.9								
1-17	Girls	928	1.1 (1.0-1.1)	0.6	0.8	1.0 (1.0-1.0)	1.2	1.6								
18-79	Men	880	1.7 (1.6-1.7)	1.0	1.3	1.6 (1.5-1.6)	1.9	2.8								
18-79	Women	867	1.5 (1.4-1.5)	0.9	1.1	1.4 (1.3-1.4)	1.7	2.4								
1-3	Boys	353	0.9 (0.8-0.9)	0.6	0.7	0.8 (0.8-0.9)	1.0	1.3			0.3; 0.4[a]	P50>AI	Seems adequate	1	25.2 (22.2-29.7)	High intakes
1-3	Girls	350	0.8 (0.8-0.8)	0.5	0.7	0.8 (0.8-0.8)	0.9	1.2			0.3; 0.4[a]	P50>AI	Seems adequate	1	16.7 (14.1-20.0)	High intakes
4-11	Boys	270	1.1 (1.1-1.2)	0.7	0.9	1.1 (1.1-1.1)	1.3	1.7			0.4; 0.5; 0.7[a]	P50>AI	Seems adequate	2; 3; 4[b]	4-6 yr: 0.4 (0.0-0.9); 7-10 yr: 0.0 (0.0-0.1); 11 yr: 0.2 (0.0-0.3)	Tolerable intakes
4-11	Girls	278	1.0 (1.0-1.1)	0.7	0.8	1.0 (1.0-1.0)	1.2	1.6			0.4; 0.5; 0.7[a]	P50>AI	Seems adequate	2; 3; 4[b]	4-6 yr: 0.2 (0.0-0.4); 7-10 yr: 0.0 (0.0-0.0); 11 yr: 0.0	Tolerable intakes

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI) <EAR	AI	P50 related to AI	Evaluation EAR/AI	UL	% (95%-CI) ≥UL	Evalu-ation UL
															(0.0-0.0)	
12-17	Boys	272	1.4 (1.3-1.4)	0.9	1.1	1.3 (1.3-1.4)	1.6	2.1	0.7[c]	14-17 yr: 0.6 (0.2-0.8)	0.7[a]	12-13 yr: P50>AI	12-13 yr: seems adequate; 14-17 yr: adequate intakes	4	12-14 yr: 0.2 (0.0-0.3); 15-17 yr: 0.0 (0.0-0.5)	Tolerable intakes
12-17	Girls	300	1.2 (1.2-1.2)	0.8	1.0	1.1 (1.1-1.2)	1.4	1.8	0.7[c]	14-17 yr: 1.8 (1.1-2.7)	0.7[a]	12-13 yr: P50>AI	12-13 yr: seems adequate; 14-17 yr: adequate intakes	4	12-14 yr: 0.0 (0.0-0.0); 15-17 yr: 0.0 (0.0-0.2)	Tolerable intakes
18-50	Men	318	1.7 (1.7-1.8)	1.0	1.3	1.6 (1.6-1.7)	2.0	2.9	0.7	0.1 (0.0-0.1)			Adequate intakes	5	0.0 (0.0-0.1)	Tolerable intakes
18-50	Women	284	1.5 (1.4-1.5)	0.9	1.1	1.4 (1.3-1.4)	1.7	2.4	0.7	0.5 (0.2-0.8)			Adequate intakes	5	0.0 (0.0-0.0)	Tolerable intakes
51-64	Men	251	1.7 (1.6-1.8)	1.0	1.3	1.6 (1.5-1.6)	2.0	2.8	0.7	0.1 (0.0-0.2)			Adequate intakes	5	0.1 (0.0-0.3)	Tolerable intakes
51-64	Women	287	1.5 (1.4-1.5)	0.9	1.1	1.4 (1.3-1.4)	1.7	2.4	0.7	0.4 (0.1-0.5)			Adequate intakes	5	0.0 (0.0-0.0)	Tolerable intakes
65-79	Men	311	1.6 (1.5-1.7)	0.9	1.2	1.4 (1.4-1.5)	1.8	2.8	0.7	0.3 (0.1-0.5)			Adequate intakes	5	0.0 (0.0-0.1)	Tolerable intakes
65-79	Women	296	1.5 (1.4-1.5)	0.9	1.1	1.3 (1.3-1.4)	1.7	2.6	0.7	0.5 (0.2-1.0)			Adequate intakes	5	0.0 (0.0-0.0)	Tolerable intakes

[a] AI 1 year=0.3 mg, 2-5 years=0.4 mg, 6-9 years=0.5 mg, 10-13 years=0.7 mg.
[b] UL 4-6 years=2 mg, 7-10 years=3 mg, 11-17 years=4 mg.
[c] EAR 14+ years=0.7 mg.

4.4.3 *Iodine*

The average habitual iodine intake from food, dietary supplements and added iodised salt was 194 µg/day and the median intake was 184 µg/day (see Figure 4.18 and Table 4.18). The average iodine intake withouth dietary supplements was 178 µg/day (see Appendix B) and without added iodised salt was 166 µg/day.[37]

The total intake of iodine by boys (178 µg/day) was higher than the intake by girls (151 µg/day), and the intake by men (220 µg/day) was higher than the intake by women (184 µg/day).
Adults had a higher total intake of iodine than children (202 and 165 µg/day, respectively). This was seen in both boys/men and girls/women. Also when looking at the intake from exclusively foods, adults had a higher iodine intake than children (169 and 153 µg/day, respectively). This was specifically seen in boys/men.

On average, the most important sources of iodine from foods and dietary supplements (excluding added salt) were 'Bread, cereals, rice, pasta' (37%) and 'Dairy (incl. substitutes)' (28%). 'The other food groups contributed 7% or less. Dietary supplements contributed on average 6% to the intake of iodine (see section 4.6).

For boys and girls aged 1-13 and for men and women aged 18-79 the iodine intake seemed adequate, since the median iodine intake was equal to or higher than the AI. The iodine intake was considered adequate for the adolescents aged 14-17, because less than 10% had an intake below the EAR of 100 µg/day. Among boys aged 1-6 and girls aged 1-3, high intake levels were observed. The proportion that exceeded the UL was highest among boys aged 1-3 (10%).

Without the intake of dietary supplements and added salt, high intake levels were observed for boys aged 1-6 and girls aged 1-3 (see Appendix B). The proportion that exceeded the UL was highest among boys aged 1-3 (8%).

Thus, iodine intake seemed adequate for all groups. These conclusions are in line with the findings of a nutritional status study among the adult population living in the north of the Netherlands.[53] However, in this study, iodine intake by women was close to the AI, indicating women were ingesting just enough iodine. High intakes were observed in young children. The ULs for children are based on extrapolation of the ULs for adults. The Health Council previously stated that there are no clear indications of public health problems regarding possible high intakes in the Netherlands.[54]
As intakes by women are close to the AI, and agreements for reducing the salt content in foods and the transition to a more plant-based dietary pattern could influence the iodine intake in adults and children, it is important to continue monitoring iodine intakes. To gain more insight, further research into iodine status and/or thyroid function is recommended, as the estimation of iodine intake with 24-hour dietary recalls is difficult, because it is difficult to estimate the intake of iodine through added salt.

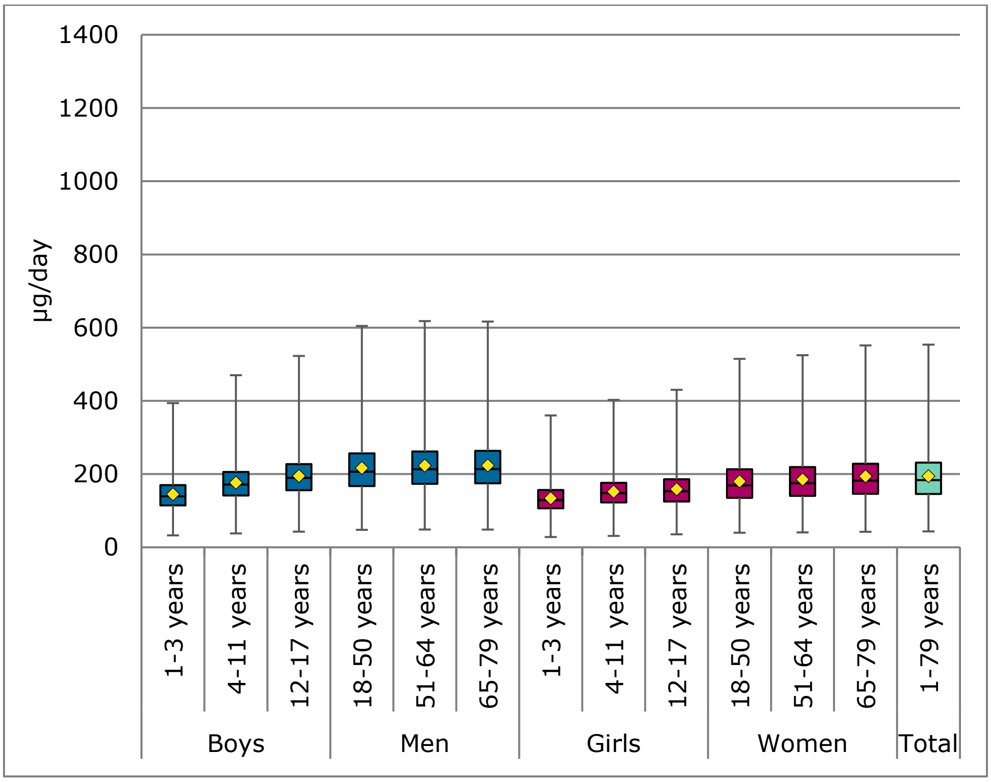


Figure 4.18 Habitual intake distribution of iodine (µg/day) from food, dietary supplements and iodised salt by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 4.18 Habitual intake distribution of iodine (µg/day) from food, dietary supplements and iodised salt by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI	UL	% (95%-CI)≥UL	Evaluation UL
1-79	Total	3570	194 (191-197)	102	146	184 (180-185)	231	322								
1-17	Children	1823	157 (167-172)	87	122	151 (160-166)	185	249								
18-79	Adults	1747	203 (215-223)	107	154	193 (204-212)	242	333								
1-17	Boys	895	168 (176-184)	92	130	162 (170-177)	198	265								
1-17	Girls	928	146 (155-163)	83	115	141 (149-158)	171	226								
18-79	Men	880	220 (229-243)	123	172	211 (220-232)	259	350								
18-79	Women	867	185 (196-207)	97	140	175 (185-195)	219	310								
1-3	Boys	353	145 (149-159)	82	114	139 (145-154)	170	224			70; 90[a]	P50>AI	Seems adequate	200	10.5 (8.0-12.0)	High intakes
1-3	Girls	350	134 (140-150)	78	106	129 (136-145)	157	204			70; 90[a]	P50>AI	Seems adequate	200	5.9 (4.2-7.5)	High intakes
4-11	Boys	270	176 (180-189)	104	142	172 (176-184)	206	264			90; 120; 150[a]	P50>AI	Seems adequate	250; 300; 450[b]	4-6 yr: 5.3 (3.8-6.7); 7-10 yr: 1.7 (0.9-2.7); 11 yr: 0.2 (0.0-0.4)	4-6 yr: high intakes; 7-11 yr: tolerable intakes
4-11	Girls	278	152 (159-169)	91	122	148 (155-164)	176	227			90; 120; 150[a]	P50>AI	Seems adequate	250; 300; 450[b]	4-6 yr: 1.9 (1.1-2.8); 7-10 yr: 0.3 (0.1-0.6);	Tolerable intakes

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evalu-ation EAR/AI	UL	% (95%-CI)≥UL	Evalu-ation UL
															11 yr: 0.0 (0.0-0.0)	
12-17	Boys	272	195 (203-217)	113	156	190 (197-210)	227	295	100[c]	14-17 yr: 2.8 (1.3-2.6)	150[a]	12-13 yr: P50>AI	12-13 yr: seems adequate 14-17 yr: adequate intakes	450; 500[b]	12-14 yr: 0.2 (0.0-0.4); 15-17 yr: 0.1 (0.0-0.1)	Tolerable intakes
12-17	Girls	300	159 (166-178)	90	125	153 (160-172)	186	244	100[c]	14-17 yr: 9.2 (4.6-7.4)	150[a]	12-13 yr: P50>AI	12-13 yr: seems adequate 14-17 yr: adequate intakes	450; 500[b]	12-14 yr: 0.0 (0.0-0.0); 15-17 yr: 0.0 (0.0-0.0)	Tolerable intakes
18-50	Men	318	217 (226-243)	120	167	207 (217-232)	257	348			150	P50>AI	Seems adequate	600	0.0 (0.0-0.1)	Tolerable intakes
18-50	Women	284	180 (185-201)	95	135	169 (176-190)	213	302			150	P50>AI	Seems adequate	600	0.0 (0.0-0.0)	Tolerable intakes
51-64	Men	251	223 (228-248)	125	173	213 (219-236)	262	356			150	P50>AI	Seems adequate	600	0.0 (0.0-0.4)	Tolerable intakes
51-64	Women	287	185 (193-208)	100	141	175 (183-197)	219	305			150	P50>AI	Seems adequate	600	0.0 (0.0-0.1)	Tolerable intakes
65-79	Men	311	224 (227-245)	126	175	214 (217-233)	264	353			150	P50>AI	Seems adequate	600	0.0 (0.0-0.1)	Tolerable intakes
65-79	Women	296	194 (200-219)	104	146	182 (189-206)	228	323			150	P50>AI	Seems adequate	600	0.0 (0.0-0.3)	Tolerable intakes

[a] AI 1 year=70 µg, 2-5 years=90 µg, 6-9 years=120 µg, 10-13 years=150 µg.
[b] UL 4-6 years=250 µg, 7-10 years=300 µg, 11-14 years=450 µg, 15-17 years=500 µg.
[c] EAR 14-17 years=100 µg.

4.4.4 Iron

The average habitual intake of total iron from foods and dietary supplements was 11.6 mg/day and the median intake was 10.4 mg/day (see Figure 4.19 and Table 4.19). This difference between average and median intake can mainly be explained by use of dietary supplements. The average total iron intake from exclusively foods was 9.9 mg/day (see Appendix B). About 7% (0.8 mg/day) of the iron intake consist of haem iron (see Figure 4.20 and Table 4.20).

The intake of total iron by boys (9.0 mg/day) was higher than the intake by girls (7.8 mg/day), and the intake by men (13.2 mg/day) was higher than the intake by women (11.7 mg/day). Also, the average intake of haem iron by boys (0.6 mg/day) was higher than the intake by girls (0.5 mg/day), and the intake by men (1.0 mg/day) was higher than the intake by women (0.6 mg/day).
Adults had a higher intake of total iron than children (12.4 and 8.4 mg/day, respectively). This was seen in both boys/men and girls/women. Also, the intake of haem iron by adults was higher than the intake by children (0.8 and 0.6 mg, respectively). This was also seen in both boys/men and girls/women.

On average, the most important sources of total iron were ‘Bread, cereals, rice, pasta’ (26%) and ‘Meat (incl. substitutes)’ (14%). Other food groups contributed less than 9% to total iron intake. Dietary supplements contributed on average 8% to the iron intake (see section 4.6). ‘Meat (incl. substitutes)’ was the major source of haem iron (96%). Other food groups contributed 2% or less. Dietary supplements did not contribute to the intake of haem iron.

For children aged 1-13, the median iron intake was below the AI. Consequently, the adequacy of the iron intake for this age group could not be assessed. For adolescent boys (aged 14-17), men, and women aged 51-79, iron intake was adequate, as 8% of the adolescent boys and less than 1% of the men and less than 3% of the women had intakes below the EAR.

For girls aged 14-17 and women aged 18-50, low iron intakes were observed. 77% of the girls aged 14-17 and 28% of the women aged 18-50 had an iron intake below the EAR. For women aged 18-50, a skewed distribution (the requirement distribution is known to have a tail towards the right, i.e. higher requirements), was considered in the calculation of the prevalence of inadequate iron intake (see method section 2.2.1). However, among girls (14-17 years old), no data on the distribution was availble and therefore this adapted method could not be applied. Therefore, the prevelance was estimated under the assumption of a symmetrical requirement distribution. The proportion estimated for girls from 14-17 years old may be over- or underestimated.

This evaluation is in view of dietary reference values based on average absorption rates. Although bioavailability of iron may differ between different food consumption patterns, EFSA considers no separate recommendations for vegetarians. They assume bioavailability of iron from European vegetarian diets is not substantially different from diets containing meat and other flesh foods.[55]

Thus, for children aged 1-13, no statement could be made about the adequacy, and low intakes were observed for girls aged 14-17 and women aged 18-50. Studies on iron status have shown similar results.[56-60] However, as far as we know, no recent studies are available on iron status in women of fertile age. Although the public health implications of these observed low iron intakes are not well known, problems with inadequacy might occur. For further insights, research on iron status in women of fertile age is strongly advised and research into the health effects associated with low iron intake in girls and women aged 14-50 in the Netherlands is advised as well.

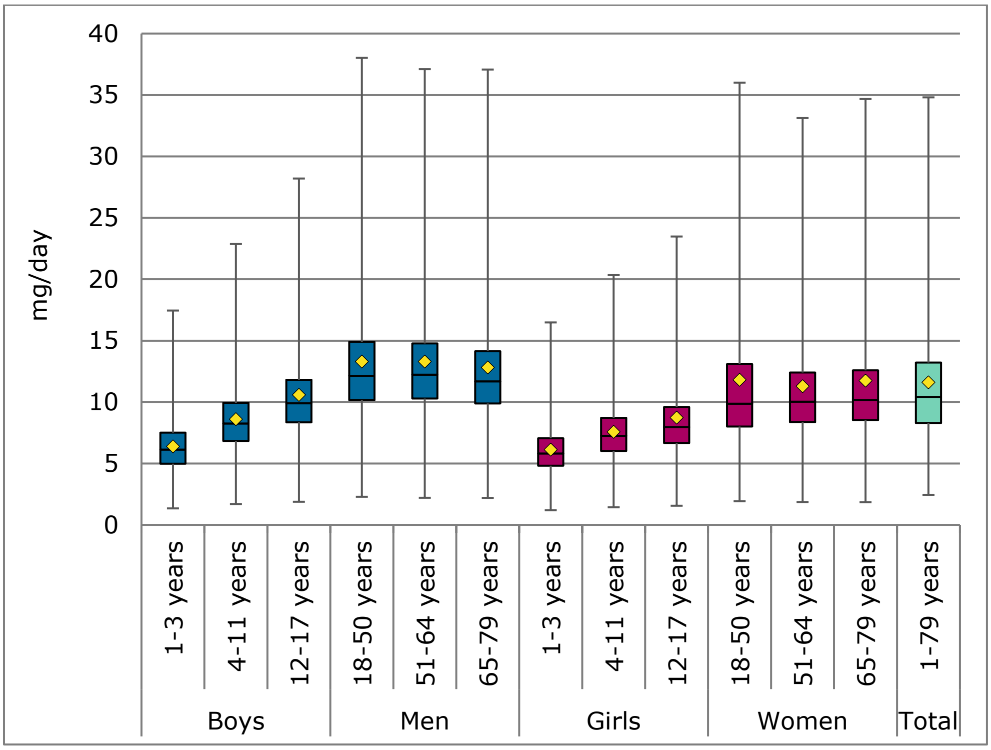


Figure 4.19 Habitual intake distribution of total iron (mg/day) from foods and dietary supplements by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

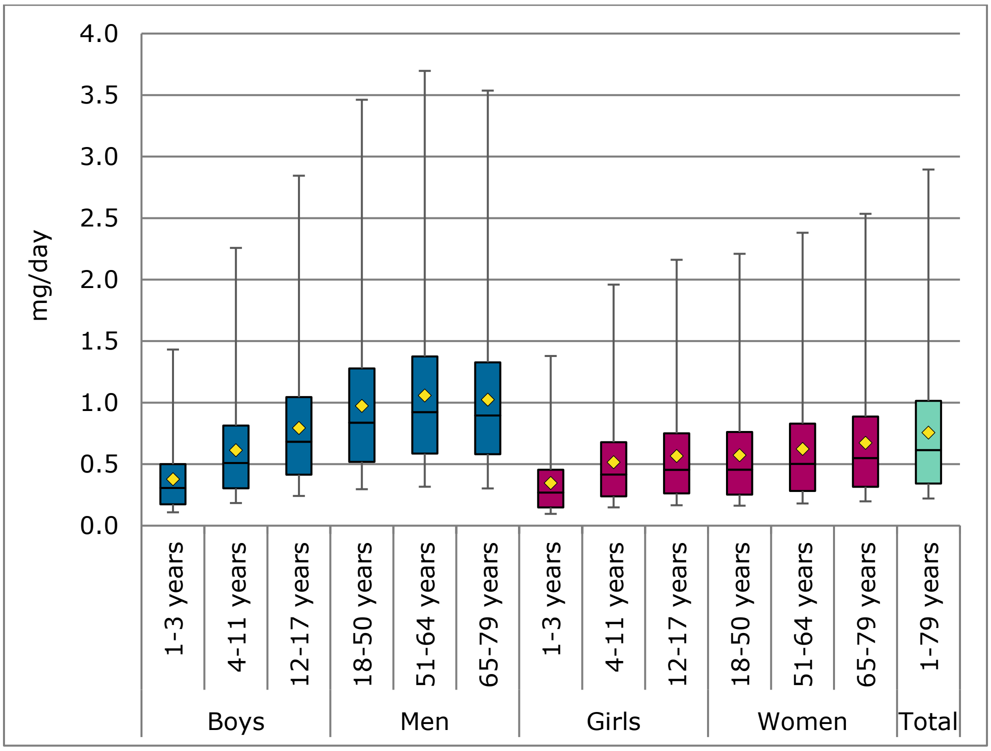


Figure 4.20 Habitual intake distribution of haem iron (mg/day) from exclusively foods by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 4.19 Habitual intake distribution of total iron (mg/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI
1-79	Total	3570	11.6 (11.3-12.0)	5.8	8.3	10.4 (10.2-10.6)	13.2	21.6					
1-17	Children	1823	8.4 (8.1-8.6)	4.6	6.3	7.8 (7.7-8.0)	9.7	13.4					
18-79	Adults	1747	12.4 (12.0-12.9)	6.8	9.0	11.1 (10.9-11.3)	14.0	22.6					
1-17	Boys	895	9.0 (8.6-9.3)	4.8	6.8	8.5 (8.3-8.7)	10.5	14.2					
1-17	Girls	928	7.8 (7.5-8.1)	4.4	6.0	7.3 (7.1-7.5)	8.8	12.2					
18-79	Men	880	13.2 (12.8-13.7)	7.9	10.1	12.1 (11.8-12.4)	14.7	22.9					
18-79	Women	867	11.7 (11.0-12.4)	6.3	8.2	10.0 (9.7-10.3)	12.8	22.3					
1-3	Boys	353	6.4 (6.2-6.6)	3.6	5.0	6.1 (5.9-6.4)	7.5	9.9			8	P50<AI	No statement
1-3	Girls	350	6.1 (5.8-6.3)	3.6	4.8	5.8 (5.6-6.0)	7.0	9.4			8	P50<AI	No statement
4-11	Boys	270	8.6 (8.2-8.8)	5.1	6.8	8.3 (8.0-8.5)	9.9	12.9			8; 9; 11[a]	P50<AI	No statement
4-11	Girls	278	7.6 (7.2-7.9)	4.6	6.0	7.2 (7.0-7.4)	8.7	11.6			8; 9; 11[a]	P50<AI	No statement

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI
12-17	Boys	272	10.6 (9.9-11.3)	6.5	8.3	9.9 (9.6-10.2)	11.8	16.4	7[b]	14-17 yr: 8.0 (6.5-10.7)	11[a]	12-13 yr: P50<AI	12-13 yr: no statement; 14-17 yr: adequate intakes
12-17	Girls	300	8.7 (8.2-9.6)	5.1	6.7	8.0 (7.8-8.3)	9.6	13.9	10[b]	14-17 yr: 77.1 (71.7-81.7)	11[a]	12-13 yr: P50<AI	12-13 yr: no statement; 14-17 yr: low intakes
18-50	Men	318	13.3 (12.6-14.0)	7.9	10.2	12.1 (11.7-12.6)	14.9	23.1	6	0.5 (0.2-0.7)			Adequate intakes
18-50	Women	284	11.8 (10.8-13.1)	6.1	8.0	9.9 (9.5-10.4)	13.1	22.9	7	28.3 (25.2-29.6)[c]			Low intakes
51-64	Men	251	13.3 (12.7-13.9)	8.1	10.3	12.2 (11.9-12.6)	14.8	22.3	6	0.4 (0.1-0.5)			Adequate intakes
51-64	Women	287	11.3 (10.7-12.2)	6.5	8.4	10.0 (9.7-10.4)	12.4	20.7	6	2.6 (1.4-3.5)			Adequate intakes
65-79	Men	311	12.8 (12.2-13.4)	7.7	9.9	11.7 (11.3-12.0)	14.1	22.9	6	0.5 (0.2-1.0)			Adequate intakes
65-79	Women	296	11.7 (10.6-12.1)	6.7	8.5	10.2 (9.6-10.4)	12.6	22.1	6	1.9 (1.2-3.3)			Adequate intakes

[a] AI 1 year=8 mg; 2-5 years=8 mg, 6-9 years=9 mg, 10-13 years=11 mg.
[b] EAR boys 14-17 years=7 mg, girls 14-17 years=10 mg.
[c] Percentage is calculated using an adapted Beaton's Full Probability Approach.[27, 28]

Table 4.20 Habitual intake distribution of haem iron (mg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	0.8 (0.7-0.8)	0.1	0.3	0.6 (0.6-0.7)	1.0	1.9
1-17	Children	1823	0.6 (0.5-0.6)	0.1	0.3	0.5 (0.4-0.5)	0.8	1.4
18-79	Adults	1747	0.8 (0.8-0.9)	0.1	0.4	0.7 (0.6-0.7)	1.1	2.0
1-17	Boys	895	0.6 (0.6-0.7)	0.1	0.3	0.5 (0.5-0.6)	0.9	1.6
1-17	Girls	928	0.5 (0.4-0.5)	0.1	0.2	0.4 (0.3-0.4)	0.7	1.3
18-79	Men	880	1.0 (0.9-1.1)	0.2	0.5	0.9 (0.8-1.0)	1.3	2.2
18-79	Women	867	0.6 (0.6-0.7)	0.1	0.3	0.5 (0.4-0.6)	0.8	1.5
1-3	Boys	353	0.4 (0.3-0.4)	0.1	0.2	0.3 (0.3-0.4)	0.5	0.9
1-3	Girls	350	0.3 (0.3-0.4)	0.1	0.1	0.3 (0.2-0.3)	0.5	0.9
4-11	Boys	270	0.6 (0.5-0.7)	0.1	0.3	0.5 (0.4-0.5)	0.8	1.4
4-11	Girls	278	0.5 (0.4-0.5)	0.1	0.2	0.4 (0.3-0.4)	0.7	1.3
12-17	Boys	272	0.8 (0.7-0.8)	0.2	0.4	0.7 (0.6-0.7)	1.0	1.8
12-17	Girls	300	0.6 (0.5-0.6)	0.1	0.3	0.5 (0.4-0.5)	0.8	1.4
18-50	Men	318	1.0 (0.9-1.1)	0.2	0.5	0.8 (0.7-1.0)	1.3	2.2
18-50	Women	284	0.6 (0.5-0.7)	0.1	0.3	0.5 (0.4-0.5)	0.8	1.4
51-64	Men	251	1.1 (1.0-1.2)	0.3	0.6	0.9 (0.8-1.0)	1.4	2.3
51-64	Women	287	0.6 (0.6-0.7)	0.1	0.3	0.5 (0.5-0.6)	0.8	1.6
65-79	Men	311	1.0 (0.9-1.1)	0.3	0.6	0.9 (0.8-1.0)	1.3	2.2
65-79	Women	296	0.7 (0.6-0.8)	0.1	0.3	0.5 (0.5-0.6)	0.9	1.6

4.4.5 *Magnesium*

The average habitual magnesium intake from foods and dietary supplements was 359 mg/day and the median intake was 337 mg/day (see Figure 4.21 and Table 4.21). The average magnesium intake from exclusively foods was 326 mg/day (see Appendix B).

The intake of magnesium by boys (279 mg/day) was higher than the intake by girls (242 mg/day), and the intake by men (414 mg/day) was higher than the intake by women (354 mg/day).
Adults had a higher intake of magnesium than children (384 and 260 mg/day, respectively). This was seen in both boys/men and girls/women.

On average, the most important sources of magnesium were 'Bread, cereals, rice, pasta' (24%), 'Dairy (incl. substitutes)' (14%), 'Non-alcoholic beverages' (11%) and 'Fruits, nuts, olives' (11%). Other food groups contributed 8% or less to magnesium intake. Dietary supplements contributed on average 6% to magnesium intake (see section 4.6).

For girls aged 10-17 years and boys aged 14-17, no statement could be made about the adequacy of the magnesium intake, because the median intake was below the AI. For all other age-gender groups, the magnesium intake seemed adequate, because median intake was above the AI.

A UL of 250 mg magnesium per day from dietary supplements was set from the age of 4 years on.[42] High intake levels were observed in men aged 51-79 and women aged 18-79. For these groups, the UL was exceeded the most by women aged 65-79 with 8% (see Table 4.22).

Thus, magnesium intake seemed adequate in most age groups, except for girls aged 10-17 and boys aged 14-17 for whom the adequacy of magnesium intake could not be assessed. Furthermore, high intakes of magnesium from dietary supplements were observed for men aged 51-79 and women aged 18-79. Further research into the magnesium intake from supplements and nutrient status of magnesium could be performed.

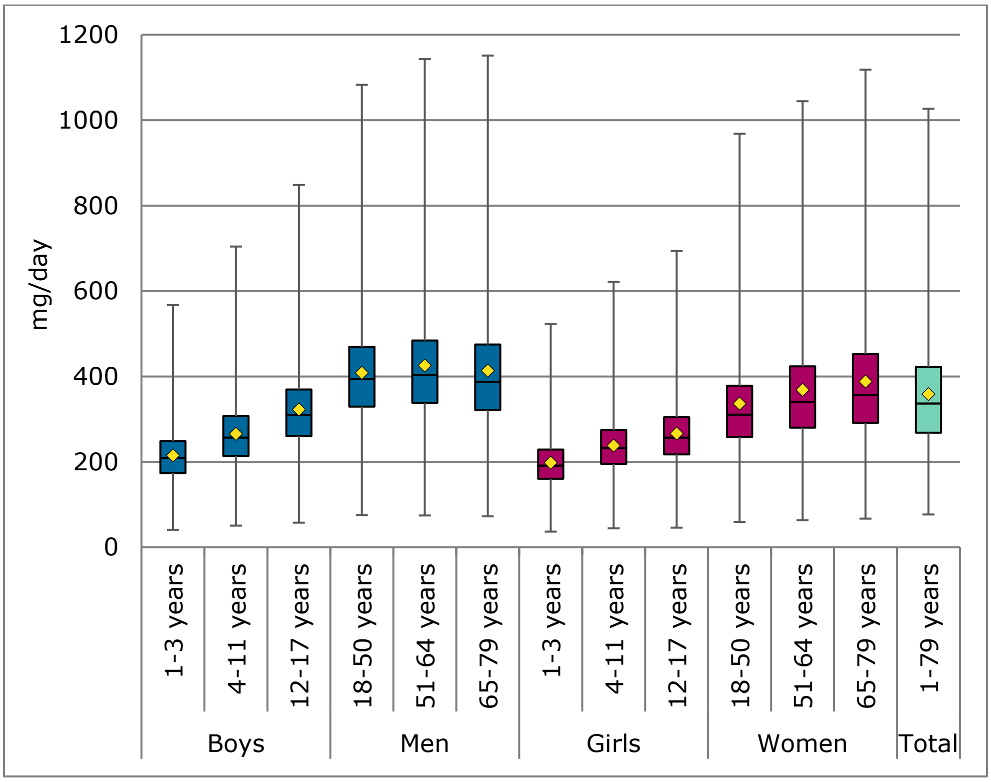


Figure 4.21 Habitual intake distribution of magnesium (mg/day) from foods and dietary supplements by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 4.21 Habitual intake distribution of magnesium (mg/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	AI	P50 related to AI	Evaluation AI
1-79	Total	3570	359 (353-365)	192	268	337 (332-342)	423	604			
1-17	Children	1823	260 (253-263)	153	205	249 (243-252)	303	402			
18-79	Adults	1747	384 (377-392)	222	294	361 (355-368)	445	629			
1-17	Boys	895	279 (271-285)	161	218	267 (261-273)	326	432			
1-17	Girls	928	242 (232-245)	147	195	235 (225-238)	280	361			
18-79	Men	880	414 (404-425)	255	330	395 (386-404)	474	636			
18-79	Women	867	354 (345-366)	206	269	325 (319-336)	403	620			
1-3	Boys	353	215 (208-222)	133	174	209 (202-215)	248	318	85; 120[a]	P50>AI	Seems adequate
1-3	Girls	350	198 (193-207)	124	161	191 (187-201)	229	294	85; 120[a]	P50>AI	Seems adequate
4-11	Boys	270	266 (259-273)	163	214	257 (251-264)	307	397	120;200;280[a]	P50>AI	Seems adequate
4-11	Girls	278	238 (226-242)	151	195	233 (220-236)	274	347	120; 200; 280[a]	4-9 yr: P50>AI; 10-11 yr: P50<AI	4-9 yr: seems adequate; 10-11 yr: no statement
12-17	Boys	272	323 (309-331)	203	260	310 (300-317)	370	479	280; 350[a]	12-13 yr: P50>AI; 14-17 yr: P50<AI	12-13 yr: seems adequate; 14-17 yr: no statement
12-17	Girls	300	266 (252-272)	171	217	257 (244-263)	305	389	280	P50<AI	No statement
18-50	Men	318	408 (396-422)	254	330	393 (383-405)	470	613	350	P50>AI	Seems adequate
18-50	Women	284	336 (323-351)	199	258	311 (303-322)	378	590	300	P50>AI	Seems adequate
51-64	Men	251	426 (410-443)	264	338	403 (392-415)	484	659	350	P50>AI	Seems adequate
51-64	Women	287	369 (355-387)	217	280	340 (330-355)	424	621	300	P50>AI	Seems adequate
65-79	Men	311	414 (396-428)	249	322	387 (374-399)	475	677	350	P50>AI	Seems adequate
65-79	Women	296	388 (376-408)	224	292	356 (343-372)	452	666	300	P50>AI	Seems adequate

[a] AI 1 year=85 mg, 2-5 years=120 mg, 6-9 years=200 mg, boys 10-13 years=280 mg, boys 14-17 years=350 mg, girls 10-17 years=280 mg.

Table 4.22 Habitual intake distribution of magnesium (mg/day) from dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	UL	% (95%-CI) ≥UL	Evaluation UL
1-79	Total	3570	33 (29-36)	0	0	0 (0-0)	18	199			
1-17	Children	1823	8 (5-9)	0	0	0 (0-0)	0	40			
18-79	Adults	1747	39 (34-44)	0	0	0 (0-0)	30	231			
1-17	Boys	895	9 (5-10)	0	0	0 (0-0)	0	38			
1-17	Girls	928	7 (5-9)	0	0	0 (0-0)	0	42			
18-79	Men	880	29 (24-35)	0	0	0 (0-0)	14	168			
18-79	Women	867	49 (41-56)	0	0	0 (0-1)	49	283			
1-3	Boys	353	4 (2-5)	0	0	0 (0-0)	0	27			
1-3	Girls	350	5 (2-6)	0	0	0 (0-0)	0	27			
4-11	Boys	270	7 (3-8)	0	0	0 (0-0)	1	31	250	0.3 (0.0-0.3)	Tolerable intakes
4-11	Girls	278	6 (4-9)	0	0	0 (0-0)	1	39	250	0.0 (0.0-0.2)	Tolerable intakes
12-17	Boys	272	13 (6-17)	0	0	0 (0-0)	1	68	250	1.2 (0.1-1.9)	Tolerable intakes
12-17	Girls	300	9 (5-11)	0	0	0 (0-0)	0	54	250	0.5 (0.0-0.8)	Tolerable intakes
18-50	Men	318	23 (17-31)	0	0	0 (0-0)	11	125	250	1.6 (0.5-2.8)	Tolerable intakes
18-50	Women	284	42 (30-52)	0	0	0 (0-2)	35	263	250	5.2 (2.7-7.4)	High intakes
51-64	Men	251	33 (20-45)	0	0	0 (0-0)	15	187	250	3.3 (0.9-5.7)	High intakes
51-64	Women	287	53 (39-65)	0	0	0 (0-0)	62	276	250	5.9 (3.2-8.3)	High intakes
65-79	Men	311	43 (31-54)	0	0	0 (0-0)	28	262	250	5.3 (2.5-7.7)	High intakes
65-79	Women	296	63 (52-78)	0	0	0 (0-0)	97	310	250	8.2 (5.6-12.0)	High intakes

4.4.6 *Phosphorus*

The average habitual intake of phosphorus from exclusively foods was 1410 mg/day and the median intake was 1374 mg/day (see Figure 4.22 and Table 4.23). Since there were only a few users of phosphorus supplements (n=123), phosphorus intake including supplements was not calculated.

The intake of phosphorus by boys (1220 mg/day) was higher than the intake by girls (1051 mg/day), and the intake by men (1663 mg/day) was higher than the intake by women (1300 mg/day).
Adults had a higher phosphorus intake than children (1480 and 1135 mg/day, respectively). This was seen in both boys/men and girls/women.

'Dairy (incl. substitutes)' was the major source of phosphorus intake (32%). In addition, 'Bread, cereals, rice, pasta' and 'Meat (incl. substitutes)' contributed 20% and 15% respectively. Other food groups contributed 6% or less.

For phosphorus, reference values are weakly substantiated and there appeared to be no deficiencies in the general population.[22] The Health Council of the Netherlands therefore advises not to use these reference values for evalution of the intake of groups.

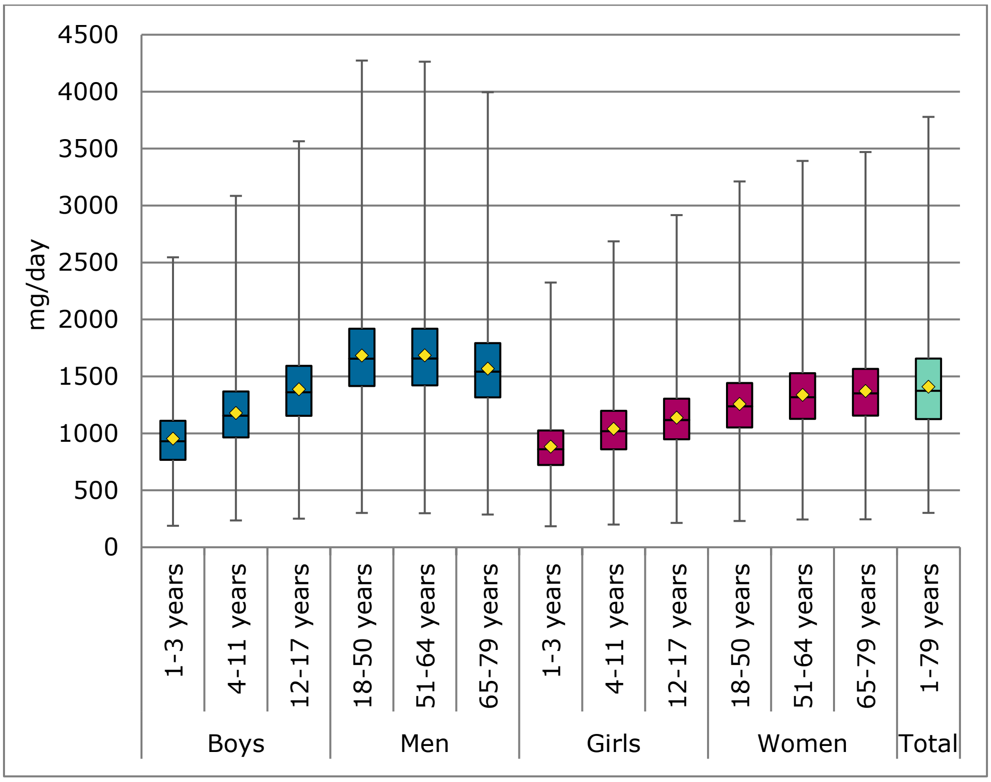


Figure 4.22 Habitual intake distribution of phosphorus (mg/day) from exclusively foods by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 4.23 Habitual intake distribution of phosphorus (mg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	1410 (1388-1426)	823	1125	1374 (1353-1390)	1657	2122
1-17	Children	1823	1135 (1117-1159)	671	907	1103 (1083-1125)	1328	1707
18-79	Adults	1747	1480 (1452-1499)	917	1203	1443 (1416-1461)	1718	2172
1-17	Boys	895	1220 (1198-1264)	709	977	1192 (1169-1237)	1436	1820
1-17	Girls	928	1051 (1021-1071)	646	859	1029 (1000-1050)	1218	1528
18-79	Men	880	1663 (1614-1688)	1096	1397	1635 (1587-1658)	1898	2327
18-79	Women	867	1300 (1277-1326)	849	1088	1279 (1255-1304)	1490	1828
1-3	Boys	353	954 (922-979)	579	767	930 (898-956)	1111	1435
1-3	Girls	350	884 (857-919)	538	722	860 (837-899)	1025	1299
4-11	Boys	270	1180 (1152-1232)	729	964	1156 (1126-1206)	1368	1717
4-11	Girls	278	1040 (1001-1065)	661	860	1019 (981-1044)	1198	1488
12-17	Boys	272	1387 (1362-1443)	903	1154	1360 (1335-1416)	1592	1973
12-17	Girls	300	1138 (1095-1168)	734	948	1117 (1075-1147)	1305	1612
18-50	Men	318	1684 (1614-1718)	1115	1416	1656 (1587-1688)	1919	2354
18-50	Women	284	1259 (1228-1295)	821	1052	1237 (1206-1273)	1442	1770
51-64	Men	251	1685 (1631-1712)	1122	1421	1657 (1604-1682)	1920	2344
51-64	Women	287	1339 (1311-1370)	884	1127	1317 (1289-1348)	1528	1864
65-79	Men	311	1569 (1529-1628)	1028	1316	1542 (1502-1599)	1792	2203
65-79	Women	296	1372 (1330-1405)	911	1156	1351 (1309-1382)	1566	1904

4.4.7 *Potassium*

The average habitual intake of potassium from exclusively foods was 3042 mg/day and the median intake was 2978 mg/day (see Figure 4.23 and Table 4.24). Since there were only a few users of potassium supplements (n=55), potassium intake from dietary supplements was not taken into account.

The intake of potassium by boys (2514 mg/day) was higher than the intake by girls (2178 mg/day), and the intake by men (3565 mg/day) was higher than the intake by women (2876 mg/day).
Adults had a higher intake of potassium than children (3219 and 2345 mg/day, respectively). This was seen in both boys/men and girls/women.

Several food groups were relevant sources of potassium intake: 'Dairy (incl. substitutes)' (17%), 'Vegetables' (13%) and 12% for each of the food groups 'Meat (incl. substitutes)', 'Non-alcoholic beverages', 'Fruits, nuts, olives' and 'Bread, cereals, rice, pasta'. The other food groups contributed 8% or less to the potassium intake.

For children aged 1-9 and men aged 51-79, the median potassium intake seemed adequate with median intakes above the AI. For children aged 10-17, men aged 18-50 and women aged 18-79, no statement could be made about the adequacy of the intake of potassium, because the median intake was below the AI.

Thus, for a large part of the population no statement can be made about the adequacy of potassium intake. Based on urinary excretion studies among adults living in the northern part of the Netherlands[61], potassium intake appeared to be adequate. For children, more research about the nutritional intake and status of potassium could be performed.

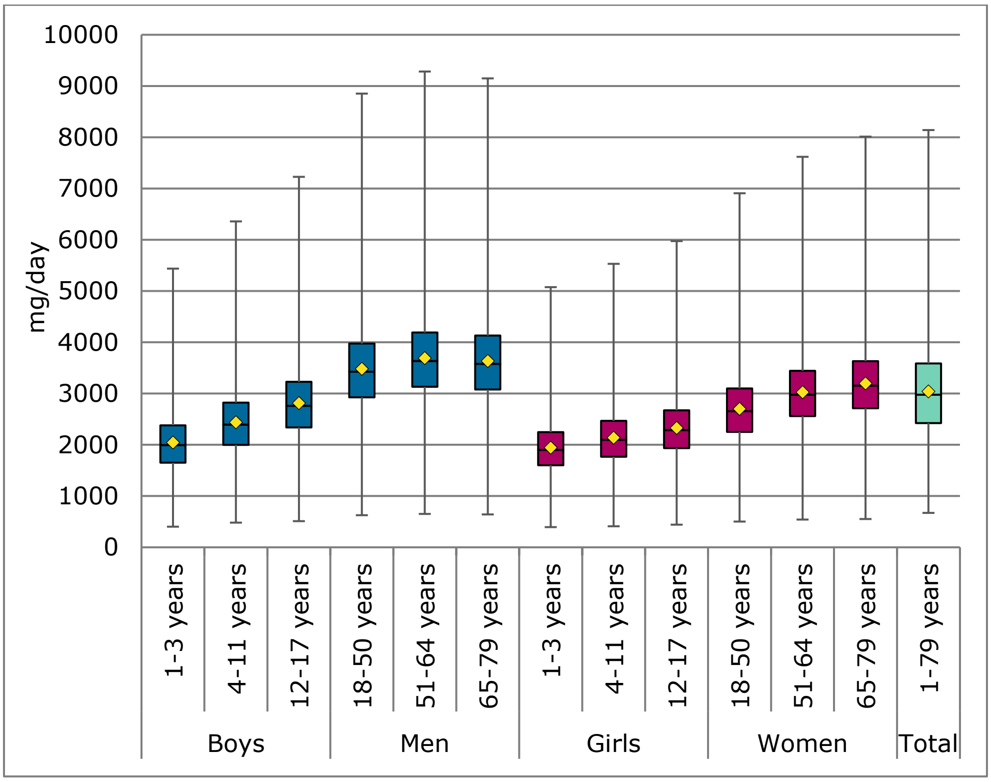


Figure 4.23 Habitual intake distribution of potassium (mg/day) from exclusively foods by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 4.24 Habitual intake distribution of potassium (mg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	AI	P50 related to AI	Evaluation EAR/AI
1-79	Total	3570	3042 (2998-3080)	1752	2423	2978 (2929-3014)	3587	4554			
1-17	Children	1823	2345 (2303-2380)	1413	1888	2284 (2241-2315)	2734	3490			
18-79	Adults	1747	3219 (3168-3267)	2001	2637	3154 (3099-3197)	3730	4667			
1-17	Boys	895	2514 (2448-2567)	1496	2031	2460 (2391-2510)	2943	3711			
1-17	Girls	928	2178 (2130-2224)	1359	1790	2134 (2087-2180)	2516	3143			
18-79	Men	880	3565 (3498-3643)	2359	3005	3510 (3441-3586)	4062	4963			
18-79	Women	867	2876 (2810-2925)	1851	2393	2828 (2756-2879)	3306	4069			
1-3	Boys	353	2045 (1998-2137)	1248	1651	1995 (1950-2091)	2381	3057	1400; 1800[a]	P50>AI	Seems adequate
1-3	Girls	350	1946 (1881-2013)	1207	1601	1900 (1840-1973)	2247	2829	1400;-1800[a]	P50>AI	Seems adequate
4-11	Boys	270	2440 (2366-2488)	1517	1998	2395 (2315-2435)	2824	3534	1800; 2000; 3300[a]	4-9 yr: P50>AI; 10-11 yr: P50<AI	4-9 yr: seems adequate; 10-11 yr: no statement
4-11	Girls	278	2140 (2087-2195)	1357	1767	2096 (2046-2152)	2467	3063	1800; 2000; 2900[a]	4-9 yr: P50>AI; 10-11 yr: P50<AI	4-9 yr: seems adequate; 10-11 yr: no statement
12-17	Boys	272	2813 (2706-2898)	1830	2340	2761 (2654-2844)	3228	4000	3300; 3500[a]	P50<AI	No statement

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	AI	P50 related to AI	Evaluation EAR/AI
12-17	Girls	300	2329 (2247-2400)	1494	1935	2287 (2205-2357)	2673	3302	2900; 3100[a]	P50<AI	No statement
18-50	Men	318	3483 (3403-3583)	2298	2925	3426 (3347-3524)	3974	4878	3500	P50<AI	No statement
18-50	Women	284	2700 (2606-2773)	1749	2252	2656 (2559-2728)	3100	3808	3500	P50<AI	No statement
51-64	Men	251	3692 (3608-3805)	2480	3132	3635 (3551-3746)	4191	5092	3500	P50>AI	Seems adequate
51-64	Women	287	3025 (2947-3078)	2019	2560	2978 (2901-3033)	3443	4175	3500	P50<AI	No statement
65-79	Men	311	3636 (3519-3710)	2437	3079	3579 (3461-3653)	4130	5019	3500	P50>AI	Seems adequate
65-79	Women	296	3197 (3111-3283)	2161	2713	3154 (3066-3235)	3632	4381	3500	P50<AI	No statement

[a] AI 1 year=1400 mg, 2-5 years=1800 mg, 6-9 years=2000 mg, boys 10-13 years=3300 mg, girls 10-13 years=2900 mg, boys 14-17 years=3500 mg, girls 14-17 years=3100 mg.

4.4.8 Selenium

The average habitual selenium intake from foods and dietary supplements was 53 µg/day and the median intake was 47 µg/day (see Figure 4.24 and Table 4.25). This difference between average and median intake can mainly be explained by use of dietary supplements. The average selenium intake from exclusively foods was 46 µg/day (see Appendix B).

The intake of selenium by boys (39 µg/day) was higher than the intake by girls (33 µg/day) and the intake by men (63 µg/day) was higher than the intake by women (53 µg/day).
Adults had a higher intake of selenium than children (58 and 36 µg/day, respectively). This was seen in both boys/men and girls/women.

On average, the most important sources of selenium were 'Meat (incl. substitutes)' (24%), 'Bread, cereals, rice, pasta' (17%), and 'Dairy (incl. substitutes)' (16%). The other food groups contributed 9% or less. Dietary supplements contributed on average 8% to the intake of selenium (see section 4.6).

For selenium, reference values are weakly substantiated and there appeared to be no deficiencies in the general population.[22] The Health Council of the Netherlands therefore advises not to use these reference values for evalution of the intake of groups. In this survey high intakes (intakes above the UL) were hardly observed. Thus, it is advised to gain more insight into the selenium requirements to be able to evaluate the intakes to the dietary reference values.

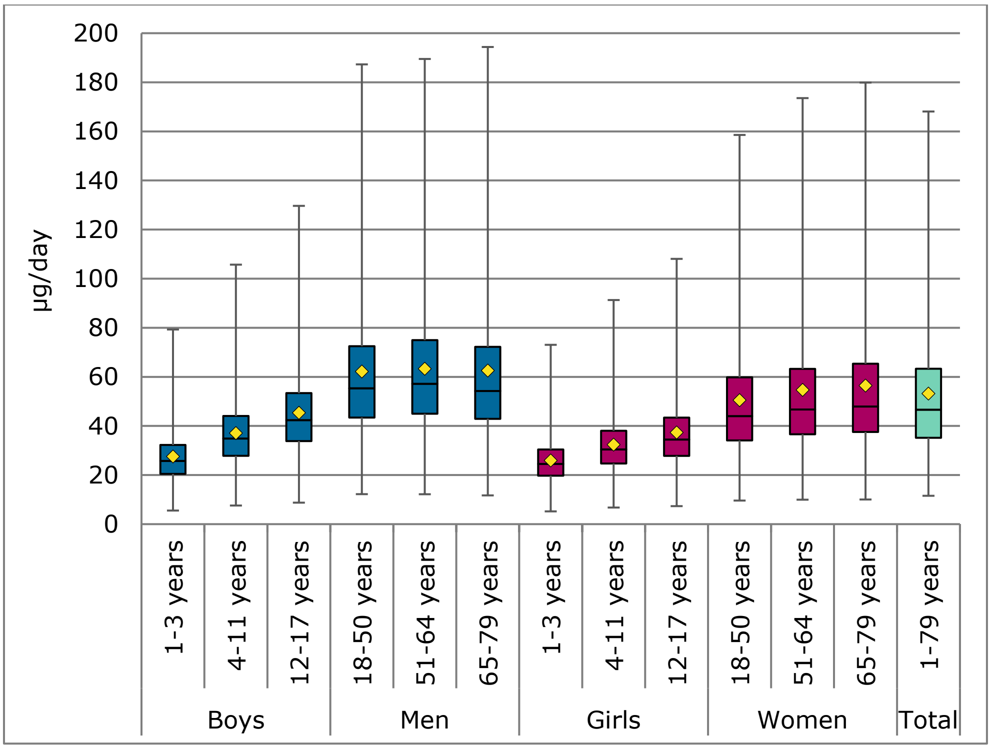


Figure 4.24 Habitual intake distribution of selenium (µg/day) from foods and dietary supplements by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 4.25 Habitual intake distribution of selenium (µg/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	UL	% (95%-CI) ≥UL	Evaluation UL
1-79	Total	3570	53 (52-55)	24	35	47 (46-48)	63	105			
1-17	Children	1823	36 (35-37)	18	26	33 (32-34)	43	63			
18-79	Adults	1747	58 (56-59)	28	39	51 (49-52)	68	111			
1-17	Boys	895	39 (38-40)	19	28	36 (35-37)	46	67			
1-17	Girls	928	33 (32-34)	18	25	31 (29-32)	39	57			
18-79	Men	880	63 (59-65)	32	44	56 (54-57)	73	116			
18-79	Women	867	53 (50-55)	25	35	45 (44-47)	62	105			
1-3	Boys	353	28 (27-29)	15	20	26 (25-27)	32	47	60	1.1 (0.3-2.0)	Tolerable intakes
1-3	Girls	350	26 (25-28)	15	20	25 (24-26)	30	43	60	0.4 (0.1-1.3)	Tolerable intakes
4-11	Boys	270	37 (36-39)	20	28	35 (34-36)	44	62	90; 130; 200[a]	4-6 yr: 0.1 (0.0-0.3); 7-10 yr: 0.0 (0.0-0.1); 11 yr: 0.0 (0.0-0.0)	Tolerable intakes
4-11	Girls	278	32 (30-33)	18	25	30 (29-31)	38	53	90; 130; 200[a]	4-6 yr: 0.0 (0.0-0.2); 7-11 yr: 0.0 (0.0-0.0)	Tolerable intakes
12-17	Boys	272	45 (44-48)	25	34	42 (41-44)	53	76	200; 250[a]	0.0 (0.0-0.0)	Tolerable intakes
12-17	Girls	300	37 (35-39)	20	28	34 (32-36)	43	65	200; 250[a]	0.0 (0.0-0.0)	Tolerable intakes
18-50	Men	318	62 (57-66)	31	43	55 (53-58)	72	115	300	0.0 (0.0-0.1)	Tolerable intakes
18-50	Women	284	50 (47-53)	25	34	44 (42-46)	60	99	300	0.0 (0.0-0.0)	Tolerable intakes
51-64	Men	251	63 (61-67)	33	45	57 (55-60)	75	115	300	0.0 (0.0-0.0)	Tolerable intakes
51-64	Women	287	55 (51-59)	27	37	47 (45-50)	63	110	300	0.0 (0.0-0.0)	Tolerable intakes
65-79	Men	311	63 (59-67)	31	43	54 (52-57)	72	122	300	0.0 (0.0-0.1)	Tolerable intakes
65-79	Women	296	56 (52-60)	28	38	48 (45-50)	65	115	300	0.0 (0.0-0.0)	Tolerable intakes

[a] UL 4-6 years=90 µg, 7-10 years=130 µg, 11-14 years=200 µg, 15-17 years=250 µg.

4.4.9 *Sodium*

The total sodium intake from foods and added salt was estimated by means of a statistical model, using several assumptions (see Chapter 2.2.1 and Appendix I). Sodium intake through dietary supplements was considered negligible. With the used method, the estimated intake is considered an indication of total sodium intake and might be underestimated (see also Chapter 5).

The average habitual intake of sodium from foods and added salt was 2643 mg/day and the median intake was 2581 mg/day (see Figure 4.25 and Table 4.26). The average sodium intake from exclusively foods was 2247 mg/day (see Appendix B). Consequently, the contribution of added salt was estimated to be 15%.

The total sodium intake by boys (2257 mg/day) was higher than the intake by girls (1936 mg/day), and the average intake by men (3126 mg/day) was higher than the intake by women (2444 mg/day). When looking at the intake of sodium from exclusively foods, the average intake by boys (2013 mg/day) did not differ significantly from the intake by girls (1731 mg/day).
Adults had a higher total sodium intake than children (2783 and 2096 mg/day, respectively). This was seen in both boys/men and girls/women.

On average, the most important sources of sodium from exclusively foods were 'Bread, cereals, rice, pasta' (25%), 'Meat (incl. substitutes)' (20%), 'Dairy (incl. substitutes)' (17%) and 'Sauces and seasonings' (10%). The other food groups contributed 5% or less (see section 4.6).

The prevalence of sodium intake above the guideline was high for all population groups, ranging from 34% (9-11 year-old girls) to 85% (18-50 year-old men). The sodium intake from exclusively foods was still high for all population groups, ranging from 22% (9-11 year-old girls) to 67% (18-50 year-old men).

Thus, based on these results and taking into account that these sodium intakes might be underestimated, the sodium intake seems to be too high in all population groups. High sodium intake is associated with high blood pressure, and can lead to cardiovascular diseases.[5] We therefore recommend policy measures for reducing salt intake added during food preparation or at the table, and by food reformulation. We recommend carrying out studies on sodium excretion in urine for further monitoring sodium intake and to monitor the effectiveness of initiatives for salt reductions.

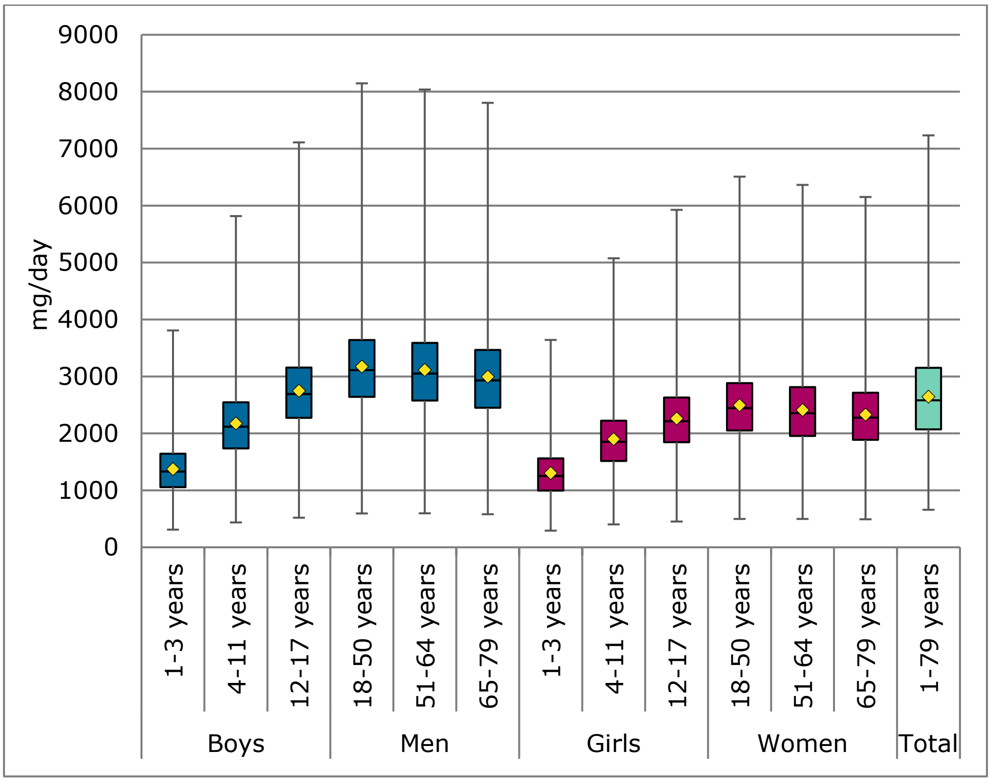


Figure 4.25 Habitual intake distribution of sodium (mg/day) from foods and added salt by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 4.26 Habitual intake distribution of sodium (mg/day) from foods and added salt by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	Guide-line	% (95%-CI)≥Guideline	Evaluation guideline
1-79	Total	3570	2643 (2614-2683)	1412	2071	2581 (2547-2622)	3152	4082			
1-17	Children	1823	2096 (2062-2135)	1021	1580	2036 (2008-2079)	2549	3370			
18-79	Adults	1747	2783 (2749-2828)	1637	2223	2709 (2672-2757)	3265	4175			
1-17	Boys	895	2257 (2195-2308)	1072	1697	2214 (2156-2268)	2751	3583			
1-17	Girls	928	1936 (1903-1990)	980	1488	1895 (1857-1951)	2332	3032			
18-79	Men	880	3126 (3079-3198)	1990	2589	3065 (3021-3130)	3597	4463			
18-79	Women	867	2444 (2384-2494)	1493	1993	2391 (2332-2441)	2837	3576			
1-3	Boys	353	1374 (1345-1441)	747	1057	1331 (1300-1393)	1645	2163	1200	62.1 (59.3-67.2)	High intakes
1-3	Girls	350	1303 (1277-1343)	703	996	1253 (1230-1298)	1561	2080	1200	55.6 (52.9-59.2)	High intakes
4-11	Boys	270	2175 (2119-2237)	1300	1737	2118 (2065-2175)	2545	3271	1800;2400[a]	4-8 yr: 62.3 (59.3-67.0); 9-11 yr: 62.0 (56.4-65.1)	High intakes
4-11	Girls	278	1899 (1859-1973)	1114	1516	1853 (1805-1923)	2224	2852	1800;2400[a]	4-8 yr: 46.8 (43.0-53.1); 9-11 yr: 34.0 (30.5-38.3)	High intakes
12-17	Boys	272	2750 (2634-2808)	1754	2274	2691 (2580-2749)	3157	3953	2400	62.0 (56.4-65.1)	High intakes
12-17	Girls	300	2262 (2201-2331)	1393	1845	2213 (2148-2281)	2631	3295	2400	34.0 (30.5-38.3)	High intakes

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	Guide-line	% (95%-CI)≥Guideline	Evaluation guideline
18-50	Men	318	3174 (3096-3265)	2047	2641	3113 (3038-3196)	3641	4506	2400	85.3 (82.8-87.8)	High intakes
18-50	Women	284	2497 (2409-2571)	1553	2051	2446 (2358-2516)	2883	3625	2400	52.9 (47.2-57.6)	High intakes
51-64	Men	251	3115 (3073-3216)	1979	2576	3053 (3012-3153)	3590	4449	2400	82.7 (80.9-86.8)	High intakes
51-64	Women	287	2412 (2342-2478)	1457	1955	2355 (2288-2427)	2813	3550	2400	47.2 (43.0-51.6)	High intakes
65-79	Men	311	2995 (2911-3096)	1870	2450	2932 (2847-3032)	3464	4340	2400	77.3 (74.1-82.3)	High intakes
65-79	Women	296	2329 (2245-2412)	1396	1888	2278 (2193-2360)	2715	3436	2400	42.3 (36.7-47.5)	High intakes

[a] UL 1-3 years=1200 mg, 4-8 years=1800 mg, 9+ years=2400 mg.

4.4.10 *Zinc*

The average habitual zinc intake from foods and dietary supplements was 11.4 mg/day and the median intake was 10.3 mg/day (see Figure 4.26 and Table 4.27). The average zinc intake from exclusively foods was 9.8 mg/day (see Appendix B).

The intake of zinc by boys (9.0 mg/day) was higher than the intake by girls (7.6 mg/day), and the intake by men (13.4 mg/day) was higher than the intake by women (11.1 mg/day).
Adults had a higher intake of zinc than children (12.2 and 8.3 mg/day, respectively). This was seen in both boys/men and girls/women.

On average, the most important sources of zinc were 'Meat (incl. substitutes)' (23%), 'Dairy (incl. substitutes)' (22%) and 'Bread, cereals, rice, pasta' (20%). The other food groups contributed 9% or less. Dietary supplements contributed on average 9% to the intake of selenium (see section 4.6).

For children aged 1-9, the median zinc intake was equal to or above the AI. This indicates that intake seemed adequate. For children aged 10-13, the median zinc intake was below the AI. Therefore, no statement about the prevalence of inadequacy could be made for this age group.
For adolescents aged 14-17 and adults aged 18-79 zinc intake was considered adequate, since the prevalence of intake below the EAR was below 4% in all age-gender groups.

In boys aged 1-10 and girls aged 1-6, high intake levels of zinc were observed. The proportion that exceeded the UL was highest among 1-3 year-olds (38% of boys and 27% of girls). High intake levels of zinc were also observed in men aged 18-79 and women aged 51-64, where the highest proportion was 4.9%. In boys aged 11-17, girls aged 7-17 and women aged 18-50 and aged 65-79, levels of zinc intake were assumed to be tolerable. Without the intake of dietary supplements, 1-10 year-old boys and 1-6 year-old girls still had high intakes of zinc.

Thus, zinc intake is adequate for most population groups. No statement about the adequacy of zinc intake could be made about 10-13 year-old boys and girls. High intake was also observed, with the highest prevalence in young children. The percentage with a low or high intake is calculated with the SPADE calculation model. However, failure to meet all assumptions in the SPADE modelling might have influenced these percentages. This impact is further investigated within RIVM. For further insights, nutritional status research for children and assessing the prevalence of clinical signs associated with high zinc intake is advised, since it is unclear if health problems are associated with current high intake.

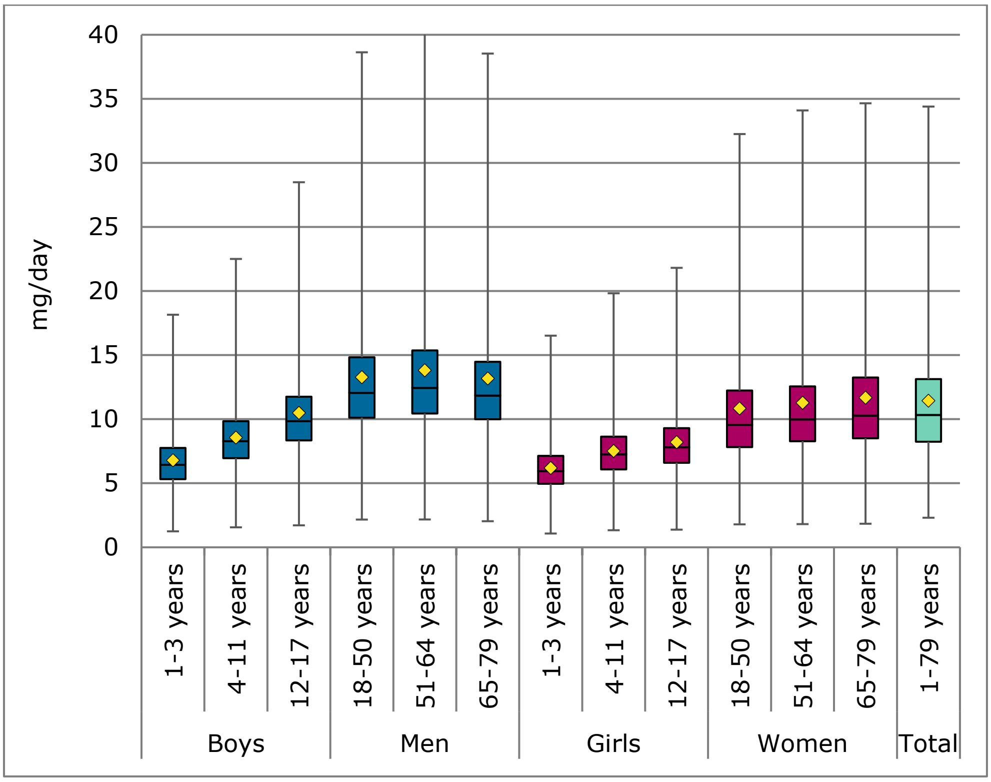


Figure 4.26 Habitual intake distribution of zinc (mg/day) from foods and dietary supplements by the Dutch population (DNFCS 2019-2021), stratified by age-gender, weighted for socio-demographic characteristics, season and day of the week (n=3570).

Table 4.27 Habitual intake distribution of zinc (mg/day) from foods and dietary supplements by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI) <EAR	AI	P50 related to AI	Evaluation EAR/AI	UL	% (95%-CI)≥UL	Evaluation UL
1-79	Total	3570	11.4 (11.2-11.7)	5.9	8.2	10.3 (10.2-10.5)	13.1	21.3								
1-17	Children	1823	8.3 (8.1-8.5)	4.8	6.4	7.8 (7.7-8.0)	9.6	13.0								
18-79	Adults	1747	12.2 (12.0-12.5)	6.7	9.0	11.0 (10.8-11.2)	13.9	22.5								
1-17	Boys	895	9.0 (8.7-9.3)	5.1	7.0	8.5 (8.3-8.8)	10.4	14.1								
1-17	Girls	928	7.6 (7.3-7.8)	4.6	6.0	7.2 (7.0-7.4)	8.7	11.5								
18-79	Men	880	13.4 (13.0-13.8)	8.0	10.2	12.1 (11.8-12.4)	14.9	24.1								
18-79	Women	867	11.1 (10.7-11.5)	6.2	8.1	9.8 (9.6-10.1)	12.5	20.7								
1-3	Boys	353	6.8 (6.5-6.9)	4.1	5.3	6.4 (6.2-6.6)	7.8	10.4			5; 6[a]	P50>AI	Seems adequate	7	38.4 (33.1-41.5)	High intakes
1-3	Girls	350	6.2 (6.0-6.4)	3.9	5.0	5.9 (5.7-6.2)	7.1	9.4			5; 6[a]	P50>AI	Seems adequate	7	27.5 (22.3-31.3)	High intakes
4-11	Boys	270	8.6 (8.3-8.9)	5.4	7.0	8.3 (8.0-8.6)	9.8	12.7			6; 7; 11[a]	4-9 yr: P50>AI; 10-11 yr: P50<AI	4-9 yr: seems adequate; 10-11 yr: no statement	10; 13; 18[b]	4-6 yr: 15.1 (11.4-19.3); 7-10 yr: 5.1 (2.9-8.0); 11 yr: 1.9 (0.0-5.0)	4-10 yr: high intakes; 11 yr: tolerable intakes

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI) <EAR	AI	P50 related to AI	Evalu-ation EAR/AI	UL	% (95%-CI)≥UL	Evalu-ation UL
4-11	Girls	278	7.5 (7.2-7.8)	4.7	6.1	7.2 (7.0-7.4)	8.6	11.2			6; 7; 8[a]	4-9 yr: P50>AI; 10-11 yr: P50<AI	4-9 yr: seems adequate; 10-11 yr: no statement	10; 13; 18[b]	4-6 yr: 10.1 (5.9-13.7); 7-10 yr: 1.3 (0.1-3.1); 11 yr: 0.5 (0.0-1.7)	4-6 yr: high intakes; 7-11 yr: tolerable intakes
12-17	Boys	272	10.5 (10.0-11.0)	6.6	8.3	9.8 (9.5-10.2)	11.8	16.7	6[c]	14-17 yr: 1.7 (0.9-2.9)	11[a]	12-13 yr: P50<AI	12-13 yr: no statement; 14-17 yr: adequate intakes	18; 22[b]	12-14 yr: 1.9 (0.0-5.0); 15-17 yr: 2.2 (0.0-3.3)	Tolerable intakes
12-17	Girls	300	8.2 (7.9-8.5)	5.2	6.6	7.8 (7.5-8.0)	9.3	12.5	5[c]	14-17 yr: 3.1 (1.6-4.7)	8[a]	12-13 yr: P50<AI	12-13 yr: no statement; 14-17 yr: adequate intakes	18; 22[b]	12-14 yr: 0.5 (0.0-1.7); 15-17 yr: 0.3 (0.0-1.2)	Tolerable intakes
18-50	Men	318	13.3 (12.7-13.9)	8.0	10.1	12.1 (11.7-12.5)	14.8	23.8	6.4	0.6 (0.3-0.9)			Adequate intakes	25	4.0 (1.8-5.8)	High intakes
18-50	Women	284	10.8 (10.3-11.5)	6.0	7.8	9.6 (9.2-10.0)	12.2	20.0	5.7	3.2 (1.8-4.3)			Adequate intakes	25	2.2 (0.6-3.7)	Tolerable intakes
51-64	Men	251	13.8 (13.2-14.5)	8.3	10.4	12.4 (12.1-12.8)	15.4	24.8	6.4	0.4 (0.1-0.6)			Adequate intakes	25	4.9 (2.8-7.2)	High intakes
51-64	Women	287	11.3 (10.8-11.9)	6.5	8.3	10.0 (9.7-10.3)	12.6	21.5	5.7	1.5 (0.7-2.3)			Adequate intakes	25	2.6 (1.1-4.3)	High intakes
65-79	Men	311	13.2 (12.5-13.8)	8.0	10.0	11.8 (11.4-12.2)	14.5	24.1	6.4	0.6 (0.2-1.1)			Adequate intakes	25	4.3 (2.3-6.3)	High intakes
65-79	Women	296	11.7 (11.0-12.2)	6.7	8.5	10.3 (9.8-10.6)	13.3	21.4	5.7	1.1 (0.4-1.9)			Adequate intakes	25	2.1 (0.7-3.3)	Tolerable intakes

[a] AI 1 year=5 mg, 2-5 years=6 mg, 6-9 years=7 mg, boys 10-13 years=11 mg, girls 10-13 years=8 mg.
[b] UL 4-6 years=10 mg, 7-10 years=13 mg, 11-14 years=18 mg, 15-17 years=22 mg.
[c] EAR boys 14-17 years=6 mg, girls 14-17 years=5 mg.

4.5 Evaluation of micronutrient intake

Table 4.28 summarises the evaluation of the intake of micronutrients with the Dutch dietary reference values.

Table 4.28 Summary of the evaluation of the intake of micronutrients with the Dutch dietary reference values by the Dutch population aged 1-79 (DNFCS 2019-2021)[a].

Evaluation	Boys	Girls	Men	Women
Adequate intakes	Vitamin A (RAE; 1-13 yr)	Vitamin A (RAE; 1-9 yr)		
	Vitamin B_1 (1-13 yr)	Vitamin B_1 (1-13 yr)	Vitamin B_1 (g/MJ)	Vitamin B_1 (g/MJ)
	Vitamin B_2 (1-13 yr)	Vitamin B_2		
	Vitamin B_3	Vitamin B_3	Vitamin B_3 (g/MJ)	Vitamin B_3 (g/MJ)
	Vitamin B_6	Vitamin B_6 (1-13 yr)	Vitamin B_6 (18-50 yr)	
	Folate (DFE; 1-13 yr)	Folate (DFE; 1-13 yr)	Folate (DFE)	
	Vitamin B_{12}	Vitamin B_{12}	Vitamin B_{12}	Vitamin B_{12}
	Vitamin C (1-13 yr)	Vitamin C (1-13 yr)		Vitamin C (51-79 yr)
	Vitamin D[b] (1-3 yr)	Vitamin D[b] (1-3 yr)		
	Vitamin K_1 (1-14 yr)	Vitamin K_1 (1-14 yr)	Vitamin K_1	Vitamin K_1
	Calcium (1-8 yr)	Calcium (1-8 yr)		
	Copper	Copper	Copper	Copper
	Iron (14-17 yr)		Iron	Iron (51-79 yr)
	Iodine	Iodine	Iodine	Iodine
	Magnesium (1-13)	Magnesium (1-9 yr)	Magnesium	Magnesium
	Potassium (1-9 yr)	Potassium (1-9 yr)	Potassium (51-79 yr)	
	Zinc (1-9 yr; 14-17 yr)	Zinc (1-9 yr; 14-17 yr)	Zinc	Zinc
Low intakes	Vitamin A (RAE; 14-17 yr)	Vitamin A (RAE; 14-17 yr)	Vitamin A (RAE)	Vitamin A (RAE)
			Vitamin B_2	Vitamin B_2
			Vitamin B_6 (51-79 yr)	Vitamin B_6
				Folate (DFE)
	Vitamin C (14-17 yr)	Vitamin C (14-17 yr)	Vitamin C	Vitamin C (18-50 yr)
			Vitamin D (70-79 yr)	Vitamin D (70-79 yr)
			Calcium (18-69 yr)	Calcium (18-49 yr)
		Iron (14-17 yr)		Iron (18-50 yr)

Evaluation	Boys	Girls	Men	Women
No statement		Vitamin A (RAE; 10-13 yr)		
	Vitamin B_1 (14-17 yr)	Vitamin B_1 (14-17 yr)		
	Vitamin B_2 (14-17 yr)			
		Vitamin B_6 (14-17 yr)		
	Folate (DFE; 14-17 yr)	Folate (DFE; 14-17 yr)		
	Vitamin D[b] (4-17 yr)	Vitamin D[b] (4-17 yr)	Vitamin D[b] (18-69 yr)	Vitamin D[b] (18-69 yr)
	Vitamin K_1 (15-17 yr)	Vitamin K_1 (15-17 yr)		
	Calcium (9-17 yr)	Calcium (9-17 yr)	Calcium (70-79 yr)	Calcium (50-79 yr)
	Iron (1-13 yr)	Iron (1-13 yr)		
	Magnesium (14-17 yr)	Magnesium (10-17 yr)		
	Potassium (10-17 yr)	Potassium (10-17 yr)	Potassium (18-50 yr)	Potassium
	Zinc (10-13 yr)	Zinc (10-13 yr)		
High intakes	Retinol (1-6 yr)	Retinol (1-3 yr)		Retinol (51-79 yr)
	Iodine (1-6 yr)	Iodine (1-3 yr)		
	Copper (1-3 yr)	Copper (1-3 yr)		
			Magnesium (from supplements, 51-79 yr)	Magnesium (from supplements)
	Sodium	Sodium	Sodium	Sodium
	Zinc (1-10 yr)	Zinc (1-6 yr)	Zinc	Zinc (51-64 yr)

[a] No comparison with dietary reference values was made for vitamin E, phosphorous and selenium, because these reference values are weakly substantiated and there appear to be no deficiencies in the general population.[22]

[b] The Health Council assumes that children and adults without supplementation advice who spend sufficient time outdoors obtain approximately two-thirds of their requirements from exposure of the skin to sunlight and approximately one third through diet. This evaluation was carried out with the standard of 10 µg/day, because sunlight exposure is unknown. Assuming sufficient exposure to sunlight and a light skin color, the intake appears to be sufficient for almost all age-gender groups, except for 12-17 year-olds.

4.6 Sources of micronutrients per food group

The most important sources of each micronutrient are presented in the previous sections. In this section we present the micronutrients for each food group for which it was an important source (at least 10%) and the contribution of dietary supplements (see Figure 4.27 and 4.28 and Appendix C.2 and C.3). Fortified foods were included in the food groups. For sodium and iodine, added salt was not included.

'Dairy (incl. substitutes)', 'Meat (incl. substitutes)' and 'Bread, cereals, rice, pasta' were the most important food sources for many micronutrients. 'Meat (incl. substitutes)' provided almost all haem iron. 'Dairy (incl. substitutes)' provided more than 50% of the calcium intake. 'Vegetables' provided almost two thirds of the intake of vitamin K_1 and had the largest contribution to the intake of vitamin C. 'Bread, cereals, rice, pasta' provided more than one third of the intake of iodine. 'Fats and oils' provided more than 40% of the intake of folic acid and were the major source of vitamin E. 'Dietary supplements' was the most important source of folic acid and vitamin D.

In more detail:

- 'Potatoes' were an important source of vitamin C (10%).
- 'Vegetables' were the major source of vitamin K_1 (65%) and vitamin C (24%). They also contributed to the intake of retinol activity equivalents (19%), folate equivalents (17%), potassium (13%) and non-haem iron (10%).
- 'Fruits, nuts, olives' were an important source of vitamin C (22%) and contributed 10-12% to the intake of vitamin E, vitamin K_1, potassium, copper and magnesium.
- 'Dairy (incl. substitutes)' was the major source of retinol activity equivalents (25%), retinol (34%), vitamin B_2 (38%), vitamin B_{12} (39%), calcium (57%), phosphorus (32%) and potassium (17%). 'Dairy (incl. substitutes)' was also an important source of folate equivalents (12%), iodine (28%), magnesium (14%), sodium (17%), selenium (16%), and zinc (22%).
- 'Bread, cereals, rice, pasta' were the major source for many micronutrients: vitamin B_1 (20%), folate equivalents (20%), total iron (26%), non-haem iron (28%), sodium (25%), copper (24%), magnesium (24%), and iodine (37%). They were also an important source of phosphorus, zinc, selenium and vitamin B_3 (each 17-20%), and of potassium and vitamin B_6 (each 10-12%).
- 'Meat (incl. substitutes)' was the major source of vitamin B_1 (20%), vitamin B_3 (30%), vitamin B_6 (21%), haem iron (96%), selenium (24%), zinc (23%). 'Meat (incl. substitutes)' was also an important source of vitamin B_{12} (26%), vitamin D (18%), sodium (20%), and phosphorus, total iron, potassium, retinol and retinol activity equivalents and vitamin B_2 (each 11-15%).
- 'Fats and oils' were the major source of folic acid (44%), vitamin D (22%), and vitamin E (19%) and were an important source of retinol (22%) and retinol activity equivalents (16%).
- 'Non-alcoholic beverages' were an important source of copper (17%) and contributed 10-13% to the intake of vitamin B_3 , vitamin C, calcium, potassium, and magnesium.

- 'Sauces and seasonings' contributed 10% to the intake of vitamin E and sodium.
- 'Dietary supplements' were the major source of folic acid (45%) and vitamin D (28%). Furthermore, 'Dietary supplements' were an important source of vitamin C (16%) and vitamin B_1, vitamin B_2, vitamin B_3, vitamin B_6, folate equivalents, vitamin B_{12}, and vitamin E (each 10-12%).
- The following food groups contributed less than 10% to all micronutrients: 'Legumes', 'Fish and shellfish', 'Eggs', 'Sugar and confectionery', 'Cakes and sweet biscuits', 'Alcoholic beverages', 'Stocks', 'Miscellaneous' and 'Savoury snacks'. The contribution of 'Stocks' and 'Legumes' to micronutrient intake was the lowest, with 0-1% for all micronutrients. For most of these food groups, the low contribution to micronutrient intake was mainly due to a low consumption frequency (2 days/week or less, see report 1 section 5.3.2).[9] For 'Sugar and confectionery' and 'Cakes and sweet biscuits', it was due to a low nutrient density of foods.

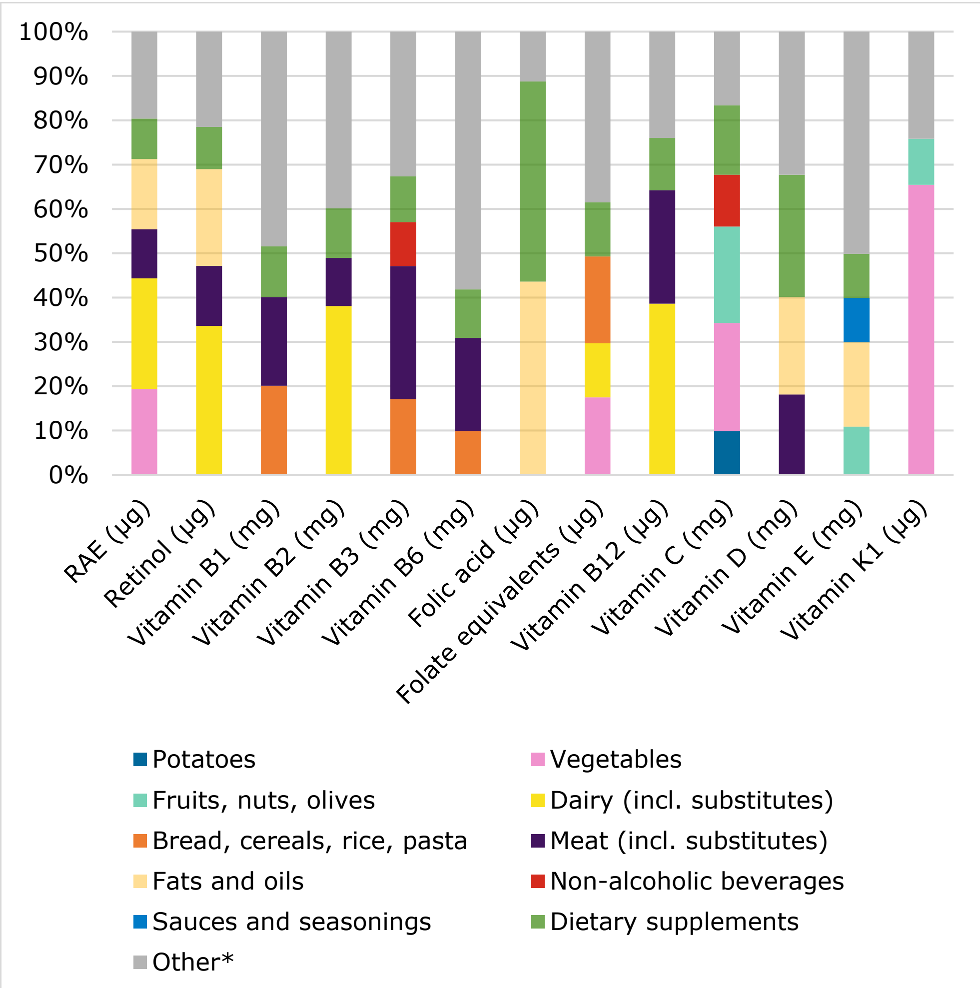


*Figure 4.27 Main sources of vitamins by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570). *All food groups with a contribution of less than 10% are categorised into 'Other' (besides for ''Dietary supplements').*

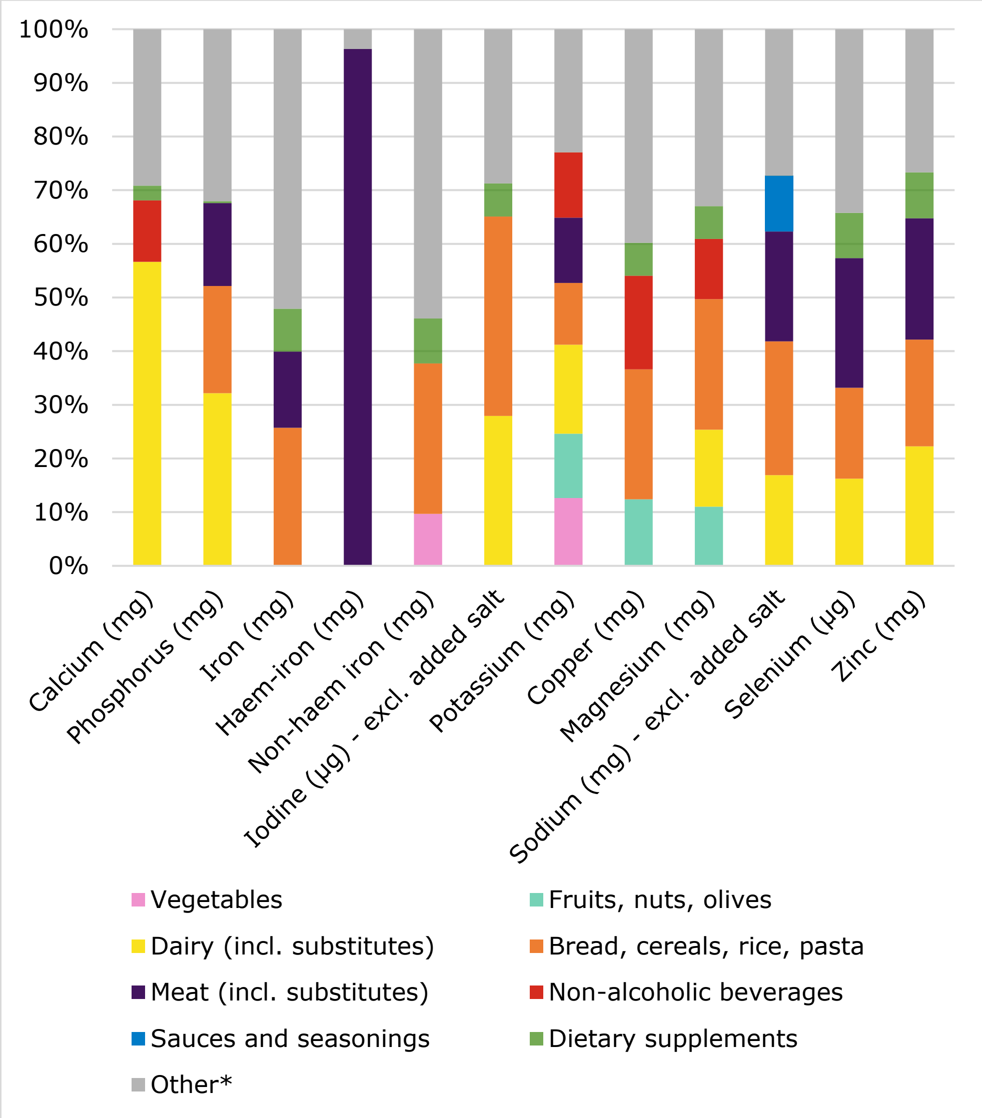


*Figure 4.28 Main sources of minerals by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570). *All food groups with a contribution of less than 10% are categorised into 'Other' (besides for ''Dietary supplements').*.

4.7 Intake of micronutrients by eating occasions and place of consumption

4.7.1 Eating occasions

Figure 4.29 and Appendix D.2 present the food consumption occasions for intake of vitamins and minerals from exclusively foods. Thus, intake from dietary supplements and discretionary salt was not included.

Dinner was the most important consumption moment for most vitamins and minerals. For vitamin K_1 and haem iron, dinner was by far the largest contributor (69% and 61%, respectively). However, for retinol, folic acid and iodine, lunch was the most important eating occasion (33%, 44% and 33%, respectively). Breakfast contributed less than 20% for most micronutrients. For folic acid intake, however, the contribution of breakfast was high (40%) and for retinol, vitamin B_2, calcium and iodine the contribution of breakfast ranged from 21-24%. The consumption in between the three main meals contributed 8-33% to the intake of vitamins and minerals. The contribution was highest (>25%) for vitamin C, calcium, copper, non-haem iron, magnesium and potassium. The intake of calcium was almost equally distributed over the four food consumption occasions.

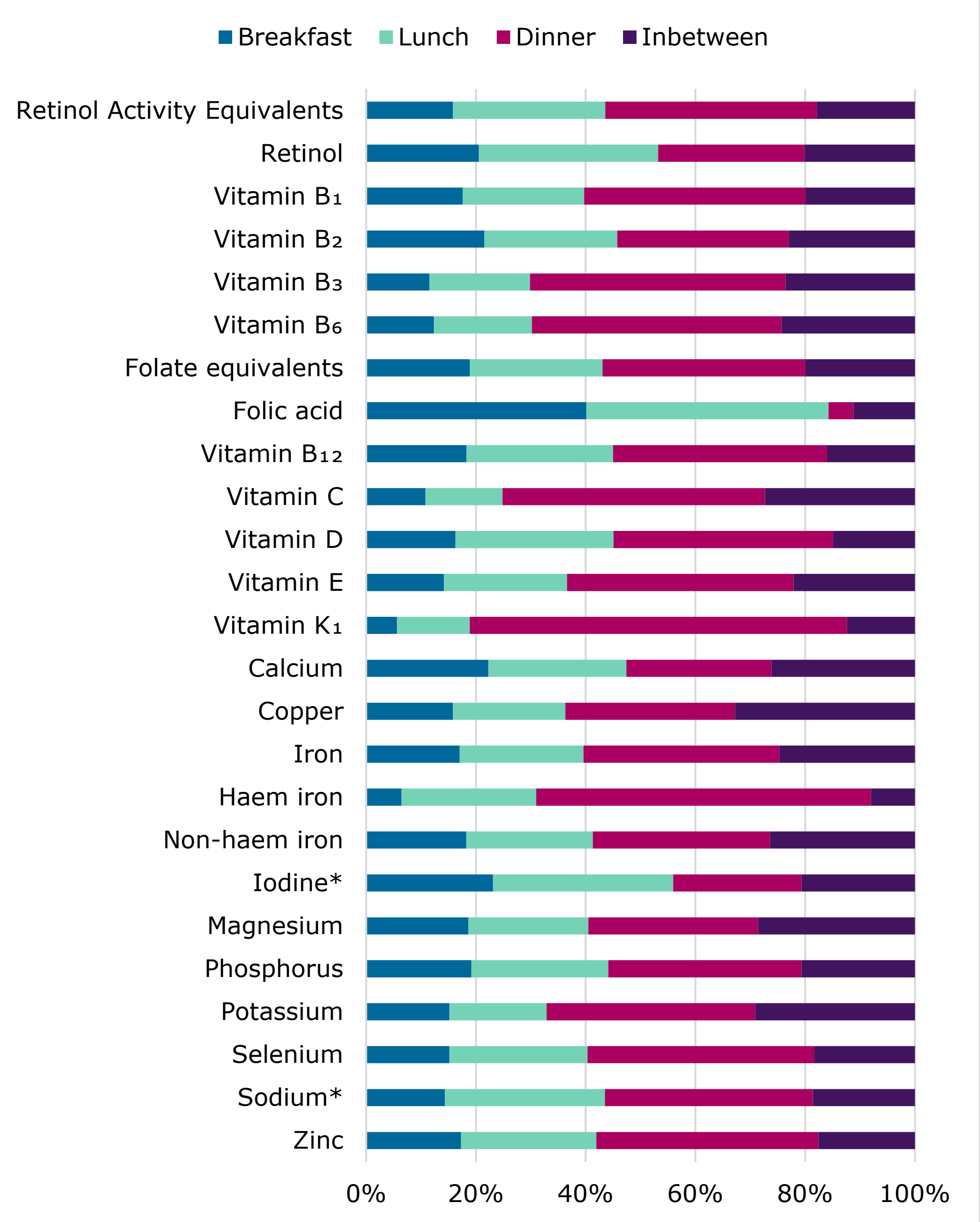


*Figure 4.29 Average contribution of eating occasions to the intake of micronutrients from exclusively foods of the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570). *Excluding added salt.*

4.7.2 *Place of consumption*

Figure 4.30 and Appendix E.2 present the place of consumption for the intake of vitamins and minerals from exclusively foods. Thus, intake from dietary supplements and discretionary salt was not included.

The average contribution of consumption at home (including family, friends and home daycare) to the intake of micronutrients was about 88%. Food consumption at school (including daycare) or work contributed 5-13% to the intake of micronutrients, and was highest for folic acid and iodine (13 and 10%, respectively). The contribution from restaurants (including canteens) ranged from 1% (folic acid) to 4% (haem iron). Eating outside and travelling, and other places contributed 0-2% to micronutrient intake.

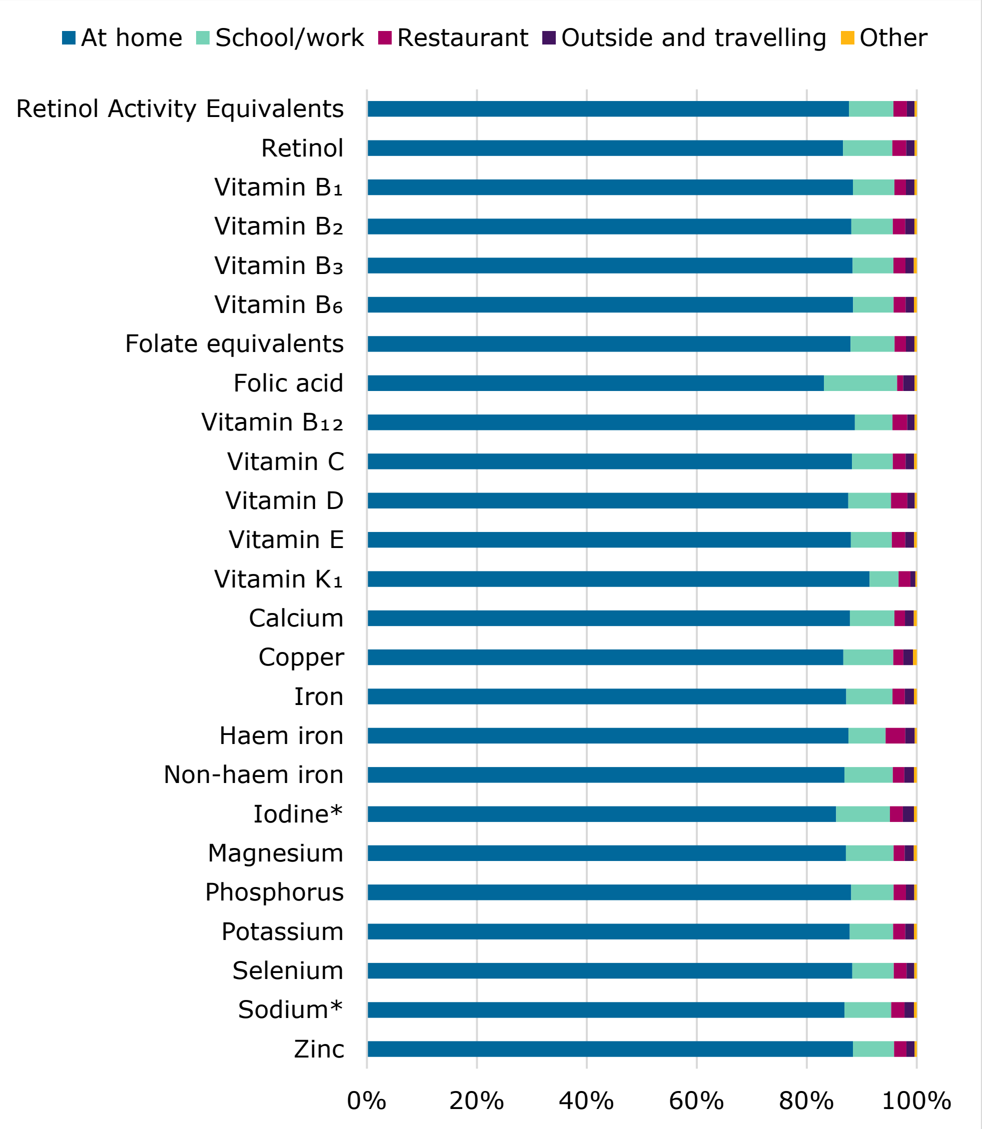


*Figure 4.30 Average contribution of place of consumption to the intake of micronutrients from exclusively foods of the Dutch population aged 1-79 (DNFCS 2019-2021) weighted for socio-demographic characteristics, season and day of the week (n=3570). *Excluding added salt.*

4.8 Differences by education level

Adherence to the Dutch dietary reference values (DRVs) for micronutrients was also studied for each education level of the population. The subgroup analyses focused on those nutrients for which the survey has identified high intakes, low intakes or nutrients for which no statement could be made, see sections 4.3 and 4.4. This consisted for (specific groups of) children and adults with low intakes of iron, vitamin A (RAE) and vitamin C; high intakes of iodine, copper, zinc, magnesium from supplements, sodium, and retinol; and no statement could be made about the adequacy of calcium, iron, magnesium, potassium, zinc, vitamins A, B_1, B_2, B_6, D, K_1 and folate. The mean habitual intake of these micronutrients for each education level are presented in Appendix G.
The mean intake of most micronutrients was nearly the same across education levels for both adults and children (see Appendix G). This included retinol, calcium, iodine, magnesium from supplements only, zinc, vitamins A, B_1, B_2, C, D and K_1. For four micronutrients, educational differences were found (folate, iron, copper and magnesium) among adults, while in these age-gender groups the intake were tolerable and adequate (see section 4.5).

For sodium and potassium, differences in education levels were found for the intake of sodium by children, and for the intake of potassium by girls (no difference in education levels was found in other age-gender groups). For these nutrients and subgroups, high intakes were observed or no statement on the adequacy could be made (see section 4.5). For these nutrients and age-gender groups, the median intakes or percentage of the subgroups with intakes above the upper level by education level are presented in Table 4.29.

Sodium
The mean intake of sodium (including added salts) by children with lower educated parents/caretakers was higher than the intake by children with higher educated parents/caretakers (Appendix G). When looking at the percentage of children exceeding the UL, a similar conclusion can be drawn. More boys and girls with lower educated parents/caretakers exceeded the UL than boys and girls with higher educated parents/caretakers (Table 4.29).

Potassium
The mean intake of potassium by girls with lower educated parents/caretakers was higher than the intake by girls with middle educated parents/caretakers (Appendix G). For 1-9 year-old girls, the intakes seemed adequate (see section 4.4.7), therefore the median intake of only 10-17 year-olds by educational level were analysed. This shows that median intakes by girls with higher educated parents/caretakers were higher than the intake by girls with middle educated. parents/caretakers, but in all cases the intake was below the AI. For girls aged 10-13 with a lower educated parent/caretaker, median intakes were also higher than that of girls with middle educated parents/caretakers.

Table 4.29 Percentage with an intake of sodium above the UL and median habitual intake of potassium, by education level in DNFCS 2019-2021, weighted for socio-demographic characteristics, season and day of the week.

Nutrient	Age	Gender	UL	Lower educated % above UL (95%-CI)	Middle educated % above UL (95%-CI)	Higher educated % above UL (95%-CI)
Sodium (mg/day)	1-3	Boys	1200	83.5 (73.9-83.4)	72.0 (65.7-76.4)	58.7 (51.0-61.0)
Sodium (mg/day)	4-8	Boys	1800	74.5 (69.1-76.1)	69.6 (65.3-76.6)	58.4 (46.3-65.0)
Sodium (mg/day)	9-17	Boys	2400	68.1 (62.7-71.0)	57.8 (57.4-61.5)	62.1 (51.5-65.0)
Sodium (mg/day)	1-3	Girls	1200	75.3 (61.8-77.3)	53.7 (51.2-58.4)	55.9 (52.6-59.5)
Sodium (mg/day)	4-8	Girls	1800	66.9 (67.5-73.9)	50.5 (44.0-54.1)	43.6 (38.9-45.0)
Sodium (mg/day)	9-17	Girls	2400	47.0 (41.3-46.2)	37.2 (33.7-38.1)	29.0 (25.9-32.1)
Nutrient	**Age**	**Gender**	**AI**	**Lower educated P50 (95%-CI)**	**Middle educated P50 (95%-CI)**	**Higher educated P50 (95%-CI)**
Potassium (mg/day)	10-13	Girls	2900	2346 (2190-2506)	2114 (2045-2,188)	2350 (2242-2448)
Potassium (mg/day)	14-17	Girls	2900	2421 (2243-2535)	2182 (2091-2262)	2470 (2349-2559)

4.9 Time trends in micronutrient intake

4.9.1 Introduction

This chapter describes the comparison of the mean intake data on micronutrients and their evaluation with the dietary references values with results from previous surveys conducted in 2007-2010 and 2012-2016.[38, 39] Based on the available age groups in all three surveys, the analyses were performed for 7-69 year-olds. Differences between the surveys are expressed in percentage changes in mean intakes compared to that in previous surveys. Changes of more than 1% decrease or increase on average per year have been assessed as relevant. This equates to a difference of 6% or more between successive surveys and 12% or more between the surveys of 2007-2010 and 2019-2021. These age-specific results may differ slightly from previous chapters, because they are modelled based on data from 7-69 year-olds instead of 1-79 year-olds.

Appendix H shows the mean intake of micronutrients in 2007-2010, in 2012-2016 and 2019-2021. Results are given for the 7-18 and 19-69 year-olds by gender, as well as the total population aged 7-69. The evaluation of the intake in these periods is also shown in Appendix H.

In this section below, only the nutrients with a relevant and statistically significant difference (indicated in the figures with an asterisk (*)) are shown. The most remarkable changes are observed in the intake of vitamin D, sodium and copper and evaluation of vitamins B_2, B_6 and C, and magnesium.

4.9.2 Intake of vitamins

Retinol

The intake of retinol decreased in 7-69 year-olds in the period between 2012-2016 and 2019-2021. Looking at the four age-gender groups, this decrease was only statistically significant and relevant among boys (see Figure 4.31).

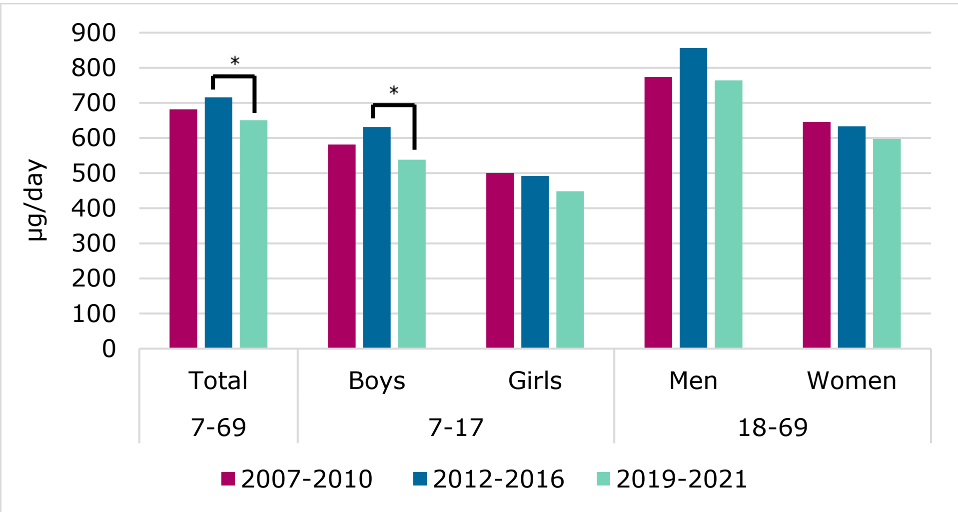


*Figure 4.31 Mean habitual intake of retinol (μg/day) of Dutch children and adults aged 7-69 in DNFCS 2007-2010, DNFCS 2012-2016 and DNFCS 2019-2021, weighted for socio-demographic characteristics, season and day of the week. *=a relevant and statistically significant difference.*

Vitamin B_3
Information on the intake of vitamin B_3 was not available in the DNFCS 2007-2010. The intake decreased in 7-69 year-olds in the period between 2012-2016 and 2019-2021. Looking at the four age-gender groups, this decrease was only statistically significant and relevant among girls, men and women (see Figure 4.32).

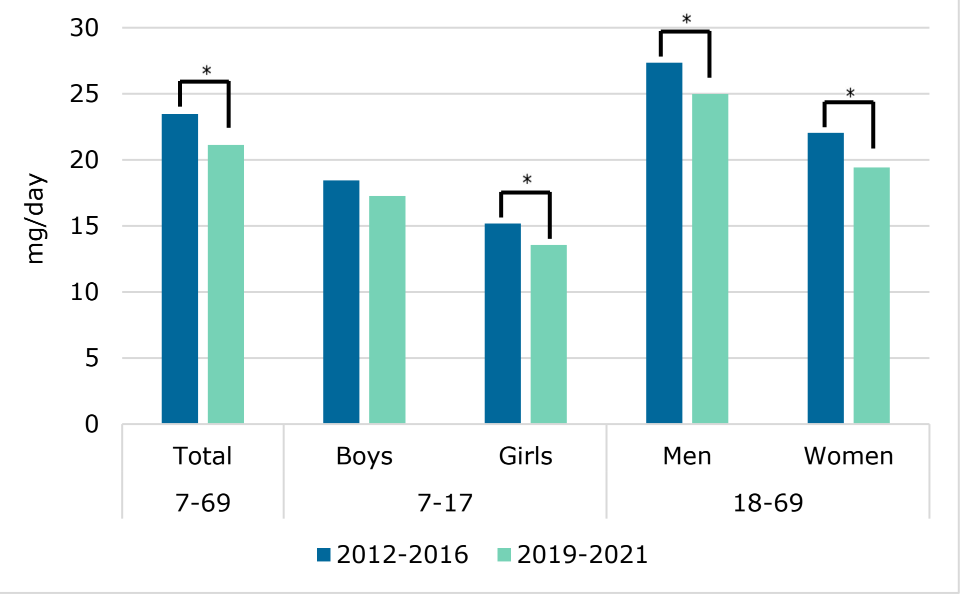


Figure 4.32 Mean habitual intake of vitamin B_3 (mg/day) of Dutch children and adults aged 7-69 in DNFCS 2012-2016 and DNFCS 2019-2021, weighted for socio-demographic characteristics, season and day of the week. Information on vitamin B_3 in 2007-2010 was lacking.
**=a relevant and statistically significant difference.*

Vitamin B_6
Compared to the survey in 2007-2010, the mean habitual intake of vitamin B_6 by 7-69 year-olds has decreased. This was seen in boys, men, girls and women, see Figure . The decrease in the intake in 2019-2021 in comparison to the intake in 2012-2016 was only statistically significant for the total population of 7-69 year-olds but not in the four age-gender groups. In women, the habitual intake in 2012-2016 was higher compared to the other surveys, However, this difference was not statistically significant. This might be explained by a low number of women consuming dietary supplements.

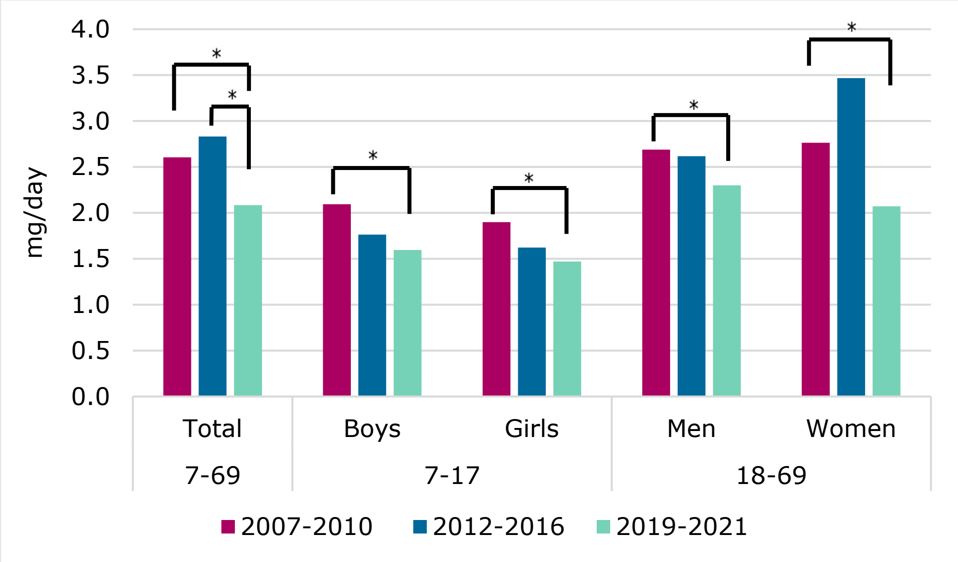


Figure 4.33 Mean habitual intake of vitamin B_6 for Dutch children and adults aged 7-69 in DNFCS 2007-2010, DNFCS 2012-2016 and DNFCS 2019-2021, weighted for socio-demographic characteristics, season and day of the week.
**=a relevant and statistically significant difference.*

Vitamin D
The intake of vitamin D by 7-69 year-olds in 2019-2021 has increased compared to that in the previous survey in 2012-2016. This was observed in boys, girls, men and women. In the period before, between 2007-2010 and 2012-2016, there was also an increase observed in women (see Figure 4.34). In all three surveys no statement could be made about the adequacy of the intake for boys, girls, men and women.

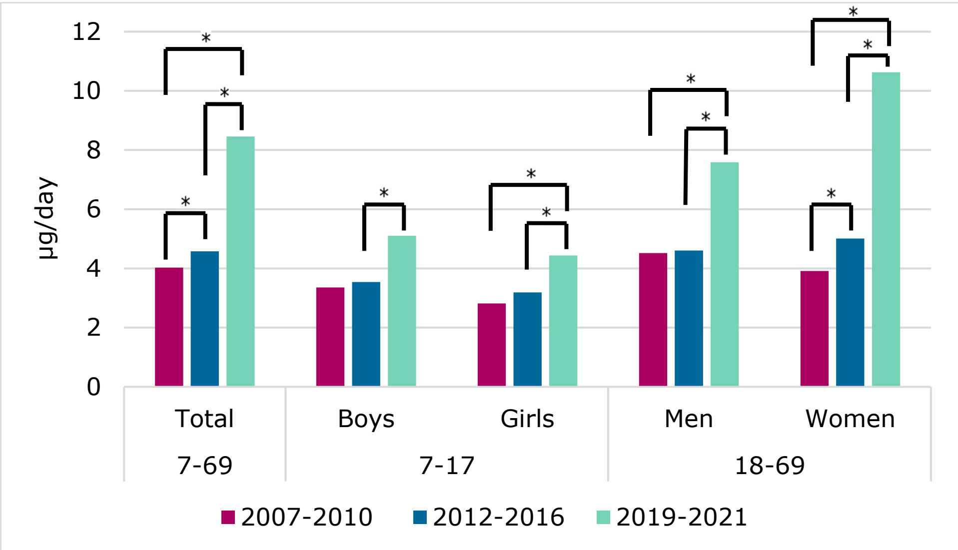


Figure 4.34 Mean habitual intake of vitamin D for Dutch children and adults aged 7-69 in DNFCS 2007-2010, DNFCS 2012-2016 and DNFCS 2019-2021, weighted for socio-demographic characteristics, season and day of the week.
**=a relevant and statistically significant difference.*

Other vitamins
For vitamin B_1, B_{12} and vitamin C increases were observed in the period between 2007-2010 and 2012-2016, see appendix H; An increase in mean habitual intake of vitamin B_1 (in mg/MJ/ day) in boys and women was observed. For men and women, an increase in vitamin B_{12} was observed between 2007-2010 and 2019-2021. In men, due to an increase in the period between 2007-2010 and 2012-2016. For vitamin C, we saw an increase in the habitual intake for women from 2007-2010 to 2019-2021, but particularly in the period between 2007-2010 to 2012-2016.

Changes in evaluation of micronutrient intake
The changes in vitamin intake over time hardly lead to a different evaluation of the intake. However, more low intakes were seen in 2019-2021 for vitamin B_2 in adults, vitamin B_6 in women and girls aged 14-17, and vitamin C in girls aged 14-17 compared to the survey in 2007-2010. In addition, folate intake by girls aged 9-13 appeared in the most recent survey to be sufficient.

4.9.3 *Intake of minerals*

Sodium
Due to the slightly different survey method, sodium intake data was not compared with the data from 2007-2010. The sodium intake should be seen as an indication. Trends were shown for the total sodium intake (from foods and added salt).

Compared to the previous measurement of food consumption in 2012-2016, sodium intake by 7-69 year-olds appears to have decreased, see Figure 4.35. This decrease was observed in boys, men and women. For girls, the intake of sodium decreased statistically significant in this period. However, the decrease is less than 6%. In both surveys the intake of sodium was evaluated as high.

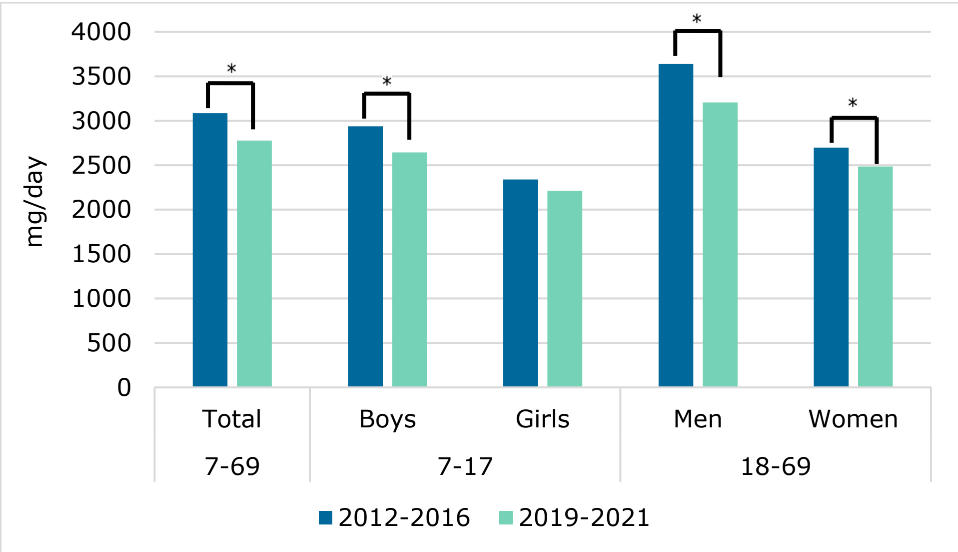


Figure 4.35 Mean habitual intake of sodium (mg/day) of Dutch children and adults aged 7-69 in DNFCS 2012-2016 and DNFCS 2019-2021, weighted for socio-demographic characteristics, season and day of the week.
**=a relevant and statistically significant difference.*

Copper
For copper, an increase in intake in 7-69 year-olds was observed, especially in the period from 2012-2016 compared to 2007-2010. This increase is seen in boys, girls, men and women. The change in copper intake in the period from 2012-2016 to 2019-2021 was only relevant and statistically significant for men (see Figure 4.36).

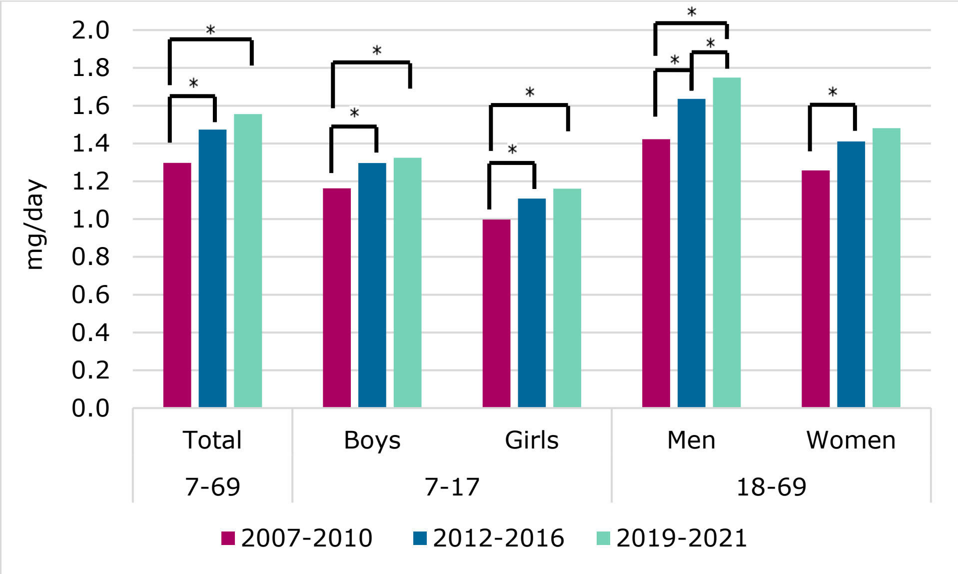


*Figure 4.36 Mean habitual intake of copper (mg/day) of Dutch children and adults aged 7-69 in DNFCS 2007-2010, DNFCS 2012-2016 and DNFCS 2019-2021, weighted for socio-demographic characteristics, season and day of the week. *=a relevant and statistically significant difference.*

Other minerals
For the other minerals, the intakes for the total population remained more or less the same. However, the habitual intake of magnesium in women has increased compared to the previous survey. Furthermore, the intake of calcium, phosphorus and potassium by girls and that of calcium by boys have decreased in the period from 2007-2010 to 2012-2016. For more information, see Appendix H.

Changes in evaluation of micronutrient intake
Also, the changes in mineral intake over time hardly lead to a different evaluation of the intake. However, the percentage of adults with a high zinc intake has increased compared to the survey in 2007-2010. Furthermore, more low intakes of calcium are seen among young adult women aged 18-24 compared to the survey in 2007-2010. In addition, the percentage of women with a high intake of magnesium from supplements has increased compared to the previous surveys (6% in 2019-2021 versus 1% in 2007-2010). For more information, see Appendix H.

5 Discussion

5.1 Introduction

The DNFCS shows what, where and when the Dutch population eats and drinks and the consumption is compared to the guidelines and dietary reference values set by the Health Council of the Netherlands. In this report, the results of DNFCS 2019-2021 on energy and nutrient intake of the Dutch population aged 1-79 were presented and evaluated. Additionally, time trends between three surveys (DNFCS 2007-2010, 2012-2016, and 2019-2021) were described. In this chapter, the main findings and the methodology used are discussed and conclusions are drawn.

5.2 Evaluation of the nutrient intake

This survey shows that the intake of carbohydrates, protein, unsaturated fatty acids, trans fatty acids and linoleic acid in the Netherlands met the recommendations. However, low intakes of dietary fibre and high intakes of alcohol, total fat and saturated fatty acids were also observed. Favourable changes in these nutrients can help prevent obesity and chronic diseases.

Furthermore, this survey shows that the intake of several micronutrients was sufficient in adults (copper, iodine, magnesium, zinc, vitamins B_1, B_3, B_{12}, K_1, and folate (only by men)). In children, the intake of copper, iodine, and vitamins B_3 and B_{12}, seemed sufficient.

Low intakes of several micronutrients were observed in some age-gender groups: calcium, iron, vitamins A, B_2, B_6, C, and folate. There are no concrete indications that these low intakes are worrying from a public health point of view. Also, low intakes of vitamin D were observed in older adults aged 70-79 and not all of them followed the vitamin D supplementation advice.[9] Compliance with this advice, together with sufficient calcium intake, can reduce the risk of bone fractures.[22] Further research into nutritional status for the prevalence of clinical signs of deficiency is desirable regarding the nutrients with low intakes. Especially for vitamin B_2, vitamin B_6, vitamin D, iron, zinc and calcium, further research (for certain parts of the population) is needed. Also, it is important to monitor the iodine intakes and gain more insight into iodine status or thyroid function, because intakes of iodine by women are close to the AI. Agreements for reducing the salt content in foods and the transition to a more plant-based dietary pattern could influence the iodine intake in adults and children. These recommendations based on DNFCS 2019-2021 for further research into nutritional status correspond to the recommendations made in the report on nutritional status from ter Borg and de Jong (2023).[62]
Besides further research to nutritional status and clinal signs, it is also recommended to get more insight into the effectivity of the current strategies to improve the nutrient intake in the Netherlands, like is done on voluntary fortification in margarines and other plant-based fats.[63]
Since 2023, RIVM is studying the adherence to suplementation advices. It is also planned to study the opportunities and barriers of using

supplements. This may help to obtain strategies improving the adherence to the advices.

For some age-gender groups, especially for teenagers, no statement about the adequacy of several micronutrients could be made, due to the limited evidence on the requirements of these micronutrients. This was the case for calcium, iron, magnesium, potassium, zinc, vitamins A, B_1, B_2, B_6, and D, and folate.

The intake of sodium was high for both children and adults. High sodium intake is associated with high blood pressure.[5] Also, high intakes of retinol, zinc, iodine, copper, and magnesium (from supplements) were observed in parts of the population. With these high intakes, a health risk cannot be ruled out. However, there are no concrete indications that these high intakes are worrying from a public health point of view. Follow-up research into the possible high intake is desirable.
First it is advised to investigate the assumptions in the SPADE modelling to exclude the potential impact of not meeting all assumptions on the findings. Subsequently, if necessary, it is adviced to conduct nutritional status studies and performing research into the prevalence of clinical signs.

The ratio of plant protein and animal protein is an important indicator for monitoring the progress towards a more environmentally friendly diet, more specifically the protein transition. This ratio was 43/57 (plant/animal) in the population aged 1-79 years in 2019-2021. This was based on the average contribution of plant protein to the total protein intake. This is lower than the 60/40 goal for 2050, set in the Dutch Climate Agreement, and the intermediate 50/50 goal for 2030, set by the Ministry of Agriculture, Nature and Food Quality.[30] In the period between 2007 and 2021, a statistically significant and relevant (12% or more) increase in the contribution of plant protein to total protein intake was only observed in girls aged 7-17 (42% vs 48%). For boys aged 7-17 and adults aged 18-69, the contribution did significantly increase. However, the increase was less than 12% and therefore not considered as a relevant increase. These findings are consistent with conclusions from WECR in 2024; there is more attention for the need of a transition towards more plant-based food, but animal proteins still predominate in consumption, perception, offer and marketing attention.[64] In this report, we only focused on the protein intake. A more extensive and in-depth analysis of the environmental impact of the diet in 2019-2021, with for example the sources of greenhouse gas emission and land use, as the study with data from DNFCS 2012-2016[65], will be conducted later in 2024.

5.3 Differences by subpopulations

Adults are taller than children and the average male is taller than the average female of the same age. Therefore, dietary reference intakes for most nutrients, when expressed in grams per day, are higher in adults versus children and also higher in males versus females of the same age. Expression of requirements or intakes in energy percentages or intakes per kilogram per day (relative intakes) is a way to compensate for differences in body size. Most of the results in this report are consistent with these expected differences. However, there were some exceptions: the intake by women was higher than the intake by men for vitamin C and vitamin D. This higher intake can be explained by a higher consumption of dietary supplements by women.[9]

Furthermore, children had a higher intake than adults for protein (in g/kg body weight/day), the contribution of plant protein to total protein, and the contribution of total carbohydrates and mono- and disaccharides to total energy intake. When examining the absolute intake of protein in g/day, adults had a higher intake than children. For total carbohydrates and mono- and disaccharides in g/day, the intake was almost equal by adults and children.

Looking at nutrient intake by education level for those nutrients for which the survey has identified challenges (high intakes, low intakes or for which no statement could be made), differences were only found in a few nutrients and age-gender groups. Among the highly educated, the the intake of alcohol, n-3 fish fatty acids and fibre was higher, and the intake of sodium was lower compared to the other education groups. Among girls, mainly the female teenagers with middle educated parents/caretakers had the lowest intakes of potassium. Most of these differences in intakes by education level were also found when looking at meeting the recommendations set for these nutrients.

5.4 Time trends in nutrient intake

The results of DNFCS 2019-2021 showed that there are some beneficial changes in the nutrient intake in the period between 2007 and 2021. The intake of alcohol (particularly in men), carbohydrates and mono- and disaccharides decreased in this period. Also, the intake of dietary fibre (in gram per MJ) and vitamin D has increased between 2007 and 2021. The intake of sodium from foods and added salt has decreased between 2012-2016 and 2019-2021.

These changes in the intake of nutrients can be caused by people consuming a higher or lower amount of certain foods and/or by changes in the composition of the consumed foods. For instance, the NAPV[66] aims to improve the product composition, such as reducing added salt. In addition, the current survey was partially carried out during the COVID-19 pandemic. Measures taken during this period may have affected diets and lifestyles. For instance, a lower consumption could be expected for the types of food that are often consumed out of home, such as alcoholic and non-alcoholic beverages.

The figures on nutrients correspond to the outcomes of the 2019–2021 survey on food products, which were published in early 2023.[9] These showed that the Dutch population’s intake of vegetable products – such as fruit, vegetables, unsalted nuts and legumes – had increased. The increase of dietary fibre intake may be related to the increase in the consumption of fruit, vegetables, nuts and legumes. The decrease in the intake of mono- and disaccharides may be related to the decrease in the consumption of sugar-containing foods, such as sugary beverages (both soft drinks and syrups, fruit juices, and dairy drinks), confectionery, and cookies and pastries, and partly due to consumption of products containing less sugars within food groups.[9, 67] A decrease in the intake of alcohol particularly among men[9], corresponds to the decrease shown by the Health Survey.[68]

In contrast, some unfavourable trends were observed as well. More people with a high fat intake (as contribution to the total energy intake) and more people with a lower intake of vitamins B_2, B_6 and C were observed.

It is recommended to monitor the food consumption on a continuous basis, to see whether the trends will continue, and to be less dependent on specific factors in a certain period (e.g. COVID-19 measures).

5.5 Strengths and limitations

This study has several strengths and limitations that should be considered when interpreting the findings. The methodology used is similar to the DNFCS 2012-2016, so the strengths and limitations are comparable and described before.[39] The described advantages and disadvantages of working with consumer panels, the strengths of using a validated multiple pass type of 24-hour dietary recall with GloboDiet software, and estimating habitual intake distributions also apply to the current survey. However, self-reported dietary assessment remains a weakness. See also our previously published report on DNFCS 2019-2021 for additional strengths and limitations on obtaining representative data, underreporting, data collection during the COVID-19 pandemic, and data analyses on food consumption intakes. The current chapter addresses strengths and limitations specifically for the methodology and results on energy and nutrient intake.

5.5.1 Dietary reference values

For most nutrients, DRVs are set by the Health Council of the Netherlands (see Appendix A). The dietary reference values on vitamins and minerals were updated in 2018 for adults.[22] However, those for macronutrients and children have not yet been revised. We recommend evaluating the intake for children when the reference values are updated by the Health Council of the Netherlands.

The evaluation of the intakes can be affected by the fact that most DRVs are based on healthy people with a healthy weight, while many people in the Netherlands have one or more chronic diseases or are overweight.[22] This is due to the limited scientific evidence for these nutrient requirements in groups with higher risks of negative health effects. Quantative conclusions on prevalence of inadequacy could not be drawn for all nutrients due to limited evidence on nutrient requirements. This is particularly the case for children. In 2023, ZonMw therefore recommended conducting further research into nutrient requirements of specific target groups.[69]

In the evalation of the intakes, we used arbitrary cut-off points for relevance. For instance, in the evaluation of the intakes above the UL, we used a cutt-off point of 2.5%. For the evaluation of the intake in comparison to an EAR, we used a relatively high cut-off point of 10%. With this cutt-off point, we took into account that the data can be influenced by underreporting. In the evalution of the AIs, no statement on the intake was made when the 95%-confidence interval was completely under the AI. This was done to take the uncertainty of the data into account.

5.5.2 *Quality of the food composition data*

The quality of the nutrient intake data relies on the quality of the used Dutch food composition database (NEVO[17]) and the Dutch supplement database (NES[46]). A lot of attention is paid to the quality of data in these databases. The food data compilation process adheres to internationally accepted standards.[70, 71] Limitations of the NEVO database include partly reliance on expert judgements rather than laboratory analysis, missing data on foods or components (for nicotinamide and nicotinic acid), and the fact that part of the data was analysed years ago.[47] The coverage rate of NEVO varies per nutrient. For most nutrients analysed in this report, the coverage rate is above 90%.[47] However, the coverage rate in NEVO is lower for vitamin E (89%), selenium (88%), iodine (79%), and vitamin K_1 (53%), which can lead to a potential underestimation of the intake. Extension of the Dutch food composition database with vitamin K_1 and iodine values for more food groups could be useful. No effects on the conclusions are expected yet for these nutrients, as the intake of iodine and vitamin K_1 seemed adequate in most age gender groups. Also, because in case of a missing nutrient value for a food, while the intake by this food is assumed to be relevant, the composition of the most comparable food was used to fill the NEVO database.

Data in the NES database are not based on laboratory analyses, but on label information published by manufacturers. This information is regulated and it is required to reflect minimum contents of nutrients at the end of shelf life. During the production process of these products, vitamins and minerals are commonly thought to be added in higher amounts than labelled, to make sure the content is still available at the end of the shelf life period. Therefore, label values are usually thought to tend toward overages. However, there are also studies showing that the measured contant was lower than the declared values at the label. Thus, the use of the label information may either result in under- or overestimation of true intake values.[72] In the evaluation of vitamin D, no information on skin colour or sunlight exposure was available, which might have affected the evaluation of the vitamin D intake. Additional research about the vitamin D status of people with a darker skin colour is recommended and preparations for this research will start in 2024.

5.5.3 *Intake from all sources*

A strength of our method is that a combination of intake from foods and dietary supplements were taken into account in assessing the habitual intake. For these analyses, we used not only the information on supplement use during the recalls, but also that from the additional questionnaire to obtain better estimates. Unfortunately, some intakes might be underestimated, as not all sources of this intake were taken into account. For instance, the number of users of dietary supplements with sodium (n=19), dietary fibre (n=17), protein (n=27), phosphorus (n=123), or potassium (n=55) were too low. Furthermore, the habitual intake of vitamin K_1 was based on the intake of exclusively foods, because for supplements the distinction between vitamins K_1 and K_2 is usually unknown.

Estimating quantitative salt intake through food consumption research is difficult. A strength in our assessment of sodium and iodine is that the contribution from discretionary salt was taken into account. Several assumptions were made for these analyses, such as on the amounts of added salt at home and in the industry. However, this amount may differ between various brands of a similar product or vary by individuals. In 2024, RIVM will study some of the assumptions underlying the sodium and iodine calculation model, this will help to make the model up-to-date to the current dietary habits. Although high sodium intakes were observed in this study, sodium intakes measured with nutritional status research using 24-hour urine were even higher.[73] Consequently, the estimated intake of sodium should be interpreted as an indication. Complementary to nutritional status research, this study does provide insight into the sources, place of consumption and eating occasions of sodium intake.
A global comparison of the median intakes by adults of this survey with intakes based on urine samples of the Lifelines cohort (cohort including participants of the north of the Netherlands) showed differences of about 25% for sodium intake and less than 10% for iodine intakes.[74] Differences in study population, limitations in study design and calculation model may have caused these differences. However, similar conclusions were drawn based on both studies: low indication of inadequate iodine intakes and high intakes for sodium.[74]

5.6 Conclusions

The DNFCS 2019-2021 provides insight into the amount of foods and beverages consumed among children and adults in the Netherlands.[9] This report describes the intake and evaluation of energy and nutrients.

The intake of protein, carbohydrates, trans fatty acids, cis-unsaturated fatty acids, and linoleic acid in the Netherlands met the recommendations. However, high intakes of total fat, saturated fatty acids, and alcohol, and low intakes of dietary fibre were observed. Comparison with previous surveys, shows time trends in nutrient intake. Various favourable trends occurred in the period between 2007 and 2021. These include an increase in the dietary fibre intake and a decrease in the intake of mono- and disaccharides, sodium and alcohol (particularly in men). Based on other studies, we know that an increase in dietary fibre intake, a decrease of sugar intake and a beneficial fatty acid pattern can be important to prevent obesity and chronic diseases. A lower salt intake helps to keep blood pressure under control.[5]

For people in all age categories, the intake of vitamin D has increased compared to the previous survey (2012–2016). However, vitamin D intake is still too low for older adults aged 70–79. It is important that people in this age category adhere better to the vitamin D supplement advice. A sufficient intake of both vitamin D and calcium reduces the risk of bone fractures.

Some population groups have low intakes of particular types of vitamins and minerals, including vitamins A, B_2, B_6 and C, folate, calcium and iron. However, this is not necessarily a cause for immediate concern. Follow-up studies, such as nutritional status studies[75], are recommended. The same is true for the high intakes of some other vitamins and minerals.

The data from the Dutch national food consumption surveys conducted by RIVM enable policy makers and health professionals to work towards healthy, sustainable and safe food consumption, food product innovation, and enable research and education on nutrition. More detailed information about this survey and previous surveys is available on the website https://www.wateetnederland.nl and RIVM StatLine[14] and in a report[9] in which the methods are described in detail as well as the results on food consumption and evaluation with dietary guidelines.

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List of abbreviations

AI	Adequate intake
ALA	Alpha-linoleic acid
AR	Average Requirement
BMI	Body Mass Index
CBS	Statistics Netherlands (Centraal Bureau voor de Statistiek)
DHA	Docosahexaenoic acid
DNFCS	Dutch National Food Consumption Survey
DRV	Dietary Reference Value
EAR	Estimated Average Requirement
EFSA	European Food Safety Authority
En%	Nutrient intake relative to the energy intake per day
EPA	Eicosapentaenoic acid
EPIC	European Prospective Investigation into Cancer and nutrition
GR	Health Council of the Netherlands (GezondheidsRaad)
HC	Health Council of the Netherlands
IARC	International Agency for Research on Cancer
IOM	US Institute of Medicine
Kantar	Dutch market research agency
LA	Linoleic acid
MET	Metabolic Equivalent of Task; a physiological measure expressing the energy cost of physical activities is defined as the ratio of metabolic rate (and therefore the rate of energy consumption) during a specific physical activity and a reference metabolic rate
NES	Dutch Dietary Supplement Database (Nederlandse Supplementenbestand)
NEVO	Dutch Food Composition Database (Nederlands Voedingsstoffenbestand)
PRI	Population Reference Intake
PUFAs	Polyunsaturated fatty acids
RDA	Recommended Dietary Allowance
RIVM	Dutch National Institute for Public Health and the Environment (Rijksinstituut voor Volksgezondheid en Milieu)
RGV	Dutch food-based dietary guidelines (Richtlijnen Goede Voeding)
SFA	Saturated fatty acid
StatLine RIVM	On StatLine RIVM[14] you can consult the figures of RIVM and collaborating organisations. By compiling tables and graphs, the information can be downloaded and printed for free.
SPADE	Statistical Program to Assess Dietary Exposure
UL	Tolerable Upper intake Level

GloboDiet food groups are indicated with the following shorter term:

Potatoes	01. Potatoes and other tubers
Vegetables	02. Vegetables
Legumes	03. Legumes
Fruits, nuts, olives	04. Fruits, nuts and seeds, olives
Dairy (incl. substitutes)	05. Dairy products and substitutes
Bread, cereals, rice, pasta	06. Cereals and cereal products
Meat (incl. substitutes)	07. Meat, meat products and substitutes
Fish and shellfish	08. Fish, shellfish and amphibians
Eggs	09. Eggs and egg products
Fats and oils	10. Fats and oils
Sugar and confectionery	11. Sugar and confectionery
Cakes and sweet biscuits	12. Cakes and sweet biscuits
Non-alcoholic beverages	13. Non-alcoholic beverages
Alcoholic beverages	14. Alcoholic beverages
Sauces and seasonings	15. Sauces and seasonings
Stocks	16. Stocks
Miscellaneous	17. Miscellaneous
Savoury snacks	18. Savoury snacks

In this report age groups are indicated by a dash between the lower and upper age which are included in the age group. For example, participants aged 70-79 includes also participants aged 79.

Appendix A Overview sources dietary reference values

Table A.1 Overview of the sources of the used dietary reference values in this report. (HC=Health Council, EFSA=European Food Safety Authority RGV=Dutch Dietary guidelines).

	AI/EAR/RI/Guideline		UL	
Nutrient	**Children 1-17 years**	**Adults 18-79 years**	**Children 1-17 years**	**Adults 18-79 years**
Energy (MJ/day)	HC, 2001[25]	HC, 2001[25]		
Protein (g/kg/day)	HC, 2021[29]	HC, 2021[29]		
Protein (g/day)	HC, 2021[29]	HC, 2021[29]		
Carbohydrates (en%/day)	HC, 2001[25]	HC, 2001[25]		
Total fat (en%/day)	HC, 2001[25]	HC, 2001[25]	HC, 2001[25]	HC, 2001 (18-50 yr)[25]
Saturated fatty acids (en%/day)			HC, 2001[25]	HC, 2001[25]
Trans fatty acids (en%/day)			HC, 2001 (4-17 yr)[25]	HC, 2001[25]
Cis-unsaturated fatty acids (en%/day)	HC, 2001 (4-17 yr)[25]	HC, 2001[25]	HC, 2001 (4-17 yr)[25]	HC, 2001[25]
Polyunsaturated fatty acids (en%/day)			HC, 2001[25]	HC, 2001[25]
Linoleic acid (en%/day)	HC, 2001[25]	HC, 2001[25]		
Alpha-linolenic acid (en%/day)	HC, 2001[25]	HC, 2001[25]		
N-3 fish fatty acids (mg/day)	HC, 2001[25]	HC, 2001[25]		
Dietary fibre (g/MJ/day)	HC, 2006[36]	HC, 2006[36]		
Alcohol (g/day)			RGV 2015[5]	RGV 2015[5]
Retinol activity equivalent (µg/day)	HC, 2014, based on Nordic Council, 2012[23]	HC, 2018[22]		
Retinol (µg/day)			EFSA 2018[24]	EFSA 2018[24]
Vitamin B_1 (mg/day)	HC, 2000[76]			
Vitamin B_1 (mg/MJ/day)		HC, 2018[22]		
Vitamin B_2 (mg/day)	HC, 2000[76]	HC, 2018[22]		
Vitamin B_3 (mg/day)	HC, 2000[76]			

Nutrient	AI/EAR/RI/Guideline		UL	
	Children 1-17 years	Adults 18-79 years	Children 1-17 years	Adults 18-79 years
Vitamin B_3 (mg/MJ/day)		HC, 2018[22]		
Vitamin B_6 (mg/day)	HC, 2003[77]	HC, 2018[22]	EFSA 2018[24]	EFSA 2018[24]
Folate quivalents (µg/day)	HC, 2003[77]	HC, 2018[22]		
Folic acid (µg/day)			EFSA 2018[24]	EFSA 2018[24]
Vitamin B_{12} (µg/day)	HC, 2003[77]	HC, 2018[22]		
Vitamin C (mg/day)	HC, 2014, based on Nordic Council, 2012[23]	HC, 2018[22]		
Vitamin D (µg/day)	HC, 2012[78] HC, 2018 (vitamin D from sunlight)	HC, 2018[22]	EFSA 2018[24]	EFSA 2018[24]
Vitamin E (mg/day)	HC, 2014, based on Nordic Council, 2012[23]	HC, 2018[22]	EFSA 2018[24]	EFSA 2018[24]
Vitamin K_1 (µg/day)	EFSA 2017[79]	HC, 2018[22]		EFSA 2018[24]
Calcium (mg/day)	HC, 2000[76]	HC, 2018[22]		EFSA 2018[24]
Copper (mg/day)	HC, 2014, based on Nordic Council, 2012[23]	HC, 2018[22]	EFSA 2018[24]	EFSA 2018[24]
Iodine (µg/day)	HC, 2014, based on Nordic Council, 2012[23]	HC, 2018[22]	EFSA 2018[24]	EFSA 2018[24]
Iron (mg/day)	HC, 2014, based on Nordic Council, 2012[23]	HC, 2018[22]		
Magnesium (mg/day)	HC, 2014, based on Nordic Council, 2012[23]	HC, 2018[22]	EFSA 2018 (4-17 yr)[24]	EFSA 2018[24]
Phosphorus (mg/day)	HC, 2014, based on Nordic Council, 2012[23]	HC, 2018[22]		
Potassium (mg/day)	HC, 2014, based on Nordic Council, 2012[23]	HC, 2018[22]		
Selenium (µg/day)	HC, 2014, based on Nordic Council, 2012[23]	HC, 2018[22]	EFSA 2018[24]	EFSA 2018[24]
Sodium (mg/day)			Voedingscentrum[80]	RGV 2015[5]
Zinc (mg/day)	HC, 2014, based on Nordic Council, 2012[23]	HC, 2018[22]	EFSA 2018[24]	EFSA 2018[24]

Appendix B Habitual intake from exclusively foods

Table B.1 Habitual intake distribution of n-3 fish fatty acids (EPA+DHA, mg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean	P25	P50	P75	AI	P50 related to AI	Evaluation AI
1-79	Total	3570	171	19	40	111			
1-17	Children	1823	83	14	28	62			
18-79	Adults	1747	193	21	43	140			
1-17	Boys	895	90	15	32	66			
1-17	Girls	928	77	13	24	50			
18-79	Men	880	195	24	50	136			
18-79	Women	867	191	19	38	144			
1-3	Boys	353	58	9	22	46	150	P50<AI	No statement
1-3	Girls	350	64	9	18	45	150	P50<AI	No statement
4-11	Boys	270	97	14	30	63	150	P50<AI	No statement
4-11	Girls	278	79	14	23	50	150	P50<AI	No statement
12-17	Boys	272	95	20	43	86	150	P50<AI	No statement
12-17	Girls	300	78	15	27	62	150	P50<AI	No statement
18-50	Men	318	190	24	51	133	200	P50<AI	No statement
18-50	Women	284	155	19	36	109	200	P50<AI	No statement
51-64	Men	251	166	21	43	100	200	P50<AI	No statement
51-64	Women	287	226	20	40	184	200	P50<AI	No statement
65-79	Men	311	250	30	55	252	200	P50<AI	No statement
65-79	Women	296	251	19	39	255	200	P50<AI	No statement

* The 5th, 25th, 50th, 75th and 95th percentiles and the average were calculated based on the average intake of the two recall days of the participants.

Table B.2 Habitual intake distribution of retinol activity equivalents (µg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI) <EAR	AI[a]	P50 related to AI	Evaluation EAR/AI
1-79	Total	3570	724 (706-748)	289	458	634 (622-656)	887	1461					
1-17	Children	1823	546 (533-569)	237	364	489 (479-509)	664	1043					
18-79	Adults	1747	769 (747-796)	315	494	678 (662-701)	940	1531					
1-17	Boys	895	584 (562-621)	239	379	523 (504-554)	721	1139					
1-17	Girls	928	508 (486-536)	235	352	462 (445-488)	611	931					
18-79	Men	880	865 (826-913)	340	550	768 (738-807)	1070	1722					
18-79	Women	867	673 (645-705)	298	455	609 (587-637)	817	1265					
1-3	Boys	353	543 (495-574)	227	355	487 (444-515)	666	1060			300; 350	P50>AI	Seems adequate
1-3	Girls	350	476 (442-500)	221	336	439 (403-460)	573	865			300; 350	P50>AI	Seems adequate
4-11	Boys	270	572 (548-610)	236	373	515 (492-545)	707	1105			350; 400; 600	4-9 years: P50>AI; 10-11 years: P50<AI	Seems adequate[c]
4-11	Girls	278	508 (481-535)	234	348	459 (440-486)	610	942			350; 400; 600	4-9 years: P50>AI; 10-11	4-9 years: seems adequate; 10-11 years: no statement

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI) <EAR	AI[a]	P50 related to AI	Evaluation EAR/AI
												years: P50<AI	
12-17	Boys	272	617 (588-676)	254	399	552 (528-606)	759	1201	600[b]	56.0 (47.6-59.9)	600	12-13 years: P50<AI	12-13 years: no statement; 14-17 years: low intakes
12-17	Girls	300	523 (496-567)	243	365	477 (455-520)	629	946	500[b]	53.9 (45.1-58.5)[b]	600	12-13 years: P50<AI	12-13 years: no statement; 14-17 years: low intakes
18-50	Men	318	770 (734-830)	312	498	685 (658-740)	946	1513	615	41.2 (34.6-44.3)			Low intakes
18-50	Women	284	623 (597-665)	277	420	561 (542-598)	753	1173	530	44.6 (38.6-47.7)			Low intakes
51-64	Men	251	934 (879-986)	387	610	839 (793-879)	1150	1812	615	25.6 (22.0-29.2)			Low intakes
51-64	Women	287	712 (674-745)	329	490	648 (615-679)	856	1305	530	31.4 (26.5-36.0)			Low intakes
65-79	Men	311	1054 (954-1129)	442	690	945 (856-1008)	1299	2047	615	17.8 (13.8-23.7)			Low intakes
65-79	Women	296	774 (707-812)	359	537	707 (643-743)	931	1408	530	24.0 (19.0-31.7)			Low intakes

[a] AI 1 year=300 µg, 2-5 years=350 µg, 6-9 years=400 µg, 10-13 years=600 µg.
[b] only for 14-17 years.
[c] P50<AI, however AI within CI. Therefore, intake is evaluated as seems adequate.

Table B.3 Habitual intake distribution of retinol (µg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	UL	% (95%-CI)≥UL	Evaluation UL
1-79	Total	3570	527 (504-544)	170	301	445 (428-458)	660	1157			
1-17	Children	1823	402 (386-420)	141	242	349 (337-363)	501	841			
18-79	Adults	1747	558 (532-578)	183	322	475 (453-490)	700	1215			
1-17	Boys	895	431 (407-460)	155	261	375 (356-399)	539	898			
1-17	Girls	928	372 (352-393)	131	225	324 (310-340)	463	772			
18-79	Men	880	656 (617-690)	226	390	567 (533-594)	822	1385			
18-79	Women	867	461 (431-483)	160	277	400 (378-416)	575	964			
1-3	Boys	353	397 (372-437)	145	244	345 (325-380)	497	816	800	5.3 (3.6-8.4)	High intakes
1-3	Girls	350	356 (336-385)	124	215	309 (296-335)	440	744	800	3.7 (2.1-5.3)	High intakes
4-11	Boys	270	424 (399-455)	151	256	369 (349-393)	530	887	1100; 1500; 2000[a]	4-6 yr: 1.9 (0.8-2.9); 7-10 yr: 0.4 (0.1-0.8); 11 yr: 0.1 (0.0-0.2)	Tolerable intakes
4-11	Girls	278	371 (351-396)	129	223	323 (308-341)	464	772	1100; 1500; 2000[a]	4-6 yr: 1.2 (0.3-2.0); 7-10 yr: 0.2 (0.0-0.4); 11 yr: 0.1 (0.0-0.1)	Tolerable intakes

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	UL	% (95%-CI)≥UL	Evaluation UL
12-17	Boys	272	455 (427-483)	166	276	396 (375-420)	569	943	2000; 2600[a]	12-14 yr: 0.1 (0.0-0.2); 15-17 yr: 0.0 (0.0-0.1)	Tolerable intakes
12-17	Girls	300	380 (356-396)	137	232	333 (314-345)	474	785	2000; 2600[a]	12-14 yr: 0.1 (0.0-0.1); 15-17 yr: 0.0 (0.0-0.0)	Tolerable intakes
18-50	Men	318	578 (528-614)	206	349	501 (461-531)	722	1208	3000	0.0 (0.0-0.1)	Tolerable intakes
18-50	Women	284	437 (397-457)	151	261	378 (347-392)	545	914	3000	0.0 (0.0-0.0)	Tolerable intakes
51-64	Men	251	711 (665-751)	258	436	623 (583-655)	885	1468	3000	0.1 (0.0-0.3)	Tolerable intakes
51-64	Women	287	480 (444-503)	170	293	420 (391-438)	596	993	1500[b]	0.8 (0.2-1.2)	Tolerable intakes
65-79	Men	311	814 (766-887)	300	503	716 (674-775)	1012	1666	3000	0.2 (0.0-0.6)	Tolerable intakes
65-79	Women	296	508 (479-565)	184	312	446 (424-494)	632	1046	1500[b]	0.9 (0.3-1.8)	Tolerable intakes

[a] UL 4-6 years=1100 µg, 7-10 years=1500 µg, 11-14 years=2000 µg, 15-17 years=2600 µg.
[b] Postmenopausal women (51+ years), who are at greater risk of osteoporosis and fracture, are advised to restrict their intake to 1500 µg RE/day, because the tolerable upper level may not adequately address the possible risk of bone fracture in particularly vulnerable groups.[42]

Table B.4 Habitual intake distribution of vitamin B_1 (mg/day) from exclusively foods by the Dutch population aged 1- 79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	AI	P50 related to AI	Evaluation AI
1-79	Total	3570	1.0 (1.0-1.0)	0.5	0.8	0.9 (0.9-1.0)	1.2	1.6			
1-17	Children	1823	0.8 (0.8-0.8)	0.4	0.6	0.7 (0.7-0.8)	0.9	1.2			
18-79	Adults	1747	1.0 (1.0-1.1)	0.6	0.8	1.0 (1.0-1.0)	1.2	1.7			
1-17	Boys	895	0.8 (0.8-0.9)	0.5	0.6	0.8 (0.8-0.8)	1.0	1.3			
1-17	Girls	928	0.7 (0.7-0.7)	0.4	0.6	0.7 (0.7-0.7)	0.9	1.1			
18-79	Men	880	1.2 (1.2-1.2)	0.7	1.0	1.1 (1.1-1.2)	1.4	1.8			
18-79	Women	867	0.9 (0.9-0.9)	0.6	0.7	0.9 (0.9-0.9)	1.1	1.4			
1-3	Boys	353	0.7 (0.6-0.7)	0.4	0.5	0.6 (0.6-0.7)	0.8	1.0	0.3	P50>AI	Seems adequate
1-3	Girls	350	0.6 (0.6-0.7)	0.4	0.5	0.6 (0.6-0.6)	0.7	0.9	0.3	P50>AI	Seems adequate
4-11	Boys	270	0.8 (0.8-0.8)	0.5	0.6	0.8 (0.8-0.8)	0.9	1.2	0.5;0.8[a]	P50>AI	Seems adequate
4-11	Girls	278	0.7 (0.7-0.7)	0.4	0.6	0.7 (0.7-0.7)	0.8	1.1	0.5;0.8[a]	4-8 yr: P50>AI; 9-11 yr: P50<AI	4-8 yr: seems adequate; 9-11 yr: no statement
12-17	Boys	272	1.0 (0.9-1.0)	0.6	0.8	0.9 (0.9-1.0)	1.1	1.5	0.8;1.1[a]	12-13 yr: P50>AI; 14-17 yr: P50<AI	12-13 yr: seems adequate; 14-17 yr: no statement
12-17	Girls	300	0.8 (0.7-0.8)	0.5	0.6	0.8 (0.7-0.8)	0.9	1.2	0.8;1.1[a]	P50<AI	No statement
18-50	Men	318	1.2 (1.1-1.2)	0.7	1.0	1.1 (1.1-1.2)	1.4	1.8			
18-50	Women	284	0.9 (0.8-0.9)	0.5	0.7	0.8 (0.8-0.9)	1.0	1.3			
51-64	Men	251	1.2 (1.2-1.2)	0.7	1.0	1.2 (1.1-1.2)	1.4	1.8			
51-64	Women	287	0.9 (0.9-1.0)	0.6	0.8	0.9 (0.9-1.0)	1.1	1.4			
65-79	Men	311	1.1 (1.1-1.2)	0.7	0.9	1.1 (1.1-1.2)	1.3	1.7			
65-79	Women	296	1.0 (0.9-1.0)	0.6	0.8	0.9 (0.9-1.0)	1.1	1.5			

[a] AI 4-8 years=0.5 mg, 9-13 years=0.8 mg, 14-18 years=1.1 mg.
[b] P50<AI, however AI within CI. Therefore, intake is evaluated as seems adequate.

Table B.5 Habitual intake distribution of vitamin B_1 (mg/MJ/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	Evaluation EAR
1-79	Total	3570	0.12 (0.12-0.12)	0.08	0.10	0.12 (0.12-0.12)	0.14	0.17			
1-17	Children	1823	0.11 (0.11-0.11)	0.07	0.09	0.11 (0.11-0.11)	0.13	0.16			
18-79	Adults	1747	0.12 (0.12-0.12)	0.08	0.10	0.12 (0.12-0.12)	0.14	0.17			
1-17	Boys	895	0.11 (0.11-0.11)	0.08	0.09	0.11 (0.11-0.11)	0.13	0.16			
1-17	Girls	928	0.11 (0.11-0.11)	0.07	0.09	0.11 (0.11-0.11)	0.13	0.16			
18-79	Men	880	0.12 (0.12-0.12)	0.08	0.10	0.12 (0.12-0.12)	0.14	0.17			
18-79	Women	867	0.12 (0.12-0.13)	0.08	0.10	0.12 (0.12-0.12)	0.14	0.18			
1-3	Boys	353	0.12 (0.11-0.12)	0.08	0.10	0.12 (0.11-0.12)	0.14	0.17			
1-3	Girls	350	0.12 (0.11-0.13)	0.08	0.10	0.12 (0.11-0.12)	0.14	0.17			
4-11	Boys	270	0.11 (0.11-0.11)	0.07	0.09	0.11 (0.10-0.11)	0.12	0.15			
4-11	Girls	278	0.11 (0.11-0.11)	0.07	0.09	0.11 (0.10-0.11)	0.12	0.16			
12-17	Boys	272	0.11 (0.11-0.11)	0.08	0.09	0.11 (0.11-0.11)	0.13	0.16			
12-17	Girls	300	0.11 (0.11-0.12)	0.07	0.09	0.11 (0.10-0.11)	0.13	0.16			
18-50	Men	318	0.12 (0.12-0.12)	0.08	0.10	0.12 (0.11-0.12)	0.13	0.17	0.072	1.7 (0.7-2.4)	Adequate intakes
18-50	Women	284	0.12 (0.11-0.12)	0.08	0.10	0.12 (0.11-0.12)	0.13	0.17	0.072	2.2 (1.2-3.4)	Adequate intakes
51-64	Men	251	0.12 (0.12-0.13)	0.08	0.10	0.12 (0.12-0.12)	0.14	0.17	0.072	1.0 (0.3-1.5)	Adequate intakes
51-64	Women	287	0.13 (0.12-0.13)	0.08	0.11	0.12 (0.12-0.13)	0.15	0.18	0.072	0.9 (0.4-1.4)	Adequate intakes
65-79	Men	311	0.13 (0.12-0.13)	0.09	0.11	0.12 (0.12-0.13)	0.14	0.18	0.072	0.7 (0.2-1.2)	Adequate intakes
65-79	Women	296	0.13 (0.13-0.14)	0.09	0.11	0.13 (0.13-0.13)	0.15	0.19	0.072	0.6 (0.2-1.0)	Adequate intakes

Table B.6 Habitual intake distribution of vitamin B_2 (mg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI[a]	P50 related to AI	Evaluation EAR/AI
1-79	Total	3570	1.4 (1.3-1.4)	0.7	1.0	1.3 (1.3-1.3)	1.6	2.2					
1-17	Children	1823	1.2 (1.2-1.2)	0.6	0.9	1.1 (1.1-1.1)	1.4	1.9					
18-79	Adults	1747	1.4 (1.4-1.4)	0.7	1.1	1.4 (1.3-1.4)	1.7	2.3					
1-17	Boys	895	1.3 (1.2-1.3)	0.7	1.0	1.2 (1.2-1.3)	1.5	2.1					
1-17	Girls	928	1.1 (1.1-1.1)	0.6	0.8	1.0 (1.0-1.1)	1.3	1.7					
18-79	Men	880	1.6 (1.5-1.6)	0.9	1.2	1.5 (1.5-1.6)	1.9	2.5					
18-79	Women	867	1.3 (1.2-1.3)	0.7	1.0	1.2 (1.2-1.2)	1.5	2.0					
1-3	Boys	353	1.1 (1.1-1.2)	0.6	0.8	1.1 (1.0-1.1)	1.3	1.8			0.5	P50>AI	Seems adequate
1-3	Girls	350	1.0 (1.0-1.1)	0.6	0.8	1.0 (1.0-1.0)	1.3	1.7			0.5	P50>AI	Seems adequate
4-11	Boys	270	1.2 (1.2-1.3)	0.7	0.9	1.2 (1.2-1.3)	1.5	2.0			0.7;1.0[a]	P50>AI	Seems adequate
4-11	Girls	278	1.1 (1.0-1.1)	0.6	0.8	1.0 (1.0-1.1)	1.3	1.7			0.7;1.0[a]	P50>AI	Seems adequate
12-17	Boys	272	1.4 (1.3-1.4)	0.7	1.1	1.3 (1.3-1.4)	1.6	2.2			1.0;1.5[a]	12-13 yr: P50>AI; 14-17 yr: P50<AI	12-13 yr: seems adequate; 14-17 yr: no statement

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI[a]	P50 related to AI	Evaluation EAR/AI
12-17	Girls	300	1.1 (1.1-1.1)	0.6	0.8	1.1 (1.0-1.1)	1.3	1.8			1.0;1.1[a]	12-13 yr: P50>AI; 14-17 yr: P50<AI	12-13 yr: seems adequate; 14-17 yr: no statement
18-50	Men	318	1.6 (1.5-1.6)	0.9	1.2	1.5 (1.5-1.6)	1.9	2.5	1.3	32.0 (28.8-36.6)			Low intakes
18-50	Women	284	1.2 (1.2-1.2)	0.6	0.9	1.2 (1.1-1.2)	1.4	1.9	1.3	64.3 (61.6-69.0)			Low intakes
51-64	Men	251	1.6 (1.6-1.7)	0.9	1.3	1.6 (1.5-1.6)	1.9	2.5	1.3	28.5 (25.3-32.3)			Low intakes
51-64	Women	287	1.3 (1.3-1.3)	0.7	1.0	1.3 (1.2-1.3)	1.5	2.0	1.3	53.3 (50.0-57.9)			Low intakes
65-79	Men	311	1.6 (1.5-1.6)	0.9	1.2	1.5 (1.5-1.6)	1.9	2.5	1.3	30.3 (26.0-34.4)			Low intakes
65-79	Women	296	1.4 (1.3-1.4)	0.8	1.1	1.3 (1.3-1.4)	1.6	2.1	1.3	46.9 (42.0-51.0)			Low intakes

[a] AI 4-8 years=0.7 mg, 9-13 years=1.0 mg, boys 14-18 years=1.5 mg, girls 14-18 years=1.1 mg.

Table B.7 Habitual intake distribution of vitamin B₃ (mg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	AI	P50 related to AI	Evaluation AI
1-79	Total	3570	16.6 (16.3-16.9)	7.9	12.0	15.7 (15.5-16.1)	20.2	28.0			
1-17	Children	1823	11.9 (11.6-12.1)	5.9	8.7	11.2 (11.0-11.5)	14.4	20.2			
18-79	Adults	1747	17.7 (17.4-18.1)	9.4	13.3	16.9 (16.6-17.3)	21.3	28.9			
1-17	Boys	895	13.2 (12.8-13.5)	6.3	9.6	12.6 (12.2-12.9)	16.1	22.2			
1-17	Girls	928	10.6 (10.3-11.0)	5.7	8.1	10.2 (9.9-10.6)	12.7	17.0			
18-79	Men	880	20.8 (20.2-21.3)	12.4	16.5	20.1 (19.5-20.5)	24.2	31.5			
18-79	Women	867	14.8 (14.4-15.3)	8.4	11.5	14.2 (13.9-14.8)	17.4	23.1			
1-3	Boys	353	8.5 (8.2-8.7)	4.5	6.5	8.1 (7.8-8.4)	10.1	13.6	4	P50>AI	Seems adequate
1-3	Girls	350	8.5 (8.0-8.8)	4.7	6.5	8.1 (7.6-8.4)	10.1	13.5	4	P50>AI	Seems adequate
4-11	Boys	270	12.5 (12.1-12.9)	7.0	9.7	12.0 (11.6-12.4)	14.8	20.0	7;11[a]	P50>AI	Seems adequate
4-11	Girls	278	10.4 (10.0-10.8)	5.9	8.0	10.0 (9.6-10.4)	12.3	16.4	7;11[a]	P50>AI; P50<AI	Seems adequate[b]
12-17	Boys	272	16.1 (15.5-16.5)	9.4	12.7	15.5 (15.0-15.9)	18.9	24.8	11;17[a]	12-13 yr: P50>AI; 14-17 yr: P50<AI	12-13 yr: seems adequate; 14-17 yr: no statement
12-17	Girls	300	11.9 (11.5-12.5)	6.9	9.3	11.4 (11.1-12.1)	13.9	18.3	11;13[a]	P50<AI	12-13 yr: seems adequate; 14-17 yr: no statement[b]
18-50	Men	318	20.8 (20.0-21.4)	12.4	16.5	20.1 (19.3-20.7)	24.3	31.6			
18-50	Women	284	13.9 (13.5-14.9)	8.0	10.9	13.4 (13.0-14.3)	16.3	21.7			
51-64	Men	251	21.2 (20.7-21.8)	12.8	16.9	20.5 (20.0-21.1)	24.7	32.0			
51-64	Women	287	15.5 (15.0-16.1)	9.2	12.3	14.9 (14.5-15.6)	18.1	23.8			
65-79	Men	311	20.1 (19.4-20.8)	12.0	16.0	19.4 (18.8-20.1)	23.4	30.6			
65-79	Women	296	16.3 (15.0-16.7)	9.7	13.0	15.7 (14.4-16.1)	19.1	25.0			

[a] AI 4-8 years=7 mg, 9-13 years=11 mg, boys 14-17 years=17 mg, girls 14-17 years=13 mg.
[b] P50<AI, however AI within CI. Therefore, intake is evaluated as seems adequate.

Table B.8 Habitual intake distribution of vitamin B_3 (mg/MJ/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	Evaluation EAR
1-79	Total	3570	1.99 (1.96-2.02)	1.20	1.59	1.93 (1.90-1.96)	2.32	3.01			
1-17	Children	1823	1.66 (1.64-1.69)	1.05	1.35	1.61 (1.59-1.64)	1.92	2.46			
18-79	Adults	1747	2.08 (2.04-2.11)	1.29	1.68	2.01 (1.97-2.05)	2.40	3.08			
1-17	Boys	895	1.68 (1.65-1.74)	1.08	1.38	1.64 (1.60-1.69)	1.94	2.46			
1-17	Girls	928	1.64 (1.60-1.67)	1.02	1.32	1.58 (1.55-1.61)	1.90	2.46			
18-79	Men	880	2.15 (2.09-2.20)	1.40	1.77	2.09 (2.03-2.14)	2.46	3.11			
18-79	Women	867	2.00 (1.96-2.05)	1.22	1.60	1.93 (1.88-1.98)	2.33	3.05			
1-3	Boys	353	1.53 (1.47-1.57)	0.99	1.26	1.49 (1.43-1.52)	1.75	2.19			
1-3	Girls	350	1.62 (1.56-1.65)	1.00	1.29	1.56 (1.50-1.59)	1.88	2.43			
4-11	Boys	270	1.65 (1.61-1.71)	1.07	1.36	1.60 (1.57-1.66)	1.89	2.39			
4-11	Girls	278	1.62 (1.58-1.65)	1.01	1.30	1.57 (1.52-1.59)	1.87	2.44			
12-17	Boys	272	1.80 (1.74-1.87)	1.18	1.49	1.75 (1.69-1.82)	2.06	2.59			
12-17	Girls	300	1.67 (1.63-1.72)	1.04	1.35	1.61 (1.58-1.66)	1.93	2.50			
18-50	Men	318	2.10 (2.02-2.16)	1.37	1.73	2.04 (1.96-2.10)	2.40	3.04	1.3	3.2 (1.8-5.2)	Adequate intakes
18-50	Women	284	1.88 (1.83-1.94)	1.16	1.51	1.81 (1.77-1.87)	2.17	2.82	1.3	10.9 (8.3-12.9)	Low intakes
51-64	Men	251	2.22 (2.15-2.28)	1.46	1.83	2.15 (2.09-2.22)	2.53	3.19	1.3	1.8 (0.8-2.8)	Adequate intakes
51-64	Women	287	2.14 (2.05-2.20)	1.33	1.73	2.06 (1.99-2.12)	2.47	3.21	1.3	4.2 (2.7-5.8)	Adequate intakes
65-79	Men	311	2.21 (2.14-2.28)	1.46	1.83	2.16 (2.08-2.21)	2.53	3.18	1.3	1.8 (0.8-2.8)	Adequate intakes
65-79	Women	296	2.20 (2.12-2.28)	1.36	1.77	2.12 (2.05-2.20)	2.54	3.28	1.3	3.6 (2.1-5.0)	Adequate intakes

Table B.9 Habitual intake distribution of vitamin B_6 (mg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI	UL	% (95%-CI)≥UL	Evaluation UL
1-79	Total	3570	1.5 (1.5-1.5)	0.8	1.2	1.4 (1.4-1.5)	1.8	2.4								
1-17	Children	1823	1.2 (1.2-1.2)	0.7	0.9	1.1 (1.1-1.2)	1.4	1.9								
18-79	Adults	1747	1.6 (1.5-1.6)	0.9	1.3	1.5 (1.5-1.5)	1.9	2.4								
1-17	Boys	895	1.3 (1.3-1.3)	0.7	1.0	1.2 (1.2-1.3)	1.5	2.0								
1-17	Girls	928	1.1 (1.1-1.1)	0.6	0.9	1.1 (1.0-1.1)	1.3	1.7								
18-79	Men	880	1.8 (1.7-1.8)	1.1	1.4	1.7 (1.7-1.8)	2.1	2.6								
18-79	Women	867	1.4 (1.4-1.4)	0.9	1.1	1.4 (1.3-1.4)	1.6	2.0								
1-3	Boys	353	1.0 (1.0-1.0)	0.6	0.8	1.0 (0.9-1.0)	1.2	1.6			0.4	P50>AI	Seems adequate	5	0.0 (0.0-0.0)	Tolerable intakes
1-3	Girls	350	0.9 (0.9-1.0)	0.6	0.7	0.9 (0.9-0.9)	1.1	1.4			0.4	P50>AI	Seems adequate	5	0.0 (0.0-0.0)	Tolerable intakes
4-11	Boys	270	1.2 (1.2-1.3)	0.7	1.0	1.2 (1.2-1.2)	1.5	1.9			0.7; 1.1[a]	P50>AI	Seems adequate	7; 10; 15[c]	4-6 yr: 0.0 (0.0-0.0); 7-10 yr: 0.0 (0.0-0.0); 11 yr: 0.0 (0.0-0.0)	Tolerable intakes

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI	UL	% (95%-CI)≥UL	Evaluation UL
4-11	Girls	278	1.1 (1.0-1.1)	0.6	0.9	1.0 (1.0-1.1)	1.3	1.6			0.7; 1.1[a]	P50>AI	Seems adequate	7; 10; 15[c]	4-6 yr: 0.0 (0.0-0.0); 7-10 yr: 0.0 (0.0-0.0); 11 yr: 0.0 (0.0-0.0)	Tolerable intakes
12-17	Boys	272	1.5 (1.4-1.5)	0.9	1.2	1.4 (1.4-1.5)	1.7	2.2			1.1; 1.5[a]	12-13 yr: P50>AI; 14-17 yr: P50<AI	Seems adequate[b]	15; 20[c]	12-14 yr: 0.0 (0.0-0.0); 15-17 yr: 0.0 (0.0-0.0)	Tolerable intakes
12-17	Girls	300	1.2 (1.2-1.3)	0.8	1.0	1.2 (1.1-1.2)	1.4	1.8			1.1; 1.5[a]	12-13 yr: P50>AI; 14-17 yr: P50<AI	12-13 yr: seems adequate; 14-17 yr: no statement	15; 20[c]	12-14 yr: 0.0 (0.0-0.0); 15-17 yr: 0.0 (0.0-0.0)	Tolerable intakes
18-50	Men	318	1.8 (1.7-1.9)	1.1	1.5	1.8 (1.7-1.8)	2.1	2.7	1.1	4.9 (3.8-7.1)			Adequate intakes	25	0.0 (0.0-0.0)	Tolerable intakes
18-50	Women	284	1.4 (1.3-1.4)	0.9	1.1	1.4 (1.3-1.4)	1.6	2.0	1.1	21.0 (17.6-26.7)			Low intakes	25	0.0 (0.0-0.0)	Tolerable intakes
51-64	Men	251	1.8 (1.7-1.8)	1.1	1.5	1.7 (1.7-1.8)	2.1	2.6	1.3	14.1 (11.6-17.7)			Low intakes	25	0.0 (0.0-0.0)	Tolerable intakes
51-64	Women	287	1.4 (1.4-1.5)	0.9	1.2	1.4 (1.4-1.4)	1.7	2.1	1.1	17.7 (14.3-21.4)			Low intakes	25	0.0 (0.0-0.0)	Tolerable intakes
65-79	Men	311	1.7 (1.6-1.7)	1.0	1.3	1.6 (1.6-1.7)	1.9	2.5	1.3	22.1 (17.2-25.6)			Low intakes	25	0.0 (0.0-0.0)	Tolerable intakes
65-79	Women	296	1.4 (1.3-1.4)	0.9	1.1	1.3 (1.3-1.4)	1.6	2.0	1.1	22.8 (16.5-26.8)			Low intakes	25	0.0 (0.0-0.0)	Tolerable intakes

[a] AI 4-8 years=0.7 mg, 9-13 years=1.1 mg, 14-18 years=1.5 mg.

[b] P50<AI, however AI within CI. Therefore, intake is evaluated as seems adequate.

[c] UL 4-6 years=7 mg, 7-10 years=10 mg, 11-14 years=15 mg, 15-17 years=20 mg.

Table B.10 Habitual intake distribution of folate equivalents (µg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI
1-79	Total	3570	262 (258-266)	140	199	251 (247-254)	313	424					
1-17	Children	1823	206 (203-211)	112	157	197 (194-201)	245	332					
18-79	Adults	1747	277 (271-281)	157	215	265 (260-269)	326	436					
1-17	Boys	895	217 (212-223)	115	164	207 (202-213)	259	353					
1-17	Girls	928	196 (191-202)	111	152	188 (183-194)	230	306					
18-79	Men	880	303 (295-310)	174	237	292 (284-298)	356	471					
18-79	Women	867	250 (244-255)	147	199	242 (236-247)	293	382					
1-3	Boys	353	176 (170-182)	96	134	168 (162-174)	209	283			85	P50>AI	Seems adequate
1-3	Girls	350	171 (162-176)	97	134	165 (156-169)	201	266			85	P50>AI	Seems adequate
4-11	Boys	270	209 (205-217)	116	161	200 (196-207)	249	335			150; 225[a]	P50>AI; P50<AI	Seems adequate[b]
4-11	Girls	278	192 (187-200)	110	151	185 (180-193)	226	298			150; 225[a]	4-8 yr: P50>AI; 9-11 yr: P50<AI	4-8 yr: seems adequate; 9-11 yr: no statement
12-17	Boys	272	244 (237-252)	138	190	235 (227-242)	288	382			225; 300[a]	P50<AI	12-13 yr: seems adequate[b]; 14-17 yr: no statement
12-17	Girls	300	211 (204-220)	122	166	203 (197-213)	247	327			225; 300[a]	P50<AI	No statement

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI
18-50	Men	318	301 (290-309)	173	235	289 (279-297)	355	470	200	11.8 (10.0-14.3)			Low intakes
18-50	Women	284	242 (235-249)	142	192	235 (227-241)	284	369	200	29.5 (25.7-33.1)			Low intakes
51-64	Men	251	311 (302-319)	181	244	300 (291-307)	365	479	200	9.3 (7.5-11.2)			Adequate intakes
51-64	Women	287	260 (251-265)	155	207	251 (243-257)	303	394	200	21.4 (18.7-25.3)			Low intakes
65-79	Men	311	298 (288-310)	172	234	287 (278-299)	350	462	200	11.9 (8.9-14.4)			Low intakes
65-79	Women	296	262 (253-271)	156	209	253 (245-262)	305	397	200	20.5 (16.8-24.4)			Low intakes

[a] AI 4-8 years=150 mg, 9-13 years=225 mg, 14-18 years=300 mg.

[b] P50<AI, however AI within CI. Therefore, intake is evaluated as seems adequate.

Table B.11 Habitual intake distribution of folic acid (µg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	UL	% (95%-CI)≥UL	Evaluation UL
1-79	Total	3570	13 (12-15)	0	0	2 (1-3)	17	60			
1-17	Children	1823	14 (13-15)	0	0	4 (3-6)	20	56			
18-79	Adults	1747	13 (12-15)	0	0	1 (1-2)	16	62			
1-17	Boys	895	14 (13-17)	0	0	4 (3-6)	21	59			
1-17	Girls	928	13 (12-15)	0	0	5 (3-6)	20	53			
18-79	Men	880	17 (14-19)	0	0	2 (1-4)	22	76			
18-79	Women	867	9 (8-11)	0	0	1 (0-2)	11	46			
1-3	Boys	353	17 (14-19)	0	1	7 (5-10)	25	63	200	0.0 (0.0-0.1)	Tolerable intakes
1-3	Girls	350	16 (14-18)	0	1	8 (6-11)	25	57	200	0.0 (0.0-0.0)	Tolerable intakes
4-11	Boys	270	15 (13-17)	0	0	5 (3-7)	21	59	300;400;600 [a]	4-6 yr: 0.0 (0.0-0.0); 7-10 yr: 0.0 (0.0-0.0); 11 yr: 0.0 (0.0-0.0)	Tolerable intakes
4-11	Girls	278	14 (12-15)	0	0	5 (4-7)	21	54	300;400;600 [a]	4-6 yr: 0.0 (0.0-0.0); 7-10 yr: 0.0 (0.0-0.0); 11 yr: 0.0 (0.0-0.0)	Tolerable intakes
12-17	Boys	272	13 (11-16)	0	0	2 (1-5)	18	59	600;800[a]	12-14 yr: 0.0 (0.0-0.0); 15-17 yr: 0.0 (0.0-0.0)	Tolerable intakes
12-17	Girls	300	12 (10-13)	0	0	3 (1-4)	17	49	600;800[a]	12-14 yr: 0.0 (0.0-0.0); 15-17 yr: 0.0 (0.0-0.0)	Tolerable intakes
18-50	Men	318	17 (15-21)	0	0	3 (1-6)	23	75	1000	0.0 (0.0-0.0)	Tolerable intakes
18-50	Women	284	10 (8-12)	0	0	1 (0-2)	12	47	1000	0.0 (0.0-0.0)	Tolerable intakes
51-64	Men	251	17 (14-21)	0	0	2 (1-4)	23	78	1000	0.0 (0.0-0.0)	Tolerable intakes
51-64	Women	287	9 (7-10)	0	0	1 (0-1)	10	45	1000	0.0 (0.0-0.0)	Tolerable intakes
65-79	Men	311	14 (10-17)	0	0	1 (0-2)	15	74	1000	0.0 (0.0-0.0)	Tolerable intakes
65-79	Women	296	8 (7-10)	0	0	0 (0-1)	8	45	1000	0.0 (0.0-0.0)	Tolerable intakes

[a] UL 4-6 years=300 µg, 7-10 years=400 µg, 11-14 years=600 µg, 15-17 years=800 µg.

Table B.12 Habitual intake distribution of vitamin B_{12} (µg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI
1-79	Total	3570	4.0 (3.9-4.1)	1.7	2.7	3.7 (3.6-3.8)	5.0	7.4					
1-17	Children	1823	3.2 (3.1-3.3)	1.4	2.2	3.0 (2.9-3.0)	4.0	5.9					
18-79	Adults	1747	4.2 (4.1-4.3)	1.8	2.9	3.9 (3.8-4.0)	5.2	7.6					
1-17	Boys	895	3.6 (3.4-3.7)	1.6	2.5	3.3 (3.1-3.4)	4.4	6.5					
1-17	Girls	928	2.9 (2.8-3.0)	1.3	2.0	2.7 (2.6-2.8)	3.5	5.1					
18-79	Men	880	4.8 (4.6-5.0)	2.3	3.4	4.5 (4.3-4.6)	5.8	8.4					
18-79	Women	867	3.7 (3.5-3.8)	1.6	2.6	3.5 (3.3-3.6)	4.5	6.5					
1-3	Boys	353	2.9 (2.7-3.1)	1.2	2.0	2.6 (2.5-2.9)	3.5	5.1			0.7	P50>AI	Seems adequate
1-3	Girls	350	2.7 (2.6-2.8)	1.2	1.9	2.5 (2.4-2.7)	3.3	4.8			0.7	P50>AI	Seems adequate
4-11	Boys	270	3.5 (3.3-3.6)	1.6	2.5	3.3 (3.0-3.4)	4.3	6.3			1.3; 2.0[a]	P50>AI	Seems adequate
4-11	Girls	278	2.8 (2.7-2.9)	1.2	2.0	2.6 (2.5-2.7)	3.5	5.0			1.3; 2.0[a]	P50>AI	Seems adequate
12-17	Boys	272	4.0 (3.6-4.1)	1.8	2.8	3.7 (3.4-3.9)	4.8	7.0			2.0; 2.8[a]	P50>AI	Seems adequate
12-17	Girls	300	3.0 (2.8-3.1)	1.3	2.1	2.8 (2.7-2.9)	3.6	5.3			2.0; 2.8[a]	P50>AI; P50<AI	Seems adequate[b]
18-50	Men	318	4.6 (4.3-4.8)	2.2	3.3	4.3 (4.1-4.5)	5.6	8.1	2.0	3.5 (1.9-5.4)			Adequate intakes
18-50	Women	284	3.4	1.5	2.4	3.2	4.2	6.0	2.0	14.9			Low intakes

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evalu-ation EAR/AI
			(3.2-3.5)			(3.0-3.3)				(11.8-18.4)			
51-64	Men	251	5.0 (4.8-5.2)	2.4	3.5	4.6 (4.5-4.9)	6.0	8.6	2.0	2.2 (1.2-3.0)			Adequate intakes
51-64	Women	287	3.9 (3.7-4.0)	1.8	2.8	3.7 (3.5-3.8)	4.8	6.7	2.0	7.5 (5.6-9.8)			Adequate intakes
65-79	Men	311	5.1 (4.8-5.5)	2.5	3.7	4.8 (4.5-5.2)	6.1	8.8	2.0	1.7 (0.8-2.6)			Adequate intakes
65-79	Women	296	4.2 (4.0-4.5)	2.0	3.1	4.0 (3.8-4.2)	5.2	7.2	2.0	5.0 (3.3-6.7)			Adequate intakes

[a] AI 4-8 years=1.3 mg, 9-13 years=2.0 mg, 14-18 years=2.8 mg.

[b] P50<AI, however AI within CI. Therefore, intake is evaluated as seems adequate.

Table B.13 Habitual intake distribution of vitamin C (mg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI
1-79	Total	3570	87 (85-89)	33	57	80 (78-82)	109	166					
1-17	Children	1823	76 (75-79)	29	50	70 (68-72)	96	146					
18-79	Adults	1747	90 (87-92)	35	59	83 (80-85)	113	170					
1-17	Boys	895	78 (76-82)	30	52	72 (70-75)	98	147					
1-17	Girls	928	75 (72-77)	27	48	68 (65-71)	94	146					
18-79	Men	880	92 (89-96)	37	61	85 (82-89)	115	171					
18-79	Women	867	88 (83-91)	33	57	80 (76-84)	110	169					
1-3	Boys	353	76 (70-79)	29	50	70 (64-72)	95	144			25;30[a]	P50>AI	Seems adequate
1-3	Girls	350	72 (69-77)	26	46	65 (62-70)	91	141			25;30[a]	P50>AI	Seems adequate
4-11	Boys	270	77 (75-82)	30	51	71 (69-75)	97	145			30;40; 50[a]	P50>AI	Seems adequate
4-11	Girls	278	74 (71-77)	27	48	68 (65-71)	94	145			30;40; 50[a]	P50>AI	Seems adequate
12-17	Boys	272	80 (77-86)	32	53	74 (71-79)	101	149	60[b]	14-17 yr: 33.1 (27.5-35.7)	50	12-13 yr: P50>AI	12-13 yr: seems adequate; 14-17 yr: low intakes

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI
12-17	Girls	300	76 (73-79)	28	49	69 (66-72)	96	150	50[b]	14-17 yr: 25.8 (23.4-29.4)	50	12-13 yr: P50>AI	12-13 yr: seems adequate; 14-17 yr: low intakes
18-50	Men	318	88 (85-94)	35	58	81 (79-86)	110	164	60	26.7 (21.8-28.4)			Low intakes
18-50	Women	284	84 (77-86)	31	54	76 (71-79)	105	160	50	20.7 (17.9-25.5)			Low intakes
51-64	Men	251	95 (92-99)	39	64	88 (85-92)	119	176	60	20.9 (17.5-23.7)			Low intakes
51-64	Women	287	91 (86-96)	35	60	84 (78-88)	114	174	50	15.8 (12.5-19.2)			Low intakes
65-79	Men	311	99 (92-103)	41	67	92 (85-96)	123	181	60	17.8 (14.6-23.1)			Low intakes
65-79	Women	296	96 (92-105)	37	63	89 (84-96)	120	182	50	13.2 (9.0-15.1)			Low intakes

[a] AI 1 year=25 mg, 2-5 years=30 mg, 6-9 years=40 mg, 10-13 years=50 mg.

[b] EAR boys/men 14+ years=60 mg, girls/women 14+ years=50 mg.

Table B.14 Habitual intake distribution of vitamin D (µg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI	UL	% (95%-CI)≥UL	Evalu-ation UL
1-79	Total	3570	2.7 (2.7-2.8)	1.0	1.7	2.5 (2.4-2.5)	3.5	5.4								
1-17	Children	1823	2.2 (2.1-2.3)	0.8	1.4	2.0 (1.9-2.0)	2.7	4.3								
18-79	Adults	1747	2.9 (2.8-3.0)	1.0	1.8	2.6 (2.5-2.7)	3.6	5.6								
1-17	Boys	895	2.3 (2.2-2.5)	0.8	1.5	2.1 (2.0-2.2)	2.9	4.5								
1-17	Girls	928	2.0 (1.9-2.1)	0.7	1.3	1.8 (1.7-1.9)	2.5	4.0								
18-79	Men	880	3.2 (3.1-3.4)	1.2	2.1	3.0 (2.9-3.1)	4.0	6.0								
18-79	Women	867	2.5 (2.4-2.6)	0.9	1.6	2.3 (2.2-2.4)	3.2	4.9								
1-3	Boys	353	2.2 (2.0-2.3)	0.7	1.3	1.9 (1.7-2.1)	2.7	4.3			3	P50<AI	No statement	50	0.0 (0.0-0.0)	Tolerable intakes
1-3	Girls	350	1.9 (1.8-2.1)	0.7	1.2	1.7 (1.6-1.9)	2.3	3.6			3	P50<AI	No statement	50	0.0 (0.0-0.0)	Tolerable intakes
4-11	Boys	270	2.3 (2.2-2.4)	0.8	1.5	2.1 (2.0-2.2)	2.9	4.4			3	P50<AI	No statement	50; 100[a]	0.0 (0.0-0.0)	Tolerable intakes
4-11	Girls	278	2.0 (1.9-2.1)	0.7	1.2	1.8 (1.7-1.9)	2.5	4.0			3	P50<AI	No statement	50; 100[a]	0.0 (0.0-0.0)	Tolerable intakes
12-17	Boys	272	2.4 (2.3-2.7)	0.9	1.6	2.2 (2.2-2.4)	3.0	4.6			3	P50<AI	No statement	100	0.0 (0.0-0.0)	Tolerable intakes
12-17	Girls	300	2.1 (2.0-2.2)	0.7	1.3	1.9 (1.8-2.0)	2.6	4.2			3	P50<AI	No statement	100	0.0 (0.0-0.0)	Tolerable intakes
18-50	Men	318	2.9 (2.8-3.2)	1.1	1.9	2.7 (2.6-2.9)	3.7	5.5			3	P50<AI	No statement	100	0.0 (0.0-0.0)	Tolerable intakes
18-50	Women	284	2.3 (2.1-2.4)	0.9	1.5	2.1 (1.9-2.2)	3.0	4.5			3	P50<AI	No statement	100	0.0 (0.0-0.0)	Tolerable intakes
51-64	Men	251	3.5 (3.3-3.6)	1.4	2.3	3.2 (3.1-3.4)	4.3	6.3			3	P50>AI	Seems adequate	100	0.0 (0.0-0.0)	Tolerable intakes
51-64	Women	287	2.7 (2.5-2.8)	1.0	1.7	2.4 (2.3-2.6)	3.3	5.1			3	P50<AI	No statement	100	0.0 (0.0-0.0)	Tolerable intakes

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI	UL	% (95%-CI)≥UL	Evaluation UL
65-79	Men	311	3.8 (3.5-3.9)	1.5	2.6	3.5 (3.2-3.7)	4.7	6.9	3	70-79 yr: 34.2 (30.8-43.3)	3	65-69 yr: P50>AI	65-69 yr: seems adequate; 70-79 yr: low intakes	100	0.0 (0.0-0.0)	Tolerable intakes
65-79	Women	296	2.9 (2.7-3.2)	1.1	1.9	2.6 (2.5-2.9)	3.6	5.3	3	70-79 yr: 58.9 (47.8-65.0)	3	65-69 yr: P50<AI	65-69 yr: no statement; 70-79 yr: low intakes	100	0.0 (0.0-0.0)	Tolerable intakes

[a] UL 1-10 years=50 µg, 11+ years=100 µg.

Table B.15 Habitual intake distribution of vitamin E (mg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	UL	% (95%-CI)≥UL	Evaluation UL
1-79	Total	3570	12.7 (12.5-12.9)	6.6	9.6	12.2 (11.9-12.3)	15.3	20.8			
1-17	Children	1823	10.3 (10.1-10.5)	5.1	7.6	9.8 (9.6-10.0)	12.4	17.2			
18-79	Adults	1747	13.4 (13.0-13.6)	7.3	10.2	12.7 (12.4-13.0)	15.8	21.4			
1-17	Boys	895	11.1 (10.8-11.5)	5.4	8.1	10.6 (10.3-11.0)	13.5	18.7			
1-17	Girls	928	9.5 (9.2-9.8)	5.0	7.2	9.1 (8.8-9.4)	11.4	15.3			
18-79	Men	880	14.8 (14.3-15.2)	8.3	11.5	14.2 (13.7-14.6)	17.5	23.3			
18-79	Women	867	11.9 (11.5-12.2)	6.8	9.4	11.5 (11.1-11.8)	14.0	18.3			
1-3	Boys	353	7.9 (7.6-8.3)	4.0	5.9	7.5 (7.2-7.9)	9.5	13.2	100	0.0 (0.0-0.0)	Tolerable intakes
1-3	Girls	350	7.3 (7.0-7.7)	3.9	5.6	7.1 (6.7-7.3)	8.7	11.8	100	0.0 (0.0-0.0)	Tolerable intakes
4-11	Boys	270	10.7 (10.4-11.3)	5.7	8.1	10.3 (9.9-10.8)	12.9	17.4	120; 160; 220[a]	4-6 yr: 0.0 (0.0-0.0); 7-10 yr: 0.0 (0.0-0.0); 11 yr: 0.0 (0.0-0.0)	Tolerable intakes
4-11	Girls	278	9.3 (8.9-9.7)	5.1	7.2	8.9 (8.6-9.3)	11.0	14.5	120; 160; 220[a]	4-6 yr: 0.0 (0.0-0.0); 7-10 yr: 0.0 (0.0-0.0); 11 yr: 0.0 (0.0-0.0)	Tolerable intakes
12-17	Boys	272	13.0 (12.5-13.4)	7.2	10.1	12.5 (12.0-12.9)	15.5	20.5	220; 260[a]	12-14 yr: 0.0 (0.0-0.0); 15-17 yr: 0.0 (0.0-0.0)	Tolerable intakes

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	UL	% (95%-CI)≥UL	Evaluation UL
12-17	Girls	300	10.7 (10.3-11.1)	6.2	8.4	10.3 (10.0-10.7)	12.6	16.4	220; 260[a]	12-14 yr: 0.0 (0.0-0.0); 15-17 yr: 0.0 (0.0-0.0)	Tolerable intakes
18-50	Men	318	15.2 (14.4-15.7)	8.6	11.8	14.6 (13.9-15.1)	17.9	23.8	300	0.0 (0.0-0.0)	Tolerable intakes
18-50	Women	284	12.2 (11.6-12.6)	7.0	9.6	11.8 (11.2-12.2)	14.4	18.7	300	0.0 (0.0-0.0)	Tolerable intakes
51-64	Men	251	14.8 (14.3-15.3)	8.4	11.5	14.2 (13.7-14.7)	17.4	23.1	300	0.0 (0.0-0.0)	Tolerable intakes
51-64	Women	287	11.9 (11.5-12.2)	6.9	9.4	11.5 (11.1-11.8)	14.0	18.1	300	0.0 (0.0-0.0)	Tolerable intakes
65-79	Men	311	13.7 (13.3-14.3)	7.7	10.7	13.2 (12.8-13.7)	16.2	21.5	300	0.0 (0.0-0.0)	Tolerable intakes
65-79	Women	296	11.0 (10.6-11.6)	6.4	8.7	10.6 (10.3-11.2)	13.0	17.0	300	0.0 (0.0-0.0)	Tolerable intakes

[a] UL 4-6 years=120 mg, 7-10 years=160 mg, 11-14 years=220 mg, 15-17 years=260 mg.

Table B.16 Habitual intake distribution of calcium (mg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI	UL	% (95%-CI)≥UL	Evaluation UL
1-79	Total	3570	956 (942-974)	491	720	916 (904-935)	1150	1552								
1-17	Children	1823	800 (782-816)	413	602	766 (748-781)	960	1306								
18-79	Adults	1747	995 (978-1018)	528	761	957 (942-980)	1190	1590								
1-17	Boys	895	862 (831-883)	448	649	827 (797-849)	1036	1402								
1-17	Girls	928	739 (718-764)	389	564	712 (690-737)	883	1180								
18-79	Men	880	1071 (1044-1105)	587	830	1035 (1009-1067)	1274	1680								
18-79	Women	867	920 (899-947)	490	706	886 (868-915)	1098	1459								
1-3	Boys	353	755 (729-791)	392	569	724 (698-758)	910	1231			500	P50>AI	Seems adequate			
1-3	Girls	350	710 (666-730)	379	541	684 (640-703)	849	1129			500	P50>AI	Seems adequate			
4-11	Boys	270	848 (813-871)	446	640	814 (780-838)	1017	1368			700; 1200[a]	P50>AI; P50<AI	4-8 yr: seems adequate; 9-11 yr: no statement			
4-11	Girls	278	731 (709-757)	384	557	704 (682-730)	875	1168			700; 1100[a]	P50<AI	No statement			
12-17	Boys	272	928 (884-954)	498	709	893 (851-920)	1109	1480			1200	P50<AI	No statement			

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI	UL	% (95%-CI)≥UL	Evaluation UL
12-17	Girls	300	760 (733-806)	404	584	733 (705-780)	906	1211			1100	P50<AI	No statement			
18-50	Men	318	1065 (1029-1104)	581	823	1029 (995-1066)	1268	1674	750; 860[b]	19.2 (16.2-22.3)			Low intakes	2500	0.1 (0.0-0.2)	Tolerable intakes
18-50	Women	284	860 (838-899)	458	660	828 (807-868)	1025	1364	750; 860[b]	41.8 (36.1-44.9)	1100[a]	50 yr: P50<AI	18-49 yr: low intakes; 50 yr: no statement	2500	0.0 (0.0-0.0)	Tolerable intakes
51-64	Men	251	1089 (1061-1140)	601	847	1053 (1025-1103)	1293	1698	750	15.2 (11.4-17.8)			Low intakes	2500	0.1 (0.0-0.2)	Tolerable intakes
51-64	Women	287	965 (936-1003)	539	753	935 (907-972)	1141	1498			1100	P50<AI	No statement	2500	0.0 (0.0-0.0)	Tolerable intakes
65-79	Men	311	1066 (1020-1106)	584	827	1030 (983-1071)	1266	1670	750[b]	65-69 yr: 16.6 (12.7-19.9)	1200[a]	70-79 yr: P50<AI	65-69 yr: low intakes; 70-79 yr: no statement	2500	0.1 (0.0-0.1)	Tolerable intakes
65-79	Women	296	1037 (976-1067)	586	816	1003 (945-1035)	1226	1593			1100; 1200[a]	P50<AI	No statement	2500	0.0 (0.0-0.1)	Tolerable intakes

[a] AI 4-8 years=700 mg, boys 9-17 years=1200 mg, girls 9-17 years=1100 mg, women 50-69 years=1100 mg, 70+ years=1200 mg.

[b] EAR 18-24 years=860 mg, men 25-69 years and women 25-49 years=750 mg.

Table B.17 Habitual intake distribution of copper (mg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI	UL	% (95%-CI)≥UL	Evaluation UL
1-79	Total	3570	1.3 (1.3-1.4)	0.8	1.1	1.3 (1.3-1.3)	1.6	2.1								
1-17	Children	1823	1.1 (1.1-1.1)	0.6	0.9	1.0 (1.0-1.1)	1.3	1.7								
18-79	Adults	1747	1.4 (1.4-1.4)	0.9	1.1	1.4 (1.3-1.4)	1.6	2.1								
1-17	Boys	895	1.1 (1.1-1.2)	0.7	0.9	1.1 (1.1-1.1)	1.3	1.8								
1-17	Girls	928	1.0 (1.0-1.0)	0.6	0.8	1.0 (1.0-1.0)	1.2	1.5								
18-79	Men	880	1.5 (1.5-1.6)	1.0	1.3	1.5 (1.5-1.5)	1.8	2.3								
18-79	Women	867	1.3 (1.3-1.3)	0.8	1.1	1.3 (1.2-1.3)	1.5	1.8								
1-3	Boys	353	0.8 (0.8-0.9)	0.5	0.7	0.8 (0.8-0.8)	1.0	1.2			0.3; 0.4[a]	P50>AI	Seems adequate	1	22.3 (19.2-26.3)	High intakes
1-3	Girls	350	0.8 (0.8-0.8)	0.5	0.7	0.8 (0.8-0.8)	0.9	1.2			0.3; 0.4[a]	P50>AI	Seems adequate	1	14.5 (12.0-17.7)	High intakes
4-11	Boys	270	1.1 (1.1-1.1)	0.7	0.9	1.1 (1.0-1.1)	1.3	1.7			0.4; 0.5; 0.7[a]	P50>AI	Seems adequate	2; 3; 4[b]	4-6 yr: 0.3 (0.0-0.6); 7-10 yr: 0.0 (0.0-0.0); 11 yr: 0.0 (0.0-0.0)	Tolerable intakes
4-11	Girls	278	1.0 (1.0-1.0)	0.6	0.8	1.0 (0.9-1.0)	1.2	1.5			0.4; 0.5; 0.7[a]	P50>AI	Seems adequate	2; 3; 4[b]	4-6 yr: 0.1 (0.0-0.1); 7-10 yr: 0.0 (0.0-0.0); 11	Tolerable intakes

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI	UL	% (95%-CI)≥UL	Evaluation UL
															yr: 0.0 (0.0-0.0)	
12-17	Boys	272	1.3 (1.3-1.4)	0.9	1.1	1.3 (1.2-1.3)	1.5	1.9	0.7[c]	14-17 yr: 0.7 (0.2-1.1)	0.7	12-13 yr: P50>AI	12-13 yr: seems adequate; 14-17 yr: adequate intakes	4	12-14 yr: 0.0 (0.0-0.0); 15-17 yr: 0.0 (0.0-0.0)	Tolerable intakes
12-17	Girls	300	1.1 (1.1-1.2)	0.8	1.0	1.1 (1.1-1.1)	1.3	1.6	0.7[c]	14-17 yr: 2.3 (1.5-3.4)	0.7	12-13 yr: P50>AI	12-13 yr: seems adequate; 14-17 yr: adequate intakes	4	12-14 yr: 0.0 (0.0-0.0); 15-17 yr: 0.0 (0.0-0.0)	Tolerable intakes
18-50	Men	318	1.6 (1.5-1.6)	1.0	1.3	1.5 (1.5-1.6)	1.8	2.3	0.7	0.1 (0.0-0.2)			Adequate intakes	5	0.0 (0.0-0.0)	Tolerable intakes
18-50	Women	284	1.3 (1.3-1.3)	0.8	1.1	1.3 (1.2-1.3)	1.5	1.8	0.7	1.1 (0.4-1.7)			Adequate intakes	5	0.0 (0.0-0.0)	Tolerable intakes
51-64	Men	251	1.5 (1.5-1.6)	1.0	1.3	1.5 (1.5-1.5)	1.8	2.3	0.7	0.1 (0.0-0.2)			Adequate intakes	5	0.0 (0.0-0.0)	Tolerable intakes
51-64	Women	287	1.3 (1.3-1.4)	0.9	1.1	1.3 (1.3-1.3)	1.5	1.9	0.7	0.7 (0.2-1.1)			Adequate intakes	5	0.0 (0.0-0.0)	Tolerable intakes
65-79	Men	311	1.4 (1.4-1.5)	0.9	1.2	1.4 (1.3-1.4)	1.6	2.1	0.7	0.4 (0.2-0.6)			Adequate intakes	5	0.0 (0.0-0.0)	Tolerable intakes
65-79	Women	296	1.3 (1.2-1.3)	0.8	1.1	1.3 (1.2-1.3)	1.5	1.8	0.7	0.8 (0.4-1.4)			Adequate intakes	5	0.0 (0.0-0.0)	Tolerable intakes

[a] AI 1 year=0.3 mg, 2-5 years=0.4 mg, 6-9 years=0.5 mg, 10-13 years=0.7 mg.
[b] UL 4-6 years=2 mg, 7-10 years=3 mg, 11-17 years=4 mg.
[c] EAR 14+ years=0.7 mg.

Table B.18 Habitual intake distribution of iodine (µg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI	UL	% (95%-CI)≥UL	Evaluation UL
1-79	Total	3570	178 (176-181)	98	138	172 (169-175)	211	280								
1-17	Children	1823	159 (157-162)	90	125	154 (151-156)	188	247								
18-79	Adults	1747	183 (180-186)	101	142	177 (174-180)	217	286								
1-17	Boys	895	172 (168-177)	97	136	168 (164-172)	203	263								
1-17	Girls	928	146 (143-150)	86	117	142 (139-145)	171	221								
18-79	Men	880	202 (198-208)	117	162	197 (193-203)	237	304								
18-79	Women	867	164 (160-168)	92	129	158 (155-162)	193	253								
1-3	Boys	353	141 (136-145)	81	112	137 (132-140)	165	217			70; 90[a]	P50>AI	Seems adequate	200	8.4 (6.5-10.6)	High intakes
1-3	Girls	350	131 (127-137)	77	105	127 (123-132)	153	200			70; 90[a]	P50>AI	Seems adequate	200	4.9 (3.5-6.6)	High intakes
4-11	Boys	270	171 (166-176)	101	137	167 (162-171)	200	256			90; 120; 150[a]	P50>AI	Seems adequate	250; 300; 450[b]	4-6 yr: 4.1 (2.8-5.3); 7-10 yr: 1.3 (0.8-1.9); 11 yr: 0.0 (0.0-0.0)	4-6 yr: high intakes; 7-11 yr: tolerable intakes
4-11	Girls	278	148 (143-151)	88	119	144 (139-147)	171	220			90; 120; 150[a]	4-9 yr: P50>AI; 10-11 yr: P50<AI	Seems adequate	250; 300; 450[b]	4-6 yr: 1.6 (0.8-1.9); 7-10 yr: 0.4 (0.1-0.5);	Tolerable intakes

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evalu-ation EAR/AI	UL	% (95%-CI)≥UL	Evalu-ation UL
															11 yr: 0.0 (0.0-0.0)	
12-17	Boys	272	188 (184-195)	111	152	184 (179-191)	219	279	100[c]	14-17 yr: 3.0 (1.7-3.6)	150[a]	12-13 yr: P50>AI	12-13 yr: seems adequate 14-17 yr: adequate intakes	450; 500[b]	12-14 yr 0.0 (0.0-0.0); 15-17 yr: 0.0 (0.0-0.0)	Tolerable intakes
12-17	Girls	300	152 (147-156)	88	122	148 (143-152)	178	229	100[c]	14-17 yr: 9.9 (7.8-12.0)	150[a]	12-13 yr: P50<AI	12-13 yr: seems adequate 14-17 yr: adequate intakes	450; 500[b]	12-14 yr 0.0 (0.0-0.0); 15-17 yr: 0.0 (0.0-0.0)	Tolerable intakes
18-50	Men	318	199 (193-206)	115	159	194 (189-201)	233	299			150	P50>AI	Seems adequate	600	0.0 (0.0-0.0)	Tolerable intakes
18-50	Women	284	158 (153-163)	89	125	153 (149-158)	186	242			150	P50>AI	Seems adequate	600	0.0 (0.0-0.0)	Tolerable intakes
51-64	Men	251	206 (199-212)	120	165	201 (194-207)	241	309			150	P50>AI	Seems adequate	600	0.0 (0.0-0.0)	Tolerable intakes
51-64	Women	287	168 (163-173)	95	132	162 (158-168)	197	259			150	P50>AI	Seems adequate	600	0.0 (0.0-0.0)	Tolerable intakes
65-79	Men	311	208 (200-215)	122	167	202 (194-210)	243	312			150	P50>AI	Seems adequate	600	0.0 (0.0-0.0)	Tolerable intakes
65-79	Women	296	175 (169-182)	100	139	170 (163-175)	206	270			150	P50>AI	Seems adequate	600	0.0 (0.0-0.0)	Tolerable intakes

[a] AI 1 year=70 µg, 2-5 years=90 µg, 6-9 years=120 µg, 10-13 years=150 µg.

[b] UL 4-6 years=250 µg, 7-10 years=300 µg, 11-14 years=450 µg, 15-17 years=500 µg.

[c] EAR 14-17 years=100 µg.

[d] P50<AI, however AI within CI. Therefore, intake is evaluated as seems adequate.

Table B.19 Habitual intake distribution of total iron (mg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI
1-79	Total	3570	9.9 (9.8-10.0)	5.6	7.9	9.6 (9.5-9.8)	11.6	14.9					
1-17	Children	1823	7.7 (7.6-7.8)	4.4	6.1	7.5 (7.3-7.6)	9.1	11.9					
18-79	Adults	1747	10.4 (10.3-10.6)	6.5	8.5	10.2 (10.0-10.3)	12.1	15.3					
1-17	Boys	895	8.3 (8.1-8.5)	4.6	6.6	8.2 (7.9-8.3)	9.9	12.7					
1-17	Girls	928	7.1 (7.0-7.3)	4.3	5.8	6.9 (6.8-7.1)	8.3	10.5					
18-79	Men	880	11.6 (11.4-11.9)	7.7	9.7	11.4 (11.2-11.7)	13.3	16.4					
18-79	Women	867	9.2 (9.1-9.5)	6.0	7.7	9.1 (8.9-9.3)	10.6	13.1					
1-3	Boys	353	6.0 (5.9-6.3)	3.6	4.8	5.8 (5.7-6.1)	7.1	9.2			8	P50<AI	No statement
1-3	Girls	350	5.8 (5.5-6.0)	3.5	4.7	5.6 (5.4-5.8)	6.7	8.5			8	P50<AI	No statement
4-11	Boys	270	8.1 (7.8-8.3)	4.9	6.6	7.9 (7.6-8.1)	9.4	11.9			8; 9; 11[a]	P50<AI	No statement
4-11	Girls	278	7.0 (6.8-7.2)	4.4	5.8	6.9 (6.7-7.0)	8.1	10.2			8; 9; 11[a]	P50<AI	No statement
12-17	Boys	272	9.7 (9.4-9.9)	6.3	8.1	9.5 (9.2-9.7)	11.1	13.8	7[b]	14-17 yr: 9.6 (7.7-12.5)	11	12-13 yr: P50<AI	12-13 yr: no statement; 14-17 yr: adequate intakes

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI
12-17	Girls	300	7.8 (7.6-8.1)	5.0	6.5	7.6 (7.5-8.0)	8.9	11.1	10[b]	14-17 yr: 86.6 (82.7-89.2)	11	12-13 yr: P50<AI	12-13 yr: no statement; 14-17 yr: low intakes
18-50	Men	318	11.6 (11.3-12.0)	7.6	9.7	11.4 (11.1-11.8)	13.3	16.5	6	0.6 (0.3-0.9)			Adequate intakes
18-50	Women	284	8.9 (8.8-9.3)	5.8	7.4	8.7 (8.6-9.1)	10.2	12.6	7	37.3 (34.0-37.8)[c]			Low intakes
51-64	Men	251	11.8 (11.6-12.1)	7.8	9.9	11.6 (11.3-11.9)	13.5	16.5	6	0.4 (0.2-0.6)			Adequate intakes
51-64	Women	287	9.5 (9.3-9.8)	6.3	8.0	9.4 (9.1-9.6)	10.9	13.4	6	3.3 (2.0-4.4)			Adequate intakes
65-79	Men	311	11.3 (11.0-11.6)	7.5	9.5	11.1 (10.8-11.4)	12.9	15.9	6	0.6 (0.3-1.2)			Adequate intakes
65-79	Women	296	9.8 (9.3-9.9)	6.5	8.2	9.6 (9.1-9.7)	11.1	13.6	6	2.4 (1.7-4.1)			Adequate intakes

[a] AI 1-5 years=8 mg, 6-9 years=9 mg, 10-13 years=11 mg.
[b] EAR boys 14-17=7 mg, girls 14-17 years=10 mg.
[c] Percentage is calculated using Beaton's Full Probability Approach.

Table B.20 Habitual intake distribution of magnesium (mg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	AI	P50 related to AI	Evaluation AI
1-79	Total	3570	326 (322-331)	187	257	316 (313-321)	384	500			
1-17	Children	1823	252 (247-256)	149	201	244 (237-247)	295	384			
18-79	Adults	1747	345 (341-351)	213	278	334 (330-340)	400	513			
1-17	Boys	895	270 (264-276)	158	214	261 (256-268)	317	410			
1-17	Girls	928	235 (226-238)	143	191	230 (220-233)	273	346			
18-79	Men	880	385 (377-392)	249	318	375 (368-382)	441	551			
18-79	Women	867	306 (302-313)	198	254	299 (295-307)	350	436			
1-3	Boys	353	211 (205-217)	132	171	206 (199-212)	243	310	85;120[a]	P50>AI	Seems adequate
1-3	Girls	350	193 (189-203)	122	157	188 (184-198)	224	282	85;120[a]	P50>AI	Seems adequate
4-11	Boys	270	259 (254-267)	160	210	251 (247-259)	299	383	120;200; 280[a]	P50>AI	Seems adequate
4-11	Girls	278	232 (220-235)	147	191	227 (214-230)	267	335	120;200; 280[a]	4-9 yr: P50>AI; 10-11 yr: P50<AI	4-9 yr: seems adequate; 10-11 yr: no statement
12-17	Boys	272	310 (300-318)	198	256	302 (293-309)	356	448	280;350[a]	12-13 yr: P50>AI; 14-17 yr: P40<AI	12-13 yr: seems adequate; 14-17 yr: no statement
12-17	Girls	300	258 (245-263)	168	213	251 (239-257)	295	369	280	P50<AI	No statement
18-50	Men	318	386 (376-395)	249	319	377 (367-385)	442	554	350	P50>AI	Seems adequate
18-50	Women	284	294 (289-302)	191	244	287 (283-296)	338	420	300	P50<AI	No statement
51-64	Men	251	392 (385-402)	257	326	383 (376-393)	449	560	350	P50>AI	Seems adequate
51-64	Women	287	316 (311-327)	208	264	310 (304-320)	361	445	300	P50>AI	Seems adequate
65-79	Men	311	371 (360-379)	241	307	361 (352-370)	424	533	350	P50>AI	Seems adequate
65-79	Women	296	325 (317-335)	214	272	318 (310-328)	371	458	300	P50>AI	Seems adequate

[a] AI 1 year=85 mg, 2-5 years=120 mg, 6-9 years=200 mg, 10-17 years=280 mg.

Table B.21 Habitual intake distribution of phosphorus (mg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95
1-79	Total	3570	1410 (1388-1426)	823	1125	1374 (1353-1390)	1657	2122
1-17	Children	1823	1135 (1117-1159)	671	907	1103 (1083-1125)	1328	1707
18-79	Adults	1747	1480 (1452-1499)	917	1203	1443 (1416-1461)	1718	2172
1-17	Boys	895	1220 (1198-1264)	709	977	1192 (1169-1237)	1436	1820
1-17	Girls	928	1051 (1021-1071)	646	859	1029 (1000-1050)	1218	1528
18-79	Men	880	1663 (1614-1688)	1096	1397	1635 (1587-1658)	1898	2327
18-79	Women	867	1300 (1277-1326)	849	1088	1279 (1255-1304)	1490	1828
1-3	Boys	353	954 (922-979)	579	767	930 (898-956)	1111	1435
1-3	Girls	350	884 (857-919)	538	722	860 (837-899)	1025	1299
4-11	Boys	270	1180 (1152-1232)	729	964	1156 (1126-1206)	1368	1717
4-11	Girls	278	1040 (1001-1065)	661	860	1019 (981-1044)	1198	1488
12-17	Boys	272	1387 (1362-1443)	903	1154	1360 (1335-1416)	1592	1973
12-17	Girls	300	1138 (1095-1168)	734	948	1117 (1075-1147)	1305	1612
18-50	Men	318	1684 (1614-1718)	1115	1416	1656 (1587-1688)	1919	2354
18-50	Women	284	1259 (1228-1295)	821	1052	1237 (1206-1273)	1442	1770
51-64	Men	251	1685 (1631-1712)	1122	1421	1657 (1604-1682)	1920	2344
51-64	Women	287	1339 (1311-1370)	884	1127	1317 (1289-1348)	1528	1864
65-79	Men	311	1569 (1529-1628)	1028	1316	1542 (1502-1599)	1792	2203
65-79	Women	296	1372 (1330-1405)	911	1156	1351 (1309-1382)	1566	1904

Table B.22 Habitual intake distribution of potassium (mg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	AI	P50 related to AI	Evaluation EAR/AI
1-79	Total	3570	3042 (2998-3080)	1752	2423	2978 (2929-3014)	3587	4554			
1-17	Children	1823	2345 (2303-2380)	1413	1888	2284 (2241-2315)	2734	3490			
18-79	Adults	1747	3219 (3168-3267)	2001	2637	3154 (3099-3197)	3730	4667			
1-17	Boys	895	2514 (2448-2567)	1496	2031	2460 (2391-2510)	2943	3711			
1-17	Girls	928	2178 (2130-2224)	1359	1790	2134 (2087-2180)	2516	3143			
18-79	Men	880	3565 (3498-3643)	2359	3005	3510 (3441-3586)	4062	4963			
18-79	Women	867	2876 (2810-2925)	1851	2393	2828 (2756-2879)	3306	4069			
1-3	Boys	353	2045 (1998-2137)	1248	1651	1995 (1950-2091)	2381	3057	1400; 1800[a]	P50>AI	Seems adequate
1-3	Girls	350	1946 (1881-2013)	1207	1601	1900 (1840-1973)	2247	2829	1400; 1800[a]	P50>AI	Seems adequate
4-11	Boys	270	2440 (2366-2488)	1517	1998	2395 (2315-2435)	2824	3534	1800; 2000; 3300[a]	4-9 yr: P50>AI; 10-11 yr: P50<AI	4-9 yr: seems adequate; 10-11 yr: no statement
4-11	Girls	278	2140 (2087-2195)	1357	1767	2096 (2046-2152)	2467	3063	1800; 2000; 2900[a]	4-9 yr: P50>AI; 10-11 yr: P50<AI	4-9 yr: seems adequate; 10-11 yr: no statement
12-17	Boys	272	2813 (2706-2898)	1830	2340	2761 (2654-2844)	3228	4000	3300; 3500[a]	P50<AI	No statement
12-17	Girls	300	2329 (2247-2400)	1494	1935	2287 (2205-2357)	2673	3302	2900; 3100[a]	P50<AI	No statement

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	AI	P50 related to AI	Evaluation EAR/AI
18-50	Men	318	3483 (3403-3583)	2298	2925	3426 (3347-3524)	3974	4878	3500	P50<AI	No statement
18-50	Women	284	2700 (2606-2773)	1749	2252	2656 (2559-2728)	3100	3808	3500	P50<AI	No statement
51-64	Men	251	3692 (3608-3805)	2480	3132	3635 (3551-3746)	4191	5092	3500	P50>AI	Seems adequate
51-64	Women	287	3025 (2947-3078)	2019	2560	2978 (2901-3033)	3443	4175	3500	P50<AI	No statement
65-79	Men	311	3636 (3519-3710)	2437	3079	3579 (3461-3653)	4130	5019	3500	P50>AI	Seems adequate
65-79	Women	296	3197 (3111-3283)	2161	2713	3154 (3066-3235)	3632	4381	3500	P50<AI	No statement

[a] AI 1 year=1400 mg, 2-5 years=1800 mg, 6-9 years=2000 mg, boys 10-13 years=3300 mg, girls 10-13 years=2900 mg, boys 14-17 years=3500 mg, girls 14-17 years=3100 mg.

Table B.23 Habitual intake distribution of selenium (µg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	UL	% (95%-CI)≥UL	Evaluation UL
1-79	Total	3570	46 (45-47)	22	33	43 (42-44)	55	78			
1-17	Children	1823	34 (33-34)	17	25	32 (31-32)	40	56			
18-79	Adults	1747	49 (47-50)	26	36	46 (45-47)	58	81			
1-17	Boys	895	36 (35-37)	19	27	34 (33-35)	44	61			
1-17	Girls	928	31 (29-32)	17	23	29 (28-30)	37	50			
18-79	Men	880	55 (53-56)	31	42	52 (50-53)	64	88			
18-79	Women	867	42 (41-44)	24	32	40 (39-42)	50	69			
1-3	Boys	353	26 (25-27)	15	20	25 (24-26)	30	41	60	0.2 (0.0-0.5)	Tolerable intakes
1-3	Girls	350	25 (24-26)	14	19	23 (23-25)	29	39	60	0.1 (0.0-0.4)	Tolerable intakes
4-11	Boys	270	35 (34-36)	19	26	33 (32-34)	41	56	90;130;200[a]	4-6 yr: 0.0 (0.0-0.1); 7-10 yr: 0.0 (0.0-0.0); 11 yr: 0.0 (0.0-0.0)	Tolerable intakes
4-11	Girls	278	30 (28-31)	17	23	29 (27-30)	36	49	90;130;200[a]	4-6 yr: 0.0 (0.0-0.1); 7-11 yr: 0.0 (0.0-0.0)	Tolerable intakes
12-17	Boys	272	42 (41-44)	24	33	40 (39-42)	50	67	200;250[a]	0.0 (0.0-0.0)	Tolerable intakes
12-17	Girls	300	34 (32-35)	19	27	33 (31-34)	40	54	200;250[a]	0.0 (0.0-0.0)	Tolerable intakes
18-50	Men	318	55 (52-57)	31	42	52 (50-54)	64	88	300	0.0 (0.0-0.0)	Tolerable intakes
18-50	Women	284	41 (39-43)	23	31	38 (37-40)	48	66	300	0.0 (0.0-0.0)	Tolerable intakes
51-64	Men	251	56 (54-58)	32	43	53 (52-55)	66	89	300	0.0 (0.0-0.0)	Tolerable intakes
51-64	Women	287	44 (43-47)	25	34	42 (41-44)	52	71	300	0.0 (0.0-0.0)	Tolerable intakes
65-79	Men	311	53 (51-55)	30	41	50 (49-53)	62	84	300	0.0 (0.0-0.0)	Tolerable intakes
65-79	Women	296	46 (43-48)	26	35	43 (41-45)	53	73	300	0.0 (0.0-0.0)	Tolerable intakes

[a] UL 4-6 years=90 µg, 7-10 years=130 µg, 11-14 years=200 µg, 15-17 years=250 µg.

Table B.24 Habitual intake distribution of sodium (mg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	Guideline	% (95%-CI)≥Guideline	Evaluation guideline
1-79	Total	3570	2247 (2218-2278)	1244	1774	2197 (2162-2232)	2668	3422			
1-17	Children	1823	1871 (1841-1905)	939	1427	1825 (1795-1859)	2261	2966			
18-79	Adults	1747	2343 (2308-2379)	1390	1878	2286 (2246-2327)	2748	3491			
1-17	Boys	895	2013 (1957-2062)	992	1549	1979 (1926-2032)	2432	3141			
1-17	Girls	928	1731 (1698-1780)	901	1342	1692 (1655-1745)	2073	2697			
18-79	Men	880	2637 (2590-2692)	1714	2201	2591 (2542-2644)	3020	3721			
18-79	Women	867	2052 (1997-2097)	1269	1673	2003 (1949-2049)	2377	3002			
1-3	Boys	353	1280 (1245-1337)	685	985	1237 (1204-1295)	1540	2001	1200	53.6 (50.4-59.2)	High intakes
1-3	Girls	350	1214 (1189-1251)	656	928	1172 (1144-1210)	1447	1928	1200	47.2 (44.5-50.8)	High intakes
4-11	Boys	270	1962 (1904-2022)	1183	1578	1915 (1859-1971)	2289	2915	1600; 2000[a]	4-8 yr: 54.2 (50.2-58.5); 9-11 yr: 48.2 (42.4-51.4)	High intakes
4-11	Girls	278	1708 (1668-1782)	1002	1366	1665 (1620-1735)	2002	2567	1600; 2000[a]	4-8 yr: 37.6 (33.4-45.0); 9-11 yr: 21.6 (18.7-25.4)	High intakes
12-17	Boys	272	2400 (2316-2451)	1553	1999	2355 (2272-2402)	2747	3403	2000	48.2 (42.4-51.4)	High intakes
12-17	Girls	300	1988 (1929-2043)	1231	1622	1942 (1882-1994)	2303	2915	2000	21.6 (18.7-25.4)	High intakes
18-50	Men	318	2707 (2631-2774)	1778	2270	2662 (2585-2725)	3091	3793	2400	67.2 (62.3-71.3)	High intakes
18-50	Women	284	2113 (2022-2183)	1321	1732	2065 (1974-2135)	2438	3066	2400	27.1 (21.6-31.7)	High intakes
51-64	Men	251	2612 (2569-2685)	1709	2181	2566 (2524-2639)	2986	3679	2400	61.1 (58.4-66.4)	High intakes
51-64	Women	287	2022 (1977-2066)	1254	1649	1973 (1930-2021)	2339	2964	2400	22.0 (18.8-24.7)	High intakes
65-79	Men	311	2464 (2396-2549)	1592	2050	2418 (2350-2503)	2825	3492	2400	51.1 (46.5-57.2)	High intakes
65-79	Women	296	1915 (1847-1987)	1178	1560	1869 (1801-1940)	2218	2811	2400	16.0 (12.0-20.3)	High intakes

[a] UL 1-3 years=1200 mg, 4-8 years=1800 mg, 9+ years=2400 mg.

Table B.25 Habitual intake distribution of zinc (mg/day) from exclusively foods by the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic characteristics, season and day of the week (n=3570).

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI	UL	% (95%-CI) ≥UL	Evalu-ation UL
1-79	Total	3570	9.8 (9.7-10.0)	5.6	7.7	9.5 (9.4-9.6)	11.6	15.0								
1-17	Children	1823	7.7 (7.6-7.9)	4.6	6.1	7.5 (7.3-7.6)	9.0	11.8								
18-79	Adults	1747	10.3 (10.2-10.5)	6.3	8.3	10.0 (9.8-10.2)	12.0	15.4								
1-17	Boys	895	8.4 (8.2-8.6)	5.0	6.7	8.2 (8.0-8.4)	9.9	12.7								
1-17	Girls	928	7.1 (6.9-7.3)	4.4	5.8	6.9 (6.7-7.1)	8.2	10.4								
18-79	Men	880	11.7 (11.4-11.9)	7.7	9.7	11.4 (11.1-11.6)	13.3	16.6								
18-79	Women	867	9.0 (8.8-9.2)	5.8	7.4	8.8 (8.6-9.0)	10.3	12.9								
1-3	Boys	353	6.3 (6.1-6.5)	4.0	5.2	6.2 (6.0-6.3)	7.3	9.3			5; 6[a]	P50>AI	Seems adequate	7	30.5 (26.2-34.3)	High intakes
1-3	Girls	350	5.9 (5.7-6.1)	3.7	4.8	5.7 (5.5-5.9)	6.7	8.5			5; 6[a]	P50>AI	Seems adequate	7	20.8 (16.2-24.8)	High intakes
4-11	Boys	270	1.2 (1.2-1.3)	0.7	0.9	1.2 (1.2-1.3)	1.5	2.0			6; 7; 11[a]	4-9 yr: P50>AI; 10-11 yr: P50<AI	4-9 yr: seems adequate; 10-11 yr: no statement	10; 13; 18[b]	4-6 yr: 9.6 (6.8-12.0); 7-10 yr: 2.9 (1.5-4.1); 11 yr: 0.1 (0.0-0.4)	4-10 yr: high intakes; 11 yr: tolerable intakes
4-11	Girls	278	7.0 (6.8-7.2)	4.5	5.8	6.9 (6.6-7.0)	8.1	10.2			6; 7; 8[a]	4-5 yr: P50>AI; 6-11 yr: P50<AI	4-5 yr: seems adequate; 6-11 yr: no statement	10; 13; 18[b]	4-6 yr: 4.1 (1.9-5.5); 7-10 yr: 0.5 (0.1-0.8);	4-6 yr: high intakes;

Age	Gender	n	Mean (95%-CI)	P5	P25	P50 (95%-CI)	P75	P95	EAR	% (95%-CI)<EAR	AI	P50 related to AI	Evaluation EAR/AI	UL	% (95%-CI) ≥UL	Evaluation UL
															11 yr: 0.0 (0.0-0.0)	7-11 yr: tolerable intakes
12-17	Boys	272	9.7 (9.4-10.0)	6.4	8.1	9.4 (9.2-9.7)	11.0	13.7	6[c]	14-17 yr: 2.3 (1.3-3.6)	11[a]	12-13 yr: P50<AI	12-13 yr: no statement; 14-17 yr: adequate intakes	18; 22[b]	12-14 yr: 0.1 (0.0-0.4); 15-17 yr: 0.0 (0.0-0.1)	Tolerable intakes
12-17	Girls	300	7.7 (7.5-7.9)	5.1	6.4	7.5 (7.3-7.7)	8.8	11.0	5[c]	14-17 yr: 4.3 (2.3-5.8)	8[a]	12-13 yr: P50<AI	12-13 yr: no statement; 14-17 yr: adequate intakes	18; 22[b]	12-14 yr: 0.0 (0.0-0.0); 15-17 yr: 0.0 (0.0-0.0)	Tolerable intakes
18-50	Men	318	11.7 (11.4-12.1)	7.7	9.7	11.4 (11.1-11.8)	13.3	16.8	6.4	0.8 (0.4-1.3)			Adequate intakes	25	0.1 (0.0-0.2)	Tolerable intakes
18-50	Women	284	8.7 (8.5-9.0)	5.6	7.2	8.5 (8.3-8.7)	10.0	12.5	5.7	5.8 (3.6-7.3)			Adequate intakes	25	0.0 (0.0-0.0)	Tolerable intakes
51-64	Men	251	11.9 (11.6-12.2)	7.9	9.9	11.6 (11.3-11.9)	13.5	16.8	6.4	0.6 (0.3-1.0)			Adequate intakes	25	0.1 (0.0-0.2)	Tolerable intakes
51-64	Women	287	9.3 (9.0-9.5)	6.1	7.7	9.1 (8.8-9.3)	10.6	13.2	5.7	2.8 (1.5-4.0)			Adequate intakes	25	0.0 (0.0-0.0)	Tolerable intakes
65-79	Men	311	11.3 (10.9-11.6)	7.5	9.4	11.0 (10.7-11.4)	12.8	15.8	6.4	1.2 (0.4-2.1)			Adequate intakes	25	0.0 (0.0-0.0)	Tolerable intakes
65-79	Women	296	9.5 (9.2-9.7)	6.3	8.0	9.3 (9.0-9.5)	10.9	13.5	5.7	2.1 (1.2-3.4)			Adequate intakes	25	0.0 (0.0-0.0)	Tolerable intakes

[a] AI 1 year=5 mg, 2-5 years=6 mg, 6-9 years=7 mg, boys 10-13 years=11 mg, girls 10-13 years=8 mg.

[b] UL 4-6 years=10 mg, 7-10 years=13 mg, 11-14 years=18 mg, 15-17 years=22 mg.

[c] EAR boys 14-17 years=6 mg, girls 14-17 years=5 mg.

Appendix C Average contribution of food groups to the intake of nutrients

Table C.1 Average contribution of food groups to the intake of macronutrients of the Dutch population aged 1-79 (DNFCS 2019-2021) weighted for socio-demographic factors season and day of the week (n=3570).

Food groups based on GloboDiet classification	% Energy	% Total protein	% Animal protein	% Vegetable protein	% Carbohydrates	% Mono- and disaccharides	% Polysaccharides	% Dietary fibre	% Fat	% Polyunsaturated fatty acids	% Saturated fatty acids	% Tran- fatty acids	% Cis-unsaturated fatty acids	% N-3 fish fatty acids (EPA+DHA)	% Alpha-linolenic acid	% Linoleic acid	% Cholesterol	% Alcohol	% Water
01. Potatoes	4	2	0	5	7	1	12	7	1	4	1	0	2	1	3	4	0	0	2
02. Vegetables	2	3	0	8	3	5	2	15	1	2	1	0	2	0	7	2	0	0	5
03. Legumes	0	1	0	1	1	0	1	2	0	0	0	0	0	0	1	0	0	0	0
04. Fruits, nuts, olives	9	5	0	11	10	19	3	16	8	11	4	0	11	8	10	12	0	0	4
05. Dairy (incl. substitutes)	16	24	42	1	10	20	2	3	20	4	34	46	9	8	10	3	28	2	12
06. Bread, cereals, rice, pasta	23	23	1	54	37	7	59	41	9	16	6	2	10	4	16	17	2	0	3
07. Meat (incl. substitutes)	11	26	42	2	1	1	2	2	17	11	17	21	17	24	8	12	30	0	3
08. Fish and shellfish	1	4	6	0	0	0	0	0	1	2	1	0	2	19	1	1	4	0	0
09. Eggs	1	3	5	0	0	0	0	0	2	1	2	0	2	10	0	1	20	0	0
10. Fats and oils	6	0	0	0	0	0	0	0	17	24	12	15	20	9	23	23	3	0	0
11. Sugar and confectionery	5	1	1	2	7	15	2	3	4	2	6	1	4	0	0	3	1	0	0
12. Cakes and sweet biscuits	7	3	1	5	9	11	7	4	7	5	9	8	6	5	3	4	7	0	0

Food groups based on GloboDiet classification	% Energy	% Total protein	% Animal protein	% Vegetable protein	% Carbohydrates	% Mono- and disaccharides	% Polysaccharides	% Dietary fibre	% Fat	% Polyunsaturated fatty acids	% Saturated fatty acids	% Tran- fatty acids	% Cis-unsaturated fatty acids	% N-3 fish fatty acids (EPA+DHA)	% Alpha-linolenic acid	% Linoleic acid	% Cholesterol	% Alcohol	% Water
13. Non-alcoholic beverages	4	2	1	3	7	15	1	1	1	0	1	0	0	0	1	0	1	0	64
14. Alcoholic beverages	3	0	0	1	2	2	1	1	0	0	0	0	0	0	0	0	0	98	3
15. Sauces and seasonings	4	1	1	2	2	4	1	2	7	12	3	2	10	5	14	12	3	0	1
16. Stocks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
17. Miscellaneous	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18. Savoury snacks	4	2	1	4	4	1	6	3	4	5	4	5	5	2	2	6	2	0	0
19. Dietary supplements	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0

Table C.2 Average contribution of food groups to the intake of vitamins of the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic factors season and day of the week (n=3570).

Food groups based on GloboDiet classification	**RAE %**	**Retinol %**	**Vitamin B_1 %**	**Vitamin B_2 %**	**Vitamin B_3 %**	**Vitamin B_6 %**	**Folic acid %**	**Folate equivalents %**	**Vitamin B_{12} %**	**Vitamin C %**	**Vitamin D %**	**Vitamin E %**	**Vitamin K_1 %**
01. Potatoes	1	0	4	1	4	9	0	4	0	10	0	2	0
02. Vegetables	19	0	7	5	5	9	0	17	0	24	0	9	65
03. Legumes	0	0	1	0	0	0	0	0	0	0	0	0	1
04. Fruits, nuts, olives	2	0	7	4	8	9	0	8	0	22	0	11	10
05. Dairy (incl. substitutes)	25	34	9	38	3	8	3	12	39	3	6	4	7
06. Bread, cereals, rice, pasta	0	0	20	9	17	10	5	20	0	0	1	8	2
07. Meat (incl. substitutes)	11	14	20	11	30	21	0	4	26	9	18	7	1
08. Fish and shellfish	1	1	2	1	4	2	0	1	8	0	7	2	0
09. Eggs	5	8	1	4	0	1	0	3	6	0	9	5	0
10. Fats and oils	16	22	4	3	0	4	44	5	2	0	22	19	5
11. Sugar and confectionery	1	1	1	2	1	0	0	1	1	1	0	3	0
12. Cakes and sweet biscuits	5	7	2	2	2	1	0	2	1	0	6	5	1
13. Non-alcoholic beverages	1	1	5	4	10	8	0	6	2	12	0	2	0
14. Alcoholic beverages	0	0	0	1	2	2	0	2	0	0	0	0	0
15. Sauces and seasonings	3	2	2	1	2	1	1	1	1	2	3	10	4
16. Stocks	0	0	0	0	0	0	0	0	0	0	0	0	0
17. Miscellaneous	0	1	0	0	0	0	2	0	0	0	1	0	0
18. Savoury snacks	1	1	3	1	2	3	0	1	1	1	1	3	0
19. Dietary supplements	9	9	11	11	10	11	45	12	12	16	28	10	0

Table C.3 Average contribution of food groups to the intake of minerals of the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic factors season and day of the week (n=3570).

Food groups based on GloboDiet classification	% Calcium	% Phosphorus	% Iron	% Haem iron	% Non-haem iron	% Iodine - excl. added salt	% Potassium	% Copper	% Magnesium	% Sodium - excl. added salt	% Selenium	% Zinc
01. Potatoes	1	3	3	0	4	1	8	5	4	1	1	2
02. Vegetables	6	5	9	0	10	3	13	6	6	2	2	5
03. Legumes	0	1	1	0	1	0	1	1	1	0	0	1
04. Fruits, nuts, olives	3	6	7	0	7	2	12	12	11	2	9	6
05. Dairy (incl. substitutes)	57	32	3	0	4	28	17	5	14	17	16	22
06. Bread, cereals, rice, pasta	7	20	26	0	28	37	12	24	24	25	17	20
07. Meat (incl. substitutes)	2	15	14	96	7	3	12	8	8	20	24	23
08. Fish and shellfish	0	3	1	2	1	4	2	1	1	2	7	1
09. Eggs	1	3	4	0	4	4	1	1	1	1	6	3
10. Fats and oils	1	0	0	0	0	0	0	0	0	1	0	0
11. Sugar and confectionery	2	2	6	0	6	1	2	5	3	1	1	2
12. Cakes and sweet biscuits	2	3	4	0	4	2	2	3	2	4	3	2
13. Non-alcoholic beverages	11	3	7	0	7	7	12	17	11	3	1	1
14. Alcoholic beverages	1	1	2	0	2	1	2	1	2	0	0	0
15. Sauces and seasonings	1	1	2	0	3	1	2	1	2	10	2	1
16. Stocks	0	0	0	0	0	0	0	1	0	5	0	0
17. Miscellaneous	0	0	1	0	1	0	0	0	0	0	0	0
18. Savoury snacks	1	2	3	2	3	1	3	2	2	5	2	2
19. Dietary supplements	3	0	8	0	8	6	0	6	6	0	8	9

Appendix D Average contribution of moments of consumption to the intake of nutrients

Table D.1 Average contribution of moments of consumption to the intake of macronutrients of the Dutch population aged 1-79 (DNFCS 2019-2021) weighted for socio-demographic factors season and day of the week (n=3570).

Macronutrients	Breakfast	Lunch	Dinner	Inbetween
Energy	16%	22%	34%	28%
Protein	16%	25%	42%	17%
Vegetable protein	19%	28%	31%	22%
Animal protein	15%	23%	50%	13%
Carbohydrates	17%	21%	29%	33%
Mono- and disaccharides	18%	15%	21%	46%
Polysaccharides	17%	25%	36%	22%
Dietary fibre	18%	24%	35%	22%
Fat	14%	23%	38%	24%
Saturated fatty acids	15%	23%	35%	27%
Trans fatty acids	14%	26%	38%	21%
Cis-unsaturated fatty acids	13%	23%	41%	23%
Polyunsaturated fatty acids	15%	25%	41%	20%
Linoleic acid	14%	24%	41%	20%
Alpha-linolenic acid	17%	28%	40%	15%
N-3 fish fatty acids	13%	25%	47%	15%
Cholesterol	13%	26%	44%	17%
Alcohol	0%	1%	21%	78%
Water	12%	12%	21%	54%

Table D.2 Average contribution of moments of consumption to the intake of micronutrients of the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic factors season and day of the week (n=3570).

Micronutrients	Breakfast	Lunch	Dinner	Inbetween
Retinol Activity Equivalents	16%	28%	39%	18%
Retinol	21%	33%	27%	20%
Vitamin B_1	18%	22%	40%	20%
Vitamin B_2	22%	24%	31%	23%
Vitamin B_3	12%	18%	47%	24%
Vitamin B_6	12%	18%	45%	24%
Folate equivalents	19%	24%	37%	20%
Folic acid	40%	44%	5%	11%
Vitamin B_{12}	18%	27%	39%	16%
Vitamin C	11%	14%	48%	27%
Vitamin D	16%	29%	40%	15%
Vitamin E	14%	22%	41%	22%
Vitamin K_1	6%	13%	69%	12%
Calcium	22%	25%	26%	26%
Copper	16%	21%	31%	33%
Iron	17%	23%	36%	25%
Haem iron	6%	25%	61%	8%
Non-haem iron	18%	23%	32%	26%
Iodine*	23%	33%	23%	21%
Magnesium	19%	22%	31%	29%
Phosphorus	19%	25%	35%	21%
Potassium	15%	18%	38%	29%
Selenium	15%	25%	41%	18%
Sodium*	14%	29%	38%	19%
Zinc	17%	25%	40%	18%

*Excluding added salt.

Appendix E Average contribution of places of consumption to the intake of nutrients

Table E.1 Average contribution of places of consumption to the intake of macronutrients of the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic factors season and day of the week (n=3570).

Macronutrients	School/work	Restaurant	Outside and travelling	Other	At home
Energy	8%	2%	2%	1%	87%
Protein	7%	2%	1%	0%	88%
Vegetable protein	9%	2%	2%	1%	86%
Animal protein	6%	3%	1%	0%	90%
Carbohydrates	9%	2%	2%	1%	86%
Mono- and disaccharides	9%	2%	3%	1%	85%
Polysaccharides	8%	2%	2%	1%	87%
Dietary fibre	9%	2%	2%	0%	86%
Fat	7%	3%	2%	1%	88%
Saturated fatty acids	7%	3%	2%	1%	88%
Trans fatty acids	7%	3%	2%	0%	88%
Cis-unsaturated fatty acids	7%	3%	2%	0%	88%
Polyunsaturated fatty acids	8%	3%	2%	0%	87%
Linoleic acid	8%	3%	2%	0%	87%
Alpha-linolenic acid	8%	3%	2%	0%	87%
N-3 fish fatty acids	7%	3%	1%	0%	89%
Cholesterol	6%	3%	2%	0%	89%
Alcohol	0%	7%	1%	1%	90%
Water	10%	2%	2%	1%	85%

Table E.2 Average contribution of places of consumption to the intake of micronutrients of the Dutch population aged 1-79 (DNFCS 2019-2021), weighted for socio-demographic factors season and day of the week (n=3570).

Micronutrients	School/work	Restaurant	Outside and travelling	Other	At home
Retinol Activity Equivalents	8%	2%	1%	0%	88%
Retinol	9%	3%	2%	0%	87%
Vitamin B_1	8%	2%	2%	0%	88%
Vitamin B_2	8%	2%	2%	0%	88%
Vitamin B_3	7%	2%	2%	1%	88%
Vitamin B_6	7%	2%	2%	0%	88%
Folate equivalents	8%	2%	2%	0%	88%
Folic acid	13%	1%	2%	0%	83%
Vitamin B_{12}	7%	3%	1%	0%	89%
Vitamin C	7%	2%	2%	0%	88%
Vitamin D	8%	3%	1%	0%	88%
Vitamin E	7%	2%	2%	0%	88%
Vitamin K_1	5%	2%	1%	0%	91%
Calcium	8%	2%	2%	1%	88%
Copper	9%	2%	2%	1%	87%
Iron	8%	2%	2%	1%	87%
Haem iron	7%	4%	2%	0%	88%
Non-haem iron	9%	2%	2%	1%	87%
Iodine*	10%	2%	2%	1%	85%
Magnesium	9%	2%	2%	1%	87%
Phosphorus	8%	2%	2%	0%	88%
Potassium	8%	2%	2%	1%	88%
Selenium	8%	2%	1%	0%	88%
Sodium*	9%	2%	2%	1%	87%
Zinc	7%	2%	1%	0%	88%

*Excluding added salt.

Appendix F More details on RIVM StatLine

StatLine RIVM contains data from various sources provided by the RIVM and collaborating organizations.[14] On StatLine RIVM, users can create their own tables and graphs, which can then be easily printed and downloaded.
StatLine RIVM provides more detailed information about food consumption than this report. This includes data on the consumption of food groups and nutrients in percentiles, as well as the average consumption on days when specific foods are eaten. The data can be broken down by gender, age, and different population groups (such as educational level, region, urbanisation, and weight class).

Table F.1 Habitual intake of nutrients from exclusively foods.
See https://statline.rivm.nl/#/RIVM/nl/dataset/50125NED/table?ts=1709596077421

Table F.2 Habitual intake of nutrients from foods and supplements.
See https://statline.rivm.nl/#/RIVM/nl/dataset/50126NED/table?ts=1709595986727

Table F.3 Average contribution of food groups to the intake of nutrients.
See https://statline.rivm.nl/#/RIVM/nl/dataset/50122NED/table?ts=1709596169116

Table F.4 Average contribution of place of consumption to the intake of nutrients.
See https://statline.rivm.nl/#/RIVM/nl/dataset/50124NED/table?ts=1709596244474

Table F.5 Average contribution of moments of consumption to the intake of nutrients.
See https://statline.rivm.nl/#/RIVM/nl/dataset/50123NED/table?ts=1709596421596

Appendix G Habitual intakes of challenge nutrients by education level

Table G.1 Average habitual intakes of challenge macronutrients by Dutch children aged 1-17 (DNFCS 2019-2021) by classes of education level, weighted for socio-demographic factors season and day of the week.

	Boys 1-17 years			Girls 1-17 years		
Nutrient	**Lower educated**	**Middle educated**	**Higher educated**	**Lower educated**	**Middle educated**	**Higher educated**
Dietary fibre (g/MJ/day)	2.1 (2.0-2.2)	2.4 (2.3-2.5)	2.6 (2.6-2.7)	2.4 (2.2-2.5)	2.4 (2.3-2.5)	2.7 (2.6-2.8)
Fat (En%/day)	35.5 (34.2-36.8)	34.1 (33.6-34.8)	34.2 (33.7-34.8)	33.5 (31.9-35.2)	34.7 (34.2-35.5)	34.0 (33.4-34.6)
Saturated fat (En%/day)	12.4 (11.8-12.8)	12.4 (12.1-12.7)	12.2 (12.0-12.5)	12.6 (11.8-13.4)	12.5 (12.2-13.0)	12.5 (12.2-12.7)
Alpha-linoleic acid (En%/day)	0.7 (0.6-0.7)	0.7 (0.6-0.7)	0.7 (0.6-0.7)	0.6 (0.6-0.7)	0.7 (0.6-0.7)	0.7 (0.6-0.7)
N-3 fish fatty acids (EPA+DHA, mg/day)	49	87	104	83	67	90
Alcohol (g/day)	0 (0-0)	1 (0-2)	0 (0-1)	0 (0-0)	1 (0-1)	0 (0-0)

Table G.2 Average habitual intakes of challenge macronutrients by Dutch adults aged 18-79 (DNFCS 2019-2021) by classes of education level, weighted for socio-demographic factors season and day of the week.

	Men 18-79 years			Women 18-79 years		
Nutrient	**Lower educated**	**Middle educated**	**Higher educated**	**Lower educated**	**Middle educated**	**Higher educated**
Dietary fibre (g/MJ/day)	2.3 (2.2-2.4)	2.4 (2.3-2.5)	2.6 (2.5-2.6)	2.5 (2.4-2.6)	2.5 (2.4-2.6)	2.8 (2.7-2.8)
Fat (En%/day)	37.3 (36.4-38.3)	37.3 (36.7-37.9)	38.0 (37.3-38.8)	38.1 (37.2-38.9)	37.7 (36.9-38.4)	38.8 (37.6-39.5)
Saturated fat (En%/day)	13.5 (13.1-14.0)	13.1 (12.8-13.4)	13.4 (13.1-13.9)	14.1 (13.6-14.4)	13.6 (13.3-14.0)	13.5 (13.1-13.8)
Alpha-linoleic acid (En%/day)	0.8 (0.7-0.8)	0.8 (0.7-0.8)	0.7 (0.7-0.8)	0.8 (0.8-0.9)	0.8 (0.7-0.8)	0.7 (0.7-0.8)
N-3 fish fatty acids (EPA+DHA, mg/day)	161	255	236	185	189	292
Alcohol (g/day)	11 (8-14)	12 (10-14)	10 (9-12)	4 (3-5)	5 (4-6)	7 (5-9)

Table G.3 Average habitual intakes of challenge micronutrients by Dutch children aged 1-17 (DNFCS 2019-2021) by classes of education level, weighted for socio-demographic factors season and day of the week.

	Boys 1-17 years			Girls 1-17 years		
Nutrient	**Lower educated**	**Middle educated**	**Higher educated**	**Lower educated**	**Middle educated**	**Higher educated**
Vitamin A (µg/day)	701 (564-755)	598 (553-641)	630 (589-677)	567 (471-625)	538 (504-577)	564 (514-587)
Retinol (µg/day)	552 (436-608)	481 (440-512)	452 (422-486)	451 (359-490)	403 (368-432)	404 (374-432)
Vitamin B_1 (mg/MJ/day)	0.12 (0.06-0.19)	0.12 (0.10-0.16)	0.13 (0.12-0.14)	0.14 (0.09-0.23)	0.17 (0.09-0.26)	0.21 (0.08-0.28)
Vitamin B_2 (mg/day)	1.4 (1.0-1.8)	1.7 (1.2-1.8)	1.4 (1.4-1.5)	1.4 (0.9-2.2)	1.4 (1.1-2.0)	1.3 (0.9-2.0)
Vitamin B_6 (mg/day)	1.6 (1.3-1.6)	1.4 (1.3-1.7)	1.4 (1.4-1.5)	1.4 (1.2-1.6)	1.3 (1.2-1.5)	1.2 (1.1-1.4)
Folate (µg/day)	241 (209-250)	249 (234-264)	263 (249-276)	249 (214-268)	231 (214-243)	230 (221-243)
Vitamin C (mg/day)	106 (78-133)	120 (88-132)	97 (89-107)	108 (85-140)	106 (78-136)	103 (82-128)
Vitamin D (µg/day)	5.2 (4.1-6.3)	5.9 (4.8-7.0)	6.3 (5.4-6.8)	5.3 (4.3-6.7)	5.3 (4.4-6.0)	5.6 (4.8-6.2)
Vitamin K_1 (µg/day)	52 (41-66)	60 (50-69)	53 (48-59)	70 (47-93)	53 (44-62)	59 (52-65)
Calcium (mg/day)	823 (777-919)	866 (824-901)	880 (846-912)	848 (763-926)	741 (709-773)	762 (725-782)
Copper (mg/day)	1.3 (1.1-1.3)	1.1 (1.1-1.2)	1.2 (1.2-1.3)	1.1 (1.0-1.1)	1.1 (1.1-1.2)	1.1 (1.0-1.1)
Iodine (µg/day)	178 (165-194)	176 (171-184)	181 (175-186)	165 (150-177)	153 (146-158)	149 (143-155)
Magnesium (mg/day)	279 (246-285)	266 (259-279)	285 (276-295)	256 (234-267)	224 (219-238)	245 (235-252)
Magnesium (supplements) (mg/day)	5 (0-16)	7 (4-13)	8 (3-12)	13 (6-16)	4 (2-8)	6 (4-9)
Iron (mg/day)	9.3 (7.9-9.7)	8.7 (8.2-9.1)	9.2 (8.8-9.6)	8.7 (7.8-9.1)	7.8 (7.4-8.3)	7.7 (7.4-8.1)
Potassium (mg/day)	2462 (2312-2608)	2450 (2378-2533)	2511 (2454-2601)	2360 (2190-2500)	2121 (2068-2188)	2235 (2166-2308)
Sodium (mg/day)	2527 (2475-2538)	2327 (2307-2351)	2173 (2019-2260)	2234 (2141-2254)	2009 (1965-2027)	1863 (1829-1890)
Zinc (mg/day)	8.9 (7.8-10.2)	8.9 (8.4-9.2)	9.1 (8.8-9.5)	8.3 (7.4-8.7)	7.3 (7.1-7.7)	7.5 (7.3-7.8)

Table G.4 Average habitual intakes of challenge micronutrients by Dutch adults aged 18-79 (DNFCS 2019-2021) by classes of education level, weighted for socio-demographic factors season and day of the week.

	Men 18-79 years			Women 18-79 years		
Nutrient	**Lower educated**	**Middle educated**	**Higher educated**	**Lower educated**	**Middle educated**	**Higher educated**
Vitamin A (µg/day)	1055 (950-1162)	912 (848-977)	1008 (926-1077)	849 (767-932)	765 (721-813)	796 (737-860)
Retinol (µg/day)	845 (730-939)	731 (674-793)	757 (682-811)	647 (573-710)	564 (526-605)	534 (487-576)
Vitamin B_1 (mg/MJ/day)	0.18 (0.12-0.28)	0.29 (0.13-0.38)	0.22 (0.18-0.27)	0.23 (0.18-0.31)	0.27 (0.18-0.37)	0.39 (0.19-0.55)
Vitamin B_2 (mg/day)	2.5 (1.6-2.7)	2.7 (1.6-3.9)	2.5 (2.1-2.9)	2.4 (1.7-2.9)	2.1 (1.7-2.7)	3.2 (1.9-3.8)
Vitamin B_6 (mg/day)	2.0 (1.9-2.1)	2.2 (2.0-2.5)	2.4 (2.2-2.7)	2.0 (1.8-2.3)	1.9 (1.7-2.1)	2.4 (1.8-2.8)
Folate (µg/day)	350 (319-372)	381 (354-409)	421 (395-443)	354 (324-384)	341 (314-369)	379 (351-422)
Vitamin C (mg/day)	131 (109-159)	163 (136-180)	164 (139-191)	189 (164-217)	199 (163-230)	209 (161-242)
Vitamin D (µg/day)	6.9 (5.8-8.0)	7.9 (6.6-9.7)	8.3 (6.9-9.6)	11.5 (10.0-13.3)	8.7 (6.9-10.3)	11.5 (8.9-14.2)
Vitamin K_1 (µg/day)	79 (65-93)	108 (86-121)	90 (80-101)	126 (101-155)	84 (70-96)	99 (87-111)
Calcium (mg/day)	1133 (1065-1167)	1084 (1028-1130)	1128 (1082-1164)	1014 (971-1060)	957 (917-988)	943 (919-989)
Copper (mg/day)	1.5 (1.4-1.6)	1.7 (1.6-1.7)	1.8 (1.8-1.9)	1.4 (1.3-1.4)	1.7 (1.6-1.7)	1.6 (1.5-1.6)
Iodine (µg/day)	212 (201-223)	225 (214-234)	220 (211-230)	196 (184-204)	186 (176-193)	178 (169-185)
Magnesium (mg/day)	377 (364-394)	412 (397-431)	435 (418-446)	363 (341-373)	336 (326-350)	370 (351-389)
Magnesium (supplements) (mg/day)	20 (11-29)	31 (22-42)	32 (24-39)	63 (44-71)	44 (36-58)	48 (33-61)
Iron (mg/day)	11.9 (11.3-12.5)	13.1 (12.5-13.9)	13.7 (13.2-14.4)	11.0 (10.4-11.8)	11.7 (10.3-13.3)	12.0 (11.0-12.7)
Potassium (mg/day)	3513 (3404-3613)	3577 (3466-3679)	3641 (3521-3736)	2976 (2897-3056)	2770 (2699-2846)	2886 (2785-2958)
Sodium (mg/day)	3217 (3178-3222)	3182 (3130-3201)	3079 (3070-3176)	2514 (2471-2515)	2432 (2434-2516)	2401 (2351-2459)
Zinc (mg/day)	13.5 (12.2-13.6)	13.2 (12.5-13.9)	14.0 (13.3-14.6)	11.5 (10.8-12.0)	10.8 (10.3-11.4)	11.5 (10.6-12.0)

Appendix H Trend in intake of nutrients

Table H.1 Average habitual intake of energy and macronutrients in DNFCS 2007-2010, DNFCS 2012-2016 and DNFCS 2019-2021 for the Dutch population aged 7-69.

Energy / Macronutrient	**2007-2010**		**2012-2016**		**2019-2021**		**Difference 2019-2021 vs 2012-2016**		**Difference 2019-2021 vs 2007-2010**		**Difference 2012-2016 vs 2007-2010**	
	Mean	**(95%-CI)**	**Mean**	**(95%-CI)**	**Mean**	**(95%-CI)**	**%**	**Sign.**	**%**	**Sign.**	**%**	**Sign.**
Energy (kcal)	2266	(2245-2294)	2206	(2178-2234)	2079	(2049-2109)	-5.7	*	-8.2	*	-2.7	*
Energy (MJ)	9.5	(9.4-9.6)	9.2	(9.1-9.4)	8.7	(8.6-8.8)	-5.8	*	-8.3	*	-2.7	*
Total protein (g)	83.6	(82.7-84.5)	82.0	(80.9-82.9)	79.1	(77.9-80.3)	-3.5	*	-5.3	*	-1.9	
Total protein (En%)	15.1	(15.0-15.3)	15.3	(15.2-15.5)	15.6	(15.5-15.8)	1.9		3.3	*	1.4	
Protein (g/kg)	1.19	(1.17-1.20)	1.13	(1.12-1.15)	1.11	(1.10-1.13)	-2.0		-6.4	*	-4.5	*
Animal protein (g)	52.4	(51.6-53.2)	50.2	(49.2-51.0)	46.9	(45.7-47.9)	-6.6	**	-10.5	*	-4.2	*
Vegetable protein (g)	31.2	(30.8-31.6)	31.8	(31.3-32.4)	32.3	(31.6-33.0)	1.4		3.5	*	2.0	
Ratio vegetable protein (%)	0.40	(0.39-0.40)	0.41	(0.41-0.41)	0.43	(0.42-0.43)	4.0	*	8.9	*	4.8	*
Total fat (g)	87	(86-89)	88	(87-90)	88	(87-90)	0.0		1.1		1.2	
Total fat (En%)	34.0	(33.7-34.2)	35.1	(34.9-35.4)	37.6	(37.2-37.9)	7.0	**	10.6	*	3.4	*
Saturated fatty acids (g)	33	(32-33)	32	(31-32)	31	(31-32)	-1.5		-4.8	*	-3.3	
Saturated fatty acids (En%)	12.8	(12.7-12.9)	12.7	(12.6-12.9)	13.5	(13.3-13.6)	5.7	*	5.2	*	-0.4	
Polyunsaturated fatty acids (g)	17	(17-17)	18	(17-18)	17	(17-17)	-3.3		0.6		4.0	*
Polyunsaturated fatty acids (En%)	6.6	(6.5-6.7)	7.0	(6.9-7.1)	7.2	(7.1-7.3)	2.9		9.1	*	6.1	*
Cis-unsaturated fatty acids (g)	47	(47-48)	49	(48-50)	49	(48-50)	0.8		4.8	*	4.0	*
Cis-unsaturated fatty acids (En%)	18.3	(18.1-18.5)	19.4	(19.2-19.6)	20.9	(20.7-21.2)	8.1	**	14.5	**	5.9	*
Trans fatty acids (g)	1.4	(1.4-1.5)	0.9	(0.9-0.9)	0.7	(0.7-0.7)	-23.1	**	-53.2	**	-39.1	**

Energy / Macronutrient	2007-2010		2012-2016		2019-2021		Difference 2019-2021 vs 2012-2016		Difference 2019-2021 vs 2007-2010		Difference 2012-2016 vs 2007-2010	
	Mean	(95%-CI)	Mean	(95%-CI)	Mean	(95%-CI)	%	Sign.	%	Sign.	%	Sign.
Trans fatty acids (En%)	0.6	(0.6-0.6)	0.4	(0.3-0.4)	0.3	(0.3-0.3)	-17.4	*ˣ	-48.6	*ˣ	-37.7	*ˣ
Linoleic acid (g)	14	(14-14)	15	(14-15)	14	(14-14)	-5.6	*	-0.9		5.0	*
Linoleic acid (En%)	5.5	(5.4-5.5)	5.8	(5.7-5.9)	5.8	(5.7-5.9)	0.2		7.1	*	6.8	*
Alpha-linolenic acid (g)	2	(2-2)	1.8	(1.8-1.8)	1.8	(1.7-1.8)	-2.8		1.5		4.4	
Alpha-linolenic acid (En%)	0.7	(0.7-0.7)	0.7	(0.7-0.8)	0.8	(0.7-0.8)	3.0		11.6	*	8.3	*
N-3 fish fatty acids (EPA+DHA, mg)	184		215		197		-8.2	ˣ	7.1		16.7	ˣ
Cholesterol (mg)			221	(216-227)	223	(216-230)	0.7					
Total carbohydrates (g)	254	(251-257)	243	(240-247)	219	(216-223)	-9.9	*ˣ	-13.8	*ˣ	-4.4	*
Total carbohydrates (En%)	45.4	(45.2-45.7)	44.7	(44.4-45.0)	42.5	(42.2-42.9)	-4.9	*	-6.4	*	-1.6	*
Mono- and disaccharides (g)	120	(118-122)	112	(110-114)	95	(93-97)	-15.5	*ˣ	-20.7	*ˣ	-6.2	*
Mono- and disaccharides (En%)	21.3	(21.0-21.6)	20.5	(20.3-20.8)	18.4	(18.1-18.7)	-10.2	*ˣ	-13.3	*ˣ	-3.4	*
Polysaccharides (g)	134	(133-136)	132	(130-134)	125	(123-127)	-5.1	*	-7.1	*	-2.2	
Polysaccharides (En%)	24.0	(23.8-24.2)	24.2	(24.0-24.5)	24.2	(23.9-24.4)	-0.2		0.5		0.8	
Dietary fibre (g)	20.1	(19.9-20.4)	20.3	(20.0-20.6)	21.2	(20.8-21.5)	4.3	*	5.2	*	0.9	
Dietary fibre (g/MJ)	2.2	(2.2-2.2)	2.3	(2.3-2.3)	2.5	(2.5-2.6)	10.0	*ˣ	14.6	*ˣ	4.2	*
Water (g)			2759	(2721-2797)	2828	(2790-2870)	2.5					
Alcohol (g); 12-69 yr	13.7	(12.8-14.5)	11.3	(10.3-12.3)	7.3	(6.5-8.1)	-35.2	*ˣ	-46.5	*ˣ	-17.4	*ˣ

* Indicates whether the differences are statistically significant.

ˣ Indicates a change of an average of more than 1% decrease or increase per year, assessed as relevant.

Table H.2 Average habitual intake of energy and macronutrients in DNFCS 2007-2010, DNFCS 2012-2016 and DNFCS 2019-2021 for the Dutch population aged 7-69 (four age-gender groups).

Energy / Macronutrient	Age	Gender	2007-2010		2012-2016		2019-2021		Difference 2019-2021 vs 2012-2016		Difference 2019-2021 vs 2007-2010		Difference 2012-2016 vs 2007-2010	
			Mean	(95%-CI)	Mean	(95%-CI)	Mean	(95%-CI)	%	Sign.	%	Sign.	%	Sign.
Energy (kcal)	7-17	Boys	2392	(2349-2425)	2276	(2237-2325)	2121	(2073-2166)	-6.8	*x	-11.3	*	-4.9	*
Energy (kcal)	7-17	Girls	2023	(1986-2047)	1861	(1828-1900)	1768	(1730-1805)	-5.0	*	-12.6	*x	-8.0	*x
Energy (kcal)	18-69	Men	2608	(2569-2657)	2602	(2546-2655)	2394	(2346-2445)	-8.0	*x	-8.2	*	-0.2	*
Energy (kcal)	18-69	Women	1944	(1912-1986)	1860	(1828-1893)	1822	(1779-1863)	-2.0		-6.3	*	-4.4	*
Energy (MJ)	7-17	Boys	10.0	(9.9-10.2)	9.6	(9.4-9.8)	8.9	(8.7-9.1)	-6.8	*x	-11.4	*	-4.9	*
Energy (MJ)	7-17	Girls	8.5	(8.3-8.6)	7.8	(7.7-8.0)	7.4	(7.3-7.6)	-5.1	*	-12.7	*x	-8.0	*x
Energy (MJ)	18-69	Men	10.9	(10.8-11.1)	10.9	(10.7-11.1)	10.0	(9.8-10.2)	-8.0	*x	-8.2	*	-0.2	*
Energy (MJ)	18-69	Women	8.2	(8.0-8.3)	7.8	(7.7-7.9)	7.6	(7.5-7.8)	-2.1		-6.4	*	-4.4	*
Total protein (g)	7-17	Boys	77.1	(75.4-78.9)	77.7	(75.6-79.1)	75.0	(72.5-79.9)	-3.6		-2.8		0.8	
Total protein (g)	7-17	Girls	65.4	(64.4-68.5)	62.5	(61.2-66.1)	60.9	(59.6-63.6)	-2.6		-6.9	*	-4.4	
Total protein (g)	18-69	Men	97.4	(95.8-98.8)	96.5	(94.6-98.3)	92.1	(89.8-94.0)	-4.6	*	-5.5	*	-0.9	
Total protein (g)	18-69	Women	74.5	(72.8-76.2)	71.8	(70.1-73.1)	70.5	(68.9-71.6)	-1.8		-5.3	*	-3.6	
Total protein (En%)	7-17	Boys	13.2	(13.0-13.4)	13.6	(13.4-13.8)	14.3	(14.0-14.5)	5.1	*	8.0	*	2.8	
Total protein (En%)	7-17	Girls	13.2	(13.0-13.5)	13.2	(13.0-13.5)	14.1	(13.8-14.3)	6.5	*x	6.4	*	-0.1	
Total protein (En%)	18-69	Men	15.3	(15.1-15.5)	15.3	(15.1-15.5)	15.9	(15.6-16.1)	3.6	*	3.8	*	0.2	
Total protein (En%)	18-69	Women	15.7	(15.5-16.0)	16.0	(15.8-16.3)	15.9	(15.6-16.2)	-1.1		1.1		2.2	
Protein (g/kg)	7-17	Boys	1.72	(1.68-1.76)	1.67	(1.62-1.71)	1.68	(1.62-1.73)	0.6		-2.4		-3.0	
Protein (g/kg)	7-17	Girls	1.51	(1.48-1.55)	1.41	(1.37-1.45)	1.44	(1.39-1.49)	2.1		-4.7		-6.7	*x
Protein (g/kg)	18-69	Men	1.16	(1.13-1.18)	1.13	(1.10-1.16)	1.09	(1.06-1.13)	-3.5		-6.2	*	-2.9	*
Protein (g/kg)	18-69	Women	1.04	(1.02-1.06)	0.98	(0.96-1.01)	0.97	(0.95-1.00)	-1.5		-6.4	*	-5.0	*
Animal protein (g)	7-17	Boys	46.6	(45.1-48.1)	46.7	(44.7-47.7)	43.1	(40.5-47.1)	-7.7	x	-7.5		0.2	
Animal protein (g)	7-17	Girls	40.0	(39.2-42.8)	36.0	(35.1-39.3)	34.1	(31.9-35.6)	-5.3		-14.8	*x	-10.1	x
Animal protein (g)	18-69	Men	61.4	(59.8-62.6)	59.3	(57.6-60.7)	54.8	(52.6-56.6)	-7.6	*x	-10.7	*	-3.4	*
Animal protein (g)	18-69	Women	46.9	(45.4-48.3)	44.3	(42.7-45.6)	42.1	(41.1-42.9)	-4.9		-10.3	*	-5.6	
Vegetable protein (g)	7-17	Boys	30.5	(29.8-31.2)	31.1	(30.4-32.0)	31.9	(31.5-33.3)	2.7		4.5	*	1.8	
Vegetable protein (g)	7-17	Girls	25.4	(25.0-25.8)	26.5	(25.5-27.4)	26.8	(26.4-29.3)	1.1		5.6	*	4.4	
Vegetable protein (g)	18-69	Men	36.0	(35.4-36.7)	37.2	(36.3-38.3)	37.3	(36.3-38.4)	0.2		3.6		3.3	

Energy / Macronutrient	Age	Gender	2007-2010		2012-2016		2019-2021		Difference 2019-2021 vs 2012-2016		Difference 2019-2021 vs 2007-2010		Difference 2012-2016 vs 2007-2010	
			Mean	(95%-CI)	Mean	(95%-CI)	Mean	(95%-CI)	%	Sign.	%	Sign.	%	Sign.
Vegetable protein (g)	18-69	Women	27.6	(27.0-28.2)	27.5	(26.7-28.2)	28.4	(27.2-29.2)	3.3		3.1		-0.2	
Ratio vegetable protein (%)	7-17	Boys	0.43	(0.42-0.44)	0.44	(0.43-0.44)	0.46	(0.44-0.46)	4.7	*	7.0	*	2.2	
Ratio vegetable protein (%)	7-17	Girls	0.42	(0.41-0.42)	0.44	(0.43-0.44)	0.48	(0.46-0.48)	8.7	**	14.3	**	5.2	*
Ratio vegetable protein (%)	18-69	Men	0.39	(0.38-0.39)	0.41	(0.40-0.41)	0.42	(0.41-0.42)	4.1	*	9.3	*	5.0	*
Ratio vegetable protein (%)	18-69	Women	0.39	(0.39-0.40)	0.41	(0.40-0.41)	0.42	(0.41-0.43)	2.8		8.2	*	5.2	*
Total fat (g)	7-17	Boys	90	(88-92)	86	(84-89)	85	(83-87)	-1.5		-5.1	*	-3.7	
Total fat (g)	7-17	Girls	77	(74-78)	70	(69-72)	71	(69-73)	1.2		-7.2	*	-8.3	**
Total fat (g)	18-69	Men	102	(99-104)	105	(102-108)	102	(99-105)	-2.7		0.2		3.0	
Total fat (g)	18-69	Women	74	(73-77)	75	(73-77)	79	(76-81)	4.2		5.8		1.6	
Total fat (En%)	7-17	Boys	33.3	(32.8-33.6)	33.3	(32.9-33.9)	35.3	(34.7-35.8)	5.9	*	6.1	*	0.2	
Total fat (En%)	7-17	Girls	33.1	(32.8-33.5)	33.3	(32.9-33.7)	35.5	(35.0-36.1)	6.7	**	7.2	*	0.5	
Total fat (En%)	18-69	Men	34.4	(34.1-34.9)	35.6	(35.2-36.0)	37.7	(37.2-38.1)	5.9	*	9.4	*	3.3	*
Total fat (En%)	18-69	Women	33.8	(33.4-34.2)	35.3	(34.9-35.8)	38.2	(37.6-38.8)	8.3	**	13.1	**	4.5	*
Saturated fatty acids (g)	7-17	Boys	33	(32-34)	31	(30-32)	30	(29-31)	-4.3		-9.9	*	-5.9	*
Saturated fatty acids (g)	7-17	Girls	29	(28-30)	25	(25-26)	27	(26-27)	4.5		-8.4	*	-12.4	**
Saturated fatty acids (g)	18-69	Men	38	(37-38)	37	(36-38)	36	(35-37)	-4.1		-5.2		-1.1	
Saturated fatty acids (g)	18-69	Women	28	(28-29)	27	(27-28)	28	(27-29)	1.9		-2.2		-4.0	
Saturated fatty acids (En%)	7-17	Boys	12.4	(12.2-12.5)	12.0	(11.9-12.2)	12.5	(12.3-12.7)	4.0	*	1.2		-2.8	
Saturated fatty acids (En%)	7-17	Girls	12.6	(12.4-12.8)	12.1	(11.9-12.3)	13.1	(12.9-13.4)	8.8	**	4.5	*	-4.0	*
Saturated fatty acids (En%)	18-69	Men	12.8	(12.6-13.0)	12.8	(12.6-13.0)	13.4	(13.2-13.6)	4.6	*	4.6	*	0.1	
Saturated fatty acids (En%)	18-69	Women	12.9	(12.7-13.1)	12.9	(12.7-13.1)	13.7	(13.5-14.0)	6.5	**	6.5	*	0.1	

Energy / Macronutrient	Age	Gender	2007-2010		2012-2016		2019-2021		Difference 2019-2021 vs 2012-2016		Difference 2019-2021 vs 2007-2010		Difference 2012-2016 vs 2007-2010	
			Mean	(95%-CI)	Mean	(95%-CI)	Mean	(95%-CI)	%	Sign.	%	Sign.	%	Sign.
Polyunsaturated fatty acids (g)	7-17	Boys	17	(17-18)	17	(16-18)	17	(16-18)	-0.8		-1.4		-0.6	
Polyunsaturated fatty acids (g)	7-17	Girls	14	(14-15)	14	(14-15)	14	(13-14)	-4.0		-3.2		0.9	
Polyunsaturated fatty acids (g)	18-69	Men	20	(20-21)	21	(20-22)	20	(19-21)	-5.2		-1.8		3.6	
Polyunsaturated fatty acids (g)	18-69	Women	14	(14-15)	15	(15-16)	15	(15-16)	-0.6		5.5		6.1	ˣ
Polyunsaturated fatty acids (En%)	7-17	Boys	6.3	(6.2-6.5)	6.6	(6.4-6.7)	7.0	(6.8-7.2)	6.3	*ˣ	10.7	*	4.1	
Polyunsaturated fatty acids (En%)	7-17	Girls	6.2	(6.0-6.3)	6.6	(6.5-6.8)	6.8	(6.6-7.0)	2.8		10.5	*	7.4	*ˣ
Polyunsaturated fatty acids (En%)	18-69	Men	6.9	(6.7-7.0)	7.0	(6.9-7.2)	7.3	(7.1-7.4)	3.2		5.8	*	2.5	
Polyunsaturated fatty acids (En%)	18-69	Women	6.5	(6.3-6.6)	7.1	(7.0-7.3)	7.3	(7.1-7.5)	2.0		12.0	*	9.8	*ˣ
Cis-unsaturated fatty acids (g)	7-17	Boys	49	(48-50)	49	(47-50)	48	(47-50)	-0.3		-1.7		-1.4	
Cis-unsaturated fatty acids (g)	7-17	Girls	41	(40-42)	39	(38-41)	39	(38-41)	0.8		-4.5		-5.3	
Cis-unsaturated fatty acids (g)	18-69	Men	56	(54-57)	58	(57-60)	58	(56-59)	-1.5		3.5		5.0	
Cis-unsaturated fatty acids (g)	18-69	Women	39	(39-41)	42	(40-43)	44	(42-45)	4.8		10.5	*	5.5	
Cis-unsaturated fatty acids (En%)	7-17	Boys	18.1	(17.8-18.4)	18.5	(18.2-18.9)	19.9	(19.5-20.3)	7.7	*ˣ	10.2	*	2.3	
Cis-unsaturated fatty acids (En%)	7-17	Girls	17.8	(17.5-18.1)	18.5	(18.2-18.8)	19.6	(19.3-20.0)	6.1	*ˣ	10.5	*	4.2	*

Energy / Macronutrient	Age	Gender	2007-2010		2012-2016		2019-2021		Difference 2019-2021 vs 2012-2016		Difference 2019-2021 vs 2007-2010		Difference 2012-2016 vs 2007-2010	
			Mean	(95%-CI)	Mean	(95%-CI)	Mean	(95%-CI)	%	Sign.	%	Sign.	%	Sign.
Cis-unsaturated fatty acids (En%)	18-69	Men	18.8	(18.5-19.0)	19.7	(19.4-20.0)	21.1	(20.7-21.5)	6.9	**	12.5	**	5.2	*
Cis-unsaturated fatty acids (En%)	18-69	Women	17.9	(17.6-18.2)	19.3	(19.0-19.7)	21.2	(20.8-21.6)	9.7	**	18.1	**	7.6	**
Trans fatty acids (g)	7-17	Boys	1.4	(1.3-1.4)	0.8	(0.8-0.9)	0.6	(0.6-0.6)	-25.9	**	-55.4	**	-39.8	**
Trans fatty acids (g)	7-17	Girls	1.2	(1.2-1.3)	0.7	(0.7-0.7)	0.6	(0.5-0.6)	-22.6	**	-55.6	**	-42.6	**
Trans fatty acids (g)	18-69	Men	1.6	(1.6-1.7)	1.0	(1.0-1.1)	0.8	(0.7-0.8)	-23.5	**	-51.8	**	-37.0	**
Trans fatty acids (g)	18-69	Women	1.3	(1.3-1.4)	0.8	(0.7-0.8)	0.6	(0.6-0.6)	-22.0	**	-54.0	**	-41.1	**
Trans fatty acids (En%)	7-17	Boys	0.5	(0.5-0.5)	0.3	(0.3-0.3)	0.3	(0.2-0.3)	-20.0	**	-49.2	**	-36.5	**
Trans fatty acids (En%)	7-17	Girls	0.5	(0.5-0.6)	0.3	(0.3-0.3)	0.3	(0.3-0.3)	-18.8	**	-49.7	**	-38.1	**
Trans fatty acids (En%)	18-69	Men	0.6	(0.5-0.6)	0.3	(0.3-0.4)	0.3	(0.3-0.3)	-15.3	**	-47.2	**	-37.6	**
Trans fatty acids (En%)	18-69	Women	0.6	(0.6-0.6)	0.4	(0.4-0.4)	0.3	(0.3-0.3)	-18.8	**	-49.7	**	-38.1	**
Linoleic acid (g)	7-17	Boys	14	(14-15)	14	(14-15)	14	(13-15)	-2.5		-1.3		1.2	
Linoleic acid (g)	7-17	Girls	12	(11-12)	12	(12-13)	11	(11-12)	-7.3	*	-3.7		3.9	
Linoleic acid (g)	18-69	Men	17	(16-17)	18	(17-18)	16	(16-17)	-7.8	**	-3.5		4.6	
Linoleic acid (g)	18-69	Women	12	(11-12)	12	(12-13)	12	(12-13)	-2.5		3.8		6.4	*
Linoleic acid (En%)	7-17	Boys	5.3	(5.1-5.4)	5.5	(5.4-5.7)	5.8	(5.6-6.0)	6.2	*	10.9	*	4.4	
Linoleic acid (En%)	7-17	Girls	5.1	(5.0-5.2)	5.6	(5.5-5.8)	5.5	(5.4-5.7)	-1.1		9.1	*	10.3	**
Linoleic acid (En%)	18-69	Men	5.7	(5.6-5.8)	5.9	(5.8-6.1)	5.8	(5.7-6.1)	-1.2		2.6		3.9	
Linoleic acid (En%)	18-69	Women	5.3	(5.2-5.4)	5.8	(5.7-6.0)	5.9	(5.7-6.0)	0.8		10.6	*	9.7	**
Alpha-linolenic acid (g)	7-17	Boys	2	(2-2)	1.7	(1.6-1.7)	1.6	(1.5-1.7)	-3.3		1.0		4.4	
Alpha-linolenic acid (g)	7-17	Girls	1	(1-1)	1.4	(1.3-1.4)	1.3	(1.3-1.4)	-3.7		-1.1		2.7	
Alpha-linolenic acid (g)	18-69	Men	2	(2-2)	2.1	(2.0-2.2)	2.1	(2.0-2.1)	-2.4		-0.8		1.6	
Alpha-linolenic acid (g)	18-69	Women	1	(1-2)	1.6	(1.6-1.7)	1.6	(1.5-1.6)	-2.7		5.1		8.1	**
Alpha-linolenic acid (En%)	7-17	Boys	0.6	(0.6-0.6)	0.7	(0.6-0.7)	0.7	(0.7-0.7)	5.0		14.5	**	9.1	**
Alpha-linolenic acid (En%)	7-17	Girls	0.6	(0.6-0.6)	0.7	(0.6-0.7)	0.7	(0.6-0.7)	2.4		13.1	**	10.5	**

Energy / Macronutrient	Age	Gender	2007-2010		2012-2016		2019-2021		Difference 2019-2021 vs 2012-2016		Difference 2019-2021 vs 2007-2010		Difference 2012-2016 vs 2007-2010	
			Mean	(95%-CI)	Mean	(95%-CI)	Mean	(95%-CI)	%	Sign.	%	Sign.	%	Sign.
Alpha-linolenic acid (En%)	18-69	Men	0.7	(0.7-0.7)	0.7	(0.7-0.7)	0.8	(0.8-0.8)	6.8	*×	9.3	*	2.3	
Alpha-linolenic acid (En%)	18-69	Women	0.7	(0.7-0.7)	0.8	(0.8-0.8)	0.8	(0.8-0.8)	-0.8		12.8	*×	13.6	*×
N-3 fish fatty acids (EPA+DHA, mg)	7-17	Boys	100		106		104		-1.7		4.3		6.1	×
N-3 fish fatty acids (EPA+DHA, mg)	7-17	Girls	81		99		87		-12.1	×	8.1		23.0	×
N-3 fish fatty acids (EPA+DHA, mg)	18-69	Men	192		234		215		-8.5	×	11.8		22.1	×
N-3 fish fatty acids (EPA+DHA, mg)	18-69	Women	214		237		217		-8.6	×	1.3		10.8	×
Cholesterol (mg)	7-17	Boys			194	(185-201)	196	(186-205)	0.9					
Cholesterol (mg)	7-17	Girls			166	(160-174)	171	(163-180)	3.5					
Cholesterol (mg)	18-69	Men			261	(252-273)	254	(244-266)	-2.7					
Cholesterol (mg)	18-69	Women			197	(189-204)	207	(197-216)	5.0					
Total carbohydrates (g)	7-17	Boys	302	(297-307)	285	(279-290)	255	(248-260)	-10.6	*×	-15.7	*×	-5.7	*
Total carbohydrates (g)	7-17	Girls	256	(253-261)	237	(233-242)	213	(208-217)	-10.4	*×	-16.9	*×	-7.3	*×
Total carbohydrates (g)	18-69	Men	280	(275-285)	276	(270-283)	245	(240-253)	-11.1	*×	-12.3	*×	-1.4	*
Total carbohydrates (g)	18-69	Women	218	(214-222)	204	(199-208)	188	(184-193)	-7.5	*×	-13.7	*×	-6.7	*×
Total carbohydrates (En%)	7-17	Boys	51.4	(51.0-51.8)	50.8	(50.2-51.3)	48.4	(47.8-48.9)	-4.7	*	-5.9	*	-1.3	
Total carbohydrates (En%)	7-17	Girls	51.2	(50.8-51.7)	51.4	(50.9-51.8)	48.4	(47.7-48.8)	-5.8	*	-5.5	*	0.4	
Total carbohydrates (En%)	18-69	Men	43.2	(42.8-43.7)	42.8	(42.3-43.4)	41.4	(41.0-41.9)	-3.2	*	-4.1	*	-0.9	*
Total carbohydrates (En%)	18-69	Women	45.3	(44.8-45.7)	44.2	(43.7-44.7)	41.5	(40.9-42.2)	-6.2	*×	-8.4	*	-2.4	*

Energy / Macronutrient	Age	Gender	2007-2010		2012-2016		2019-2021		Difference 2019-2021 vs 2012-2016		Difference 2019-2021 vs 2007-2010		Difference 2012-2016 vs 2007-2010	
			Mean	(95%-CI)	Mean	(95%-CI)	Mean	(95%-CI)	%	Sign.	%	Sign.	%	Sign.
Mono- and disaccharides (g)	7-17	Boys	158	(154-161)	144	(140-149)	115	(110-118)	-20.4	**	-27.5	**	-8.9	**
Mono- and disaccharides (g)	7-17	Girls	135	(132-139)	120	(118-125)	97	(93-100)	-19.7	**	-28.5	**	-11.0	**
Mono- and disaccharides (g)	18-69	Men	124	(121-128)	121	(116-125)	102	(99-106)	-15.2	**	-17.3	**	-2.5	*
Mono- and disaccharides (g)	18-69	Women	104	(101-107)	96	(92-99)	83	(81-86)	-12.9	**	-19.9	**	-8.0	**
Mono- and disaccharides (En%)	7-17	Boys	26.9	(26.4-27.3)	25.9	(25.2-26.3)	21.8	(21.2-22.5)	-15.6	**	-19.0	**	-4.0	*
Mono- and disaccharides (En%)	7-17	Girls	27.2	(26.7-27.6)	26.1	(25.6-26.7)	22.0	(21.4-22.5)	-15.6	**	-19.0	**	-4.1	
Mono- and disaccharides (En%)	18-69	Men	19.0	(18.7-19.5)	18.6	(18.2-19.2)	17.3	(16.7-17.6)	-7.1	**	-9.0	*	-2.0	*
Mono- and disaccharides (En%)	18-69	Women	21.2	(20.8-21.6)	20.4	(19.9-20.9)	18.3	(17.8-18.8)	-10.4	**	-13.7	**	-3.7	
Polysaccharides (g)	7-17	Boys	145	(143-148)	143	(139-146)	141	(137-144)	-1.8		-3.0		-1.2	
Polysaccharides (g)	7-17	Girls	120	(119-123)	117	(114-120)	116	(113-119)	-0.7		-3.5		-2.9	
Polysaccharides (g)	18-69	Men	155	(152-158)	155	(152-159)	143	(140-147)	-7.4	**	-7.6	*	-0.1	
Polysaccharides (g)	18-69	Women	114	(112-116)	109	(106-111)	106	(102-109)	-2.8		-7.5	*	-4.9	*
Polysaccharides (En%)	7-17	Boys	24.7	(24.4-25.0)	25.4	(24.9-25.7)	26.7	(26.3-27.1)	5.3	*	8.1	*	2.6	
Polysaccharides (En%)	7-17	Girls	24.3	(24.0-24.6)	25.6	(25.1-25.9)	26.6	(26.2-27.0)	4.2	*	9.8	*	5.4	*
Polysaccharides (En%)	18-69	Men	24.0	(23.7-24.3)	24.2	(23.8-24.5)	24.2	(23.8-24.5)	0.4		1.2		0.8	
Polysaccharides (En%)	18-69	Women	23.9	(23.6-24.2)	23.8	(23.5-24.3)	23.2	(22.7-23.8)	-2.7		-3.1		-0.4	
Dietary fibre (g)	7-17	Boys	18.9	(18.5-19.3)	19.3	(18.8-19.8)	20.6	(20.0-21.1)	6.9	**	8.7	*	1.6	
Dietary fibre (g)	7-17	Girls	16.3	(16.1-16.7)	16.4	(16.1-16.9)	17.7	(17.2-18.2)	8.0	**	8.5	*	0.5	
Dietary fibre (g)	18-69	Men	22.6	(22.2-23.0)	23.2	(22.7-23.7)	24.0	(23.5-24.6)	3.7		6.5	*	2.7	
Dietary fibre (g)	18-69	Women	18.6	(18.2-19.0)	18.3	(17.9-18.8)	19.1	(18.6-19.5)	4.2		2.5		-1.6	
Dietary fibre (g/MJ)	7-17	Boys	1.9	(1.9-2.0)	2.1	(2.0-2.1)	2.4	(2.3-2.4)	15.0	**	22.6	**	6.6	**

Energy / Macronutrient	Age	Gender	2007-2010		2012-2016		2019-2021		Difference 2019-2021 vs 2012-2016		Difference 2019-2021 vs 2007-2010		Difference 2012-2016 vs 2007-2010	
			Mean	(95%-CI)	Mean	(95%-CI)	Mean	(95%-CI)	%	Sign.	%	Sign.	%	Sign.
Dietary fibre (g/MJ)	7-17	Girls	2.0	(2.0-2.0)	2.2	(2.1-2.2)	2.4	(2.4-2.5)	11.8	*x	22.8	*x	9.8	*x
Dietary fibre (g/MJ	18-69	Men	2.1	(2.1-2.2)	2.2	(2.2-2.2)	2.5	(2.4-2.5)	12.0	*x	16.2	*x	3.8	
Dietary fibre (g/MJ)	18-69	Women	2.4	(2.3-2.4)	2.4	(2.4-2.5)	2.6	(2.5-2.7)	6.9	*x	10.1	*	3.0	
Water (g)	7-17	Boys			2034	(1994-2074)	2081	(2024-2126)	2.3					
Water (g)	7-17	Girls			1852	(1817-1896)	1987	(1935-2028)	7.3	*x				
Water (g)	18-69	Men			2978	(2920-3034)	3075	(3007-3142)	3.3					
Water (g)	18-69	Women			2844	(2776-2911)	2874	(2816-2944)	1					
Alcohol (g)	12-17	Boys	2.6	(1.7-4.0)	2.4	(1.0-2.9)	0.6	(0.1-1.3)	-74.4	x	-76.5	*x	-8.4	x
Alcohol (g)	12-17	Girls	1.6	(1.0-1.9)	0.5	(0.2-0.9)	0.3	(0.1-0.5)	-41.0	x	-80.4	*x	-66.8	*x
Alcohol (g)	18-69	Men	20.9	(19.2-22.3)	18.1	(16.3-20.0)	10.9	(9.4-12.4)	-39.7	*x	-47.9	*x	-13.6	*x
Alcohol (g)	18-69	Women	9.0	(8.0-10.3)	6.6	(5.6-7.6)	5.3	(4.4-6.3)	-19.9	x	-41.1	*x	-26.5	*x

* Indicates whether the differences are statistically significant.

x Indicates a change of an average of more than 1% decrease or increase per year, assessed as relevant.

Table H.3 Evaluation of the micronutrient intake compared to dietary reference values in DNFCS 2007-2010, DNFCS 2012-2016 and DNFCS 2019-2021 for the Dutch population aged 7-69 (four age-gender groups).

Macronutrient	Age	Gender	2007-2010	2012-2016	2019-2021
Protein (g/kg)	7-17	Boys	Adequate intakes (99.8%)	Adequate intakes (99.7%)	Adequate intakes (99.8%)
Protein (g/kg)	7-17	Girls	Adequate intakes (98.7%)	Adequate intakes (98.1%)	Adequate intakes (97.5%)
Protein (g/kg)	18-69	Men	Adequate intakes (97.9%)	Adequate intakes (97.0%)	Adequate intakes (95.8%)
Protein (g/kg)	18-69	Women	Adequate intakes (93.3%)	Adequate intakes (91.6%)	Low intakes (10.8%)
Total carbohydrates (En%)	7-17	Boys	Seems adequate	Seems adequate	Seems adequate
Total carbohydrates (En%)	7-17	Girls	Seems adequate	Seems adequate	Seems adequate
Total carbohydrates (En%)	18-69	Men	Seems adequate	Seems adequate	Seems adequate
Total carbohydrates (En%)	18-69	Women	Seems adequate	Seems adequate	Seems adequate
Dietary fibre (g/MJ)	7-17	Boys	Low intakes[a]	Low intakes[a]	Low intakes[a]
Dietary fibre (g/MJ)	7-17	Girls	Low intakes[a]	Low intakes[a]	Low intakes[a]
Dietary fibre (g/MJ)	18-69	Men	Low intakes[a]	Low intakes[a]	Low intakes[a]
Dietary fibre (g/MJ)	18-69	Women	Low intakes[a]	Low intakes[a]	Low intakes[a]
Fat (En%)	7-17	Boys	High intakes (5.7%)	High intakes (7.3%)	High intakes (15.1%)
Fat (En%)	7-17	Girls	High intakes (6.8%)	High intakes (7.1%)	High intakes (18.9%)
Fat (En%)	18-50	Men	High intakes (9.0%)	High intakes (15.2%)	High intakes (27.7%)
Fat (En%)	18-50	Women	High intakes (9.5%)	High intakes (12.8%)	High intakes (35.5%)
Cis-unsaturated fatty acids (En%)	7-17	Boys	No high intakes (100.0%)	No high intakes (100.0%)	No high intakes (100.0%)
Cis-unsaturated fatty acids (En%)	7-17	Girls	No high intakes (100.0%)	No high intakes (100.0%)	No high intakes (100.0%)
Cis-unsaturated fatty acids (En%)	18-69	Men	No high intakes (100.0%)	No high intakes (100.0%)	No high intakes (100.0%)
Cis-unsaturated fatty acids (En%)	18-69	Women	No high intakes (100.0%)	No high intakes (100.0%)	No high intakes (100.0%)
Linoleic acid (En%)	7-17	Boys	Seems adequate	Seems adequate	Seems adequate
Linoleic acid (En%)	7-17	Girls	Seems adequate	Seems adequate	Seems adequate
Linoleic acid (En%)	18-69	Men	Seems adequate	Seems adequate	Seems adequate
Linoleic acid (En%)	18-69	Women	Seems adequate	Seems adequate	Seems adequate
Trans fatty acids (En%)	7-17	Boys	No high intakes (99.2%)	No high intakes (100.0%)	No high intakes (100.0%)
Trans fatty acids (En%)	7-17	Girls	No high intakes (98.6%)	No high intakes (100.0%)	No high intakes (100.0%)
Trans fatty acids (En%)	18-69	Men	No high intakes (98.3%)	No high intakes (100.0%)	No high intakes (100.0%)

Macronutrient	Age	Gender	2007-2010	2012-2016	2019-2021
Trans fatty acids (En%)	18-69	Women	High intakes (3.3%)	No high intakes (100.0%)	No high intakes (100.0%)
Alpha-linolenic acid (En%)	7-17	Boys	No statement	No statement	No statement
Alpha-linolenic acid (En%)	7-17	Girls	No statement	No statement	No statement
Alpha-linolenic acid (En%)	18-69	Men	No statement	No statement	No statement
Alpha-linolenic acid (En%)	18-69	Women	No statement	No statement	No statement
Alcohol (g)	12-17	Boys	High intakes (32.9%)	High intakes (19.5%)	High intakes (15.9%)
Alcohol (g)	12-17	Girls	High intakes (31.8%)	High intakes (16.3%)	High intakes (17.6%)
Alcohol (g)	18-69	Men	High intakes (64.3%)	High intakes (58.2%)	High intakes (37.6%)
Alcohol (g)	18-69	Women	High intakes (33.7%)	High intakes (25.3%)	High intakes (19.6%)
N-3 fish fatty acids (EPA+DHA, mg)	7-17	Boys	No statement	No statement	No statement
N-3 fish fatty acids (EPA+DHA, mg)	7-17	Girls	No statement	No statement	No statement
N-3 fish fatty acids (EPA+DHA, mg)	18-69	Men	No statement	No statement	No statement
N-3 fish fatty acids (EPA+DHA, mg)	18-69	Women	No statement	No statement	No statement
Saturated fatty acids (En%)	7-17	Boys	High intakes (87.5%)	High intakes (82.3%)	High intakes (88.5%)
Saturated fatty acids (En%)	7-17	Girls	High intakes (87.0%)	High intakes (81.7%)	High intakes (90.6%)
Saturated fatty acids (En%)	18-69	Men	High intakes (91.0%)	High intakes (89.9%)	High intakes (94.4%)
Saturated fatty acids (En%)	18-69	Women	High intakes (89.4%)	High intakes (89.5%)	High intakes (93.6%)

Table H.4 Average habitual intake of micronutrients in DNFCS 2007-2010, DNFCS 2012-2016 and DNFCS 2019-2021 for the Dutch population aged 7-69.

	2007-2010		2012-2016		2019-2021		Difference 2019-2021 vs 2012-2016		Difference 2019-2021 vs 2007-2010		Difference 2012-2016 vs 2007-2010	
Energy / Macronutrient	**Mean**	**(95%-CI)**	**Mean**	**(95%-CI)**	**Mean**	**(95%-CI)**	**%**	**Sign.**	**%**	**Sign.**	**%**	**Sign.**
Retinol (µg)	682	(659-706)	716	(681-748)	651	(617-676)	-9.1	*ˣ	-4.5		5.0	
Vitamin A (RAE)	904	(871-934)	927	(894-964)	869	(841-905)	-6.3	ˣ	-3.9		2.5	
Vitamin B_1 (mg)	1.8	(1.6-2.0)	2.5	(2.0-2.9)	2.1	(1.6-2.3)	-17.8	ˣ	14.6	ˣ	39.5	ˣ
Vitamin B_1 (mg/MJ)	0.20	(0.18-0.22)	0.30	(0.23-0.38)	0.28	(0.21-0.32)	-7.4	ˣ	41.5	ˣ	52.8	*ˣ
Vitamin B_2 (mg)	2.2	(2.1-2.4)	2.9	(2.4-3.3)	2.3	(2.0-2.7)	-18.6	ˣ	5.8		30.0	ˣ
Vitamin B_3 (mg)			23.5	(22.8-24.2)	21.1	(20.5-21.9)	-10.0	*ˣ				
Vitamin B_3 (mg/MJ)			2.7	(2.6-2.8)	2.6	(2.5-2.7)	-5.3					
Vitamin B_6 (mg)	2.6	(2.4-2.7)	2.8	(2.4-3.1)	2.1	(2.0-2.3)	-26.4	*ˣ	-20.0	*ˣ	8.7	ˣ
Vitamin B_{12} (µg)	5.6	(5.2-6.0)	11.2	(7.2-16.4)	18.6	(13.3-26.3)	66.0	ˣ	233.1	*ˣ	100.6	*ˣ
Folic acid (µg)	55.4	(49.9-59.2)	55.1	(45.6-64.2)	60.1	(53.1-64.8)	8.9	ˣ	8.4		-0.5	
Folate equivalents (DFE)	330	(324-341)	338	(325-361)	362	(349-372)	7.1	ˣ	9.5	*	2.3	
Vitamin C (mg)	137	(127-148)	146	(134-155)	168	(151-180)	14.6	ˣ	22.3	*ˣ	6.7	ˣ
Vitamin D (µg)	4.0	(3.9-4.1)	4.6	(4.3-4.8)	8.5	(7.5-9.0)	84.6	*ˣ	110.0	*ˣ	13.7	*ˣ
Vitamin E (mg)	16.0	(15.5-16.6)	16.4	(15.4-17.0)	16.3	(15.6-17.1)	-0.7		1.7		2.4	
Vitamin K_1 (µg)			105.8	(97.3-114.5)	111.8	(101.2-120.4)	5.6					
Calcium (mg)	1066	(1050-1081)	1025	(1008-1044)	1015	(997-1033)	-0.9		-4.8	*	-3.9	*
Copper (mg)	1.3	(1.3-1.3)	1.5	(1.4-1.5)	1.6	(1.5-1.6)	5.6	*	19.9	*ˣ	13.6	*ˣ
Iron (mg)	11.8	(11.5-11.9)	11.8	(11.4-12.2)	12.1	(11.7-12.5)	2.7		2.9		0.3	
Magnesium (mg)	348	(345-353)	355	(349-360)	371	(364-379)	4.6	*	6.5	*	1.8	
Phosphorus (mg)	1539	(1521-1557)	1477	(1458-1497)	1450	(1431-1473)	-1.8		-5.8	*	-4.0	*
Potassium (mg)	3365	(3331-3406)	3213	(3172-3256)	3106	(3073-3158)	-3.3	*	-7.7	*	-4.5	*
Selenium (µg)	51	(51-52)	54	(52-55)	56	(54-58)	4.7		9.1	*	4.2	
Sodium (mg)			3086	(3031-3150)	2777	(2715-2816)	-10.0	*ˣ				
Zinc (mg)	11.7	(11.5-11.9)	11.7	(11.5-11.9)	11.9	(11.6-12.2)	2.5		2.3		-0.2	
Iodine (µg)			195	(192-199)	201	(198-205)	2.9					

* Indicates whether the differences are statistically significant.
ˣ Indicates a change of an average of more than 1% decrease or increase per year, assessed as relevant.

Table H.5 Average habitual intake of micronutrients in DNFCS 2007-2010, DNFCS 2012-2016 and DNFCS 2019-2021 for the Dutch population aged 7-69 (four age-gender groups).

Micronutrients	Age	Gender	2007-2010		2012-2016		2019-2021		Difference 2019-2021 vs 2012-2016		Difference 2019-2021 vs 2007-2010		Difference 2012-2016 vs 2007-2010	
			Mean	(95%-CI)	Mean	(95%-CI)	Mean	(95%-CI)	%	Sign.	%	Sign.	%	Sign.
Retinol (µg)	7-17	Boys	581	(552-614)	631	(585-672)	538	(493-576)	-14.8	*×	-7.5		8.6	×
Retinol (µg)	7-17	Girls	500	(476-528)	492	(456-530)	448	(410-477)	-8.8	×	-10.4		-1.7	
Retinol (µg)	18-69	Men	774	(735-816)	856	(798-915)	764	(712-816)	-10.7	×	-1.2		10.6	×
Retinol (µg)	18-69	Women	646	(610-681)	633	(583-677)	598	(550-629)	-5.6		-7.5		-1.9	
Vitamin A (RAE)	7-17	Boys	759	(710-785)	788	(746-832)	700	(649-740)	-11.1	*×	-7.7		3.8	
Vitamin A (RAE)	7-17	Girls	662	(626-694)	621	(585-666)	597	(560-641)	-3.9		-9.8		-6.1	×
Vitamin A (RAE)	18-69	Men	993	(947-1048)	1090	(1035-1154)	981	(932-1049)	-10.0	×	-1.2		9.8	×
Vitamin A (RAE)	18-69	Women	893	(835-938)	847	(795-896)	839	(795-885)	-0.9		-6.0		-5.1	
Vitamin B_1 (mg)	7-17	Boys	1.4	(1.1-1.5)	1.4	(1.1-1.4)	1.3	(0.9-1.4)	-9.1	×	-11.1		-2.2	*
Vitamin B_1 (mg)	7-17	Girls	1.2	(1.1-1.3)	1.5	(1.0-1.7)	1.5	(0.8-1.8)	2.3		19.9	×	17.2	×
Vitamin B_1 (mg)	18-69	Men	1.9	(1.5-2.3)	2.2	(1.7-2.4)	2.0	(1.6-2.6)	-9.1	×	8.3		19.1	×
Vitamin B_1 (mg)	18-69	Women	2.0	(1.6-2.3)	3.3	(2.4-4.2)	2.4	(1.6-2.6)	-26.5	×	21.9	×	65.7	*×
Vitamin B_1 (mg/MJ)	7-17	Boys	0.13	(0.12-0.15)	0.17	(0.12-0.17)	0.12	(0.11-0.15)	-26.5	×	-4.9		29.4	*×
Vitamin B_1 (mg/MJ)	7-17	Girls	0.15	(0.13-0.17)	0.19	(0.12-0.25)	0.24	(0.10-0.29)	29.0	×	61.3	×	25.0	×
Vitamin B_1 (mg/MJ)	18-69	Men	0.17	(0.14-0.20)	0.22	(0.14-0.30)	0.22	(0.17-0.29)	2.4		30.6	×	27.6	×
Vitamin B_1 (mg/MJ)	18-69	Women	0.25	(0.21-0.29)	0.43	(0.30-0.60)	0.37	(0.22-0.43)	-14.5	×	49.0	×	74.3	*×
Vitamin B_2 (mg)	7-17	Boys	1.7	(1.6-1.8)	1.6	(1.5-1.9)	1.6	(1.4-1.8)	3.8		-5.4		-8.9	×
Vitamin B_2 (mg)	7-17	Girls	1.6	(1.5-1.7)	1.8	(1.3-2.0)	1.8	(1.2-2.2)	-2.5		11.8		14.6	×
Vitamin B_2 (mg)	18-69	Men	2.2	(2.0-2.4)	2.3	(2.1-2.7)	2.5	(2.0-3.0)	6.7	×	13.2	×	6.1	×
Vitamin B_2 (mg)	18-69	Women	2.5	(2.1-2.9)	3.9	(2.7-4.8)	2.5	(2.0-3.1)	-36.8	×	-0.9		56.8	×
Vitamin B_3 (mg)	7-17	Boys			18.4	(17.6-19.1)	17.3	(16.1-17.7)	-6.4	×				
Vitamin B_3 (mg)	7-17	Girls			15.2	(14.5-16.1)	13.6	(12.9-14.1)	-10.7	*×				
Vitamin B_3 (mg)	18-69	Men			27.4	(26.4-28.4)	25.0	(24.0-26.4)	-8.7	*×				

Micronutrients	Age	Gender	2007-2010		2012-2016		2019-2021		Difference 2019-2021 vs 2012-2016		Difference 2019-2021 vs 2007-2010		Difference 2012-2016 vs 2007-2010	
			Mean	(95%-CI)	Mean	(95%-CI)	Mean	(95%-CI)	%	Sign.	%	Sign.	%	Sign.
Vitamin B_3 (mg)	18-69	Women			22.0	(20.8-23.5)	19.4	(18.6-20.4)	-11.8	*×				
Vitamin B_3 (mg/MJ)	7-17	Boys			2.0	(1.9-2.1)	2.0	(1.9-2.0)	-0.8					
Vitamin B_3 (mg/MJ)	7-17	Girls			2.1	(1.9-2.2)	1.9	(1.8-2.0)	-8.9	×				
Vitamin B_3 (mg/MJ)	18-69	Men			2.7	(2.5-2.8)	2.6	(2.5-2.8)	-1.1					
Vitamin B_3 (mg/MJ)	18-69	Women			3.0	(2.8-3.2)	2.7	(2.6-2.9)	-9.3	×				
Vitamin B_6 (mg)	7-17	Boys	2.1	(2.0-2.2)	1.8	(1.7-2.0)	1.6	(1.5-1.8)	-9.5	×	-23.9	*×	-15.8	×
Vitamin B_6 (mg)	7-17	Girls	1.9	(1.7-2.0)	1.6	(1.5-1.8)	1.5	(1.3-1.6)	-9.4	×	-22.5	*×	-14.5	×
Vitamin B_6 (mg)	18-69	Men	2.7	(2.6-2.8)	2.6	(2.4-3.0)	2.3	(2.1-2.5)	-12.1	×	-14.5	*×	-2.7	
Vitamin B_6 (mg)	18-69	Women	2.8	(2.4-3.0)	3.5	(2.4-4.0)	2.1	(1.9-2.4)	-40.2	×	-25.0	*×	25.5	×
Vitamin B_{12} (µg)	7-17	Boys	5.1	(3.0-7.5)	5.3	(3.7-6.4)	5.8	(2.8-9.9)	9.6	×	13.6	×	3.6	
Vitamin B_{12} (µg)	7-17	Girls	3.9	(3.5-4.4)	4.8	(2.8-8.5)	4.5	(1.4-10.6)	-5.8		13.4	×	20.5	×
Vitamin B_{12} (µg)	18-69	Men	5.9	(5.6-6.1)	11.1	(6.4-15.3)	13.1	(8.8-20.0)	18.0	×	122.5	*×	88.6	*×
Vitamin B_{12} (µg)	18-69	Women	5.7	(5.0-6.4)	13.6	(5.5-24.8)	28.8	(16.1-43.6)	111.2	×	404.0	*×	138.6	×
Folic acid (µg)	7-17	Boys	31.3	(25.8-35.0)	27.4	(21.1-37.3)	35.6	(30.5-42.8)	30.1	×	13.7	×	-12.6	×
Folic acid (µg)	7-17	Girls	25.7	(21.5-28.3)	25.3	(22.1-31.4)	30.8	(26.7-37.1)	21.5	×	19.6	×	-1.6	
Folic acid (µg)	18-69	Men	53.2	(45.6-59.2)	56.0	(36.3-72.6)	59.6	(51.1-69.2)	6.6	×	12.1	×	5.2	
Folic acid (µg)	18-69	Women	68.5	(59.5-75.6)	65.1	(54.9-76.1)	70.1	(55.5-77.8)	7.8	×	2.3		-5.0	
Folate equivalents (DFE)	7-17	Boys	245	(236-255)	251	(237-273)	278	(264-290)	11.0	×	13.5	*×	2.3	
Folate equivalents (DFE)	7-17	Girls	213	(205-220)	215	(209-232)	247	(234-257)	14.6	*×	15.7	*×	0.9	
Folate equivalents (DFE)	18-69	Men	356	(346-372)	374	(343-413)	394	(374-412)	5.2		10.6	*	5.1	

Micronutrients	Age	Gender	2007-2010		2012-2016		2019-2021		Difference 2019-2021 vs 2012-2016		Difference 2019-2021 vs 2007-2010		Difference 2012-2016 vs 2007-2010	
			Mean	(95%-CI)	Mean	(95%-CI)	Mean	(95%-CI)	%	Sign.	%	Sign.	%	Sign.
Folate equivalents (DFE)	18-69	Women	345	(331-362)	340	(324-369)	366	(343-386)	7.6	ˣ	6.1		-1.4	ˣ
Vitamin C (mg)	7-17	Boys	108	(94-120)	114	(105-124)	117	(99-132)	1.9		8.1		6.0	ˣ
Vitamin C (mg)	7-17	Girls	104	(92-118)	109	(98-121)	110	(93-140)	1.4		5.6		4.1	
Vitamin C (mg)	18-69	Men	137	(120-155)	142	(127-151)	151	(137-167)	6.3	ˣ	10.1		3.6	*
Vitamin C (mg)	18-69	Women	150	(135-164)	164	(138-183)	204	(168-225)	24.5	ˣ	35.8	*ˣ	9.1	*ˣ
Vitamin D (µg)	7-17	Boys	3.4	(3.2-3.6)	3.5	(3.3-3.7)	5.1	(4.4-6.3)	44.0	*ˣ	51.8	*ˣ	5.4	
Vitamin D (µg)	7-17	Girls	2.8	(2.7-2.9)	3.2	(2.9-3.4)	4.4	(3.7-5.1)	39.1	*ˣ	57.6	*ˣ	13.2	ˣ
Vitamin D (µg)	18-69	Men	4.5	(4.3-4.7)	4.6	(4.3-5.0)	7.6	(6.6-8.5)	64.8	*ˣ	68.0	*ˣ	1.9	
Vitamin D (µg)	18-69	Women	3.9	(3.7-4.1)	5.0	(4.5-5.4)	10.6	(8.9-11.5)	112.1	*ˣ	171.6	*ˣ	28.0	*ˣ
Vitamin E (mg)	7-17	Boys	14.2	(13.9-15.0)	14.0	(13.5-14.5)	14.4	(13.6-15.1)	2.4		0.9		-1.4	
Vitamin E (mg)	7-17	Girls	12.0	(11.6-12.6)	11.8	(11.3-12.6)	12.0	(11.4-12.6)	1.8		0.5		-1.3	
Vitamin E (mg)	18-69	Men	17.2	(16.4-18.0)	17.1	(16.5-17.9)	17.9	(17.0-18.6)	4.3		4.2		-0.2	*
Vitamin E (mg)	18-69	Women	16.0	(14.9-17.1)	16.9	(14.7-18.2)	15.8	(14.6-17.6)	-6.4	ˣ	-1.1		5.7	
Vitamin K_1 (µg)	7-17	Boys			71.3	(62.5-80.9)	71.7	(61.7-80.4)	0.5					
Vitamin K_1 (µg)	7-17	Girls			72.0	(62.6-81.3)	80.9	(69.8-91.8)	12.2	ˣ				
Vitamin K_1 (µg)	18-69	Men			114.3	(99.5-129.6)	116.0	(102.0-128.9)	1.4					
Vitamin K_1 (µg)	18-69	Women			110.1	(97.0-123.0)	120.5	(102.3-135.2)	9.5	ˣ				
Calcium (mg)	7-17	Boys	1005	(977-1038)	936	(899-967)	926	(894-963)	-1.0		-7.9	*	-6.9	*ˣ
Calcium (mg)	7-17	Girls	890	(862-913)	771	(747-796)	783	(754-810)	1.5		-12.0	*ˣ	-13.3	*ˣ
Calcium (mg)	18-69	Men	1161	(1131-1187)	1126	(1090-1162)	1123	(1089-1153)	-0.3		-3.3		-3.1	*
Calcium (mg)	18-69	Women	1018	(993-1044)	987	(964-1016)	969	(945-997)	-1.9		-4.9		-3.0	
Copper (mg)	7-17	Boys	1.2	(1.1-1.2)	1.3	(1.3-1.3)	1.3	(1.3-1.4)	2.2		14.0	*ˣ	11.6	*ˣ
Copper (mg)	7-17	Girls	1.0	(1.0-1.0)	1.1	(1.1-1.1)	1.2	(1.1-1.2)	4.8		16.4	*ˣ	11.1	*ˣ
Copper (mg)	18-69	Men	1.4	(1.4-1.5)	1.6	(1.6-1.7)	1.7	(1.7-1.8)	6.9	*ˣ	22.9	*ˣ	15.0	*ˣ
Copper (mg)	18-69	Women	1.3	(1.2-1.3)	1.4	(1.4-1.5)	1.5	(1.4-1.5)	5.0		17.8	*ˣ	12.2	*ˣ

Micronutrients	Age	Gender	2007-2010		2012-2016		2019-2021		Difference 2019-2021 vs 2012-2016		Difference 2019-2021 vs 2007-2010		Difference 2012-2016 vs 2007-2010	
			Mean	(95%-CI)	Mean	(95%-CI)	Mean	(95%-CI)	%	Sign.	%	Sign.	%	Sign.
Iron (mg)	7-17	Boys	10.2	(9.8-10.5)	10.0	(9.6-10.3)	10.2	(9.7-10.5)	2.0		0.2		-1.7	
Iron (mg)	7-17	Girls	8.8	(8.6-9.2)	8.5	(8.2-8.7)	8.7	(8.3-9.2)	2.9		-1.1		-3.9	
Iron (mg)	18-69	Men	12.9	(12.6-13.1)	13.6	(12.8-14.3)	13.4	(12.9-13.9)	-1.0		4.3		5.3	
Iron (mg)	18-69	Women	11.5	(11.1-11.9)	11.0	(10.6-11.4)	11.8	(11.0-12.6)	7.3	ˣ	1.9		-5.0	
Magnesium (mg)	7-17	Boys	297	(290-303)	295	(287-301)	301	(294-313)	2.2		1.4		-0.9	
Magnesium (mg)	7-17	Girls	252	(247-257)	244	(238-250)	254	(247-262)	4.0		0.6		-3.2	
Magnesium (mg)	18-69	Men	399	(392-407)	412	(403-420)	421	(408-433)	2.4		5.5	*	3.1	
Magnesium (mg)	18-69	Women	327	(321-334)	329	(320-338)	356	(345-367)	8.1	*ˣ	9.0	*	0.8	
Phosphorus (mg)	7-17	Boys	1440	(1406-1464)	1365	(1335-1399)	1359	(1324-1390)	-0.4		-5.7	*	-5.2	*
Phosphorus (mg)	7-17	Girls	1227	(1209-1252)	1097	(1074-1126)	1123	(1088-1154)	2.4		-8.5	*	-10.6	*ˣ
Phosphorus (mg)	18-69	Men	1780	(1752-1814)	1731	(1695-1770)	1678	(1647-1718)	-3.0		-5.7	*	-2.8	*
Phosphorus (mg)	18-69	Women	1377	(1348-1404)	1313	(1288-1337)	1303	(1277-1334)	-0.7		-5.4	*	-4.7	*
Potassium (mg)	7-17	Boys	2909	(2847-2958)	2735	(2678-2796)	2690	(2622-2745)	-1.6		-7.5	*	-6.0	*
Potassium (mg)	7-17	Girls	2516	(2481-2567)	2298	(2251-2368)	2329	(2245-2378)	1.4		-7.4	*	-8.7	*ˣ
Potassium (mg)	18-69	Men	3898	(3841-3972)	3768	(3691-3842)	3616	(3552-3691)	-4.0		-7.2	*	-3.3	*
Potassium (mg)	18-69	Women	3091	(3030-3150)	2916	(2861-2976)	2824	(2782-2912)	-3.1		-8.6	*	-5.7	*
Selenium (µg)	7-17	Boys	43	(42-44)	42	(41-44)	45	(43-47)	6.2	ˣ	4.9		-1.2	
Selenium (µg)	7-17	Girls	37	(36-38)	36	(35-38)	37	(35-38)	0.7		-0.7		-1.4	

Micronutrients	Age	Gender	2007-2010		2012-2016		2019-2021		Difference 2019-2021 vs 2012-2016		Difference 2019-2021 vs 2007-2010		Difference 2012-2016 vs 2007-2010	
			Mean	(95%-CI)	Mean	(95%-CI)	Mean	(95%-CI)	%	Sign.	%	Sign.	%	Sign.
Selenium (µg)	18-69	Men	58	(56-60)	61	(58-63)	65	(61-68)	6.5	×	10.8	*	4.1	
Selenium (µg)	18-69	Women	49	(48-51)	52	(49-54)	54	(51-56)	3.1		8.6	*	5.3	
Sodium (mg)	7-17	Boys			2938	(2859-2991)	2645	(2573-2735)	-10.0	*×				
Sodium (mg)	7-17	Girls			2340	(2285-2416)	2211	(2161-2274)	-5.5	*				
Sodium (mg)	18-69	Men			3639	(3550-3757)	3206	(3100-3277)	-11.9	*×				
Sodium (mg)	18-69	Women			2697	(2615-2772)	2485	(2405-2542)	-7.9	*×				
Zinc (mg)	7-17	Boys	10.1	(9.9-10.4)	10.2	(9.8-10.5)	10.1	(9.7-10.5)	-1.1		-0.6		0.6	
Zinc (mg)	7-17	Girls	8.7	(8.5-8.9)	8.1	(7.9-8.5)	8.3	(8.0-8.5)	2.3		-4.2		-6.3	×
Zinc (mg)	18-69	Men	13.3	(13.0-13.6)	13.3	(12.9-13.7)	13.7	(13.1-14.1)	2.8		2.9		0.2	
Zinc (mg)	18-69	Women	11.0	(10.7-11.3)	10.9	(10.6-11.3)	11.3	(10.7-11.7)	3.1		2.6		-0.4	
Iodine (µg)	7-17	Boys			191	(186-198)	200	(189-205)	4.6					
Iodine (µg)	7-17	Girls			153	(149-158)	162	(157-167)	6.3	×				
Iodine (µg)	18-69	Men			222	(216-228)	222	(218-230)	0.2					
Iodine (µg)	18-69	Women			177	(172-181)	187	(181-192)	5.6					

* Indicates whether the differences are statistically significant.
× Indicates a change of an average of more than 1% decrease or increase per year, assessed as relevant.

Table H.6 Evaluation of the micronutrient intake compared to dietary reference values in DNFCS 2007-2010, DNFCS 2012-2016 and DNFCS 2019-2021 for the Dutch population aged 7-69 (four age-gender groups).

Micronutrients	Age	Gender	2007-2010	2012-2016	2019-2021
Retinol (µg)	7-10	Boys	No high intakes (98.9%)	High intakes (2.9%)	No high intakes (99.4%)
Retinol (µg)	11-14	Boys	No high intakes (99.8%)	No high intakes (99.1%)	No high intakes (99.7%)
Retinol (µg)	15-17	Boys	No high intakes (100.0%)	No high intakes (99.6%)	No high intakes (99.9%)
Retinol (µg)	7-17	Girls	No high intakes (99.2%)	No high intakes (99.7%)	No high intakes (99.5%)
Retinol (µg)	18-69	Men	No high intakes (100.0%)	No high intakes (99.5%)	No high intakes (99.9%)
Retinol (µg)	18-50	Women	No high intakes (98.4%)	No high intakes (97.9%)	No high intakes (98.8%)
Retinol (µg)	51-69	Women	High intakes (4.3%)	High intakes (5.7%)	High intakes (3.1%)
Vitamin A (RAE)	7-13	Boys	Seems adequate	Seems adequate	Seems adequate
Vitamin A (RAE)	14-17	Boys	Low intakes (33.0%)	Low intakes (37.1%)	Low intakes (44.2%)
Vitamin A (RAE)	7-9	Girls	Seems adequate	Seems adequate	Seems adequate
Vitamin A (RAE)	10-13	Girls	Seems adequate	Seems adequate	No statement
Vitamin A (RAE)	14-17	Girls	Low intakes (34.8%)	Low intakes (37.7%)	Low intakes (40.2%)
Vitamin A (RAE)	18-69	Men	Low intakes (20.0%)	Low intakes (18.9%)	Low intakes (23.9%)
Vitamin A (RAE)	18-69	Women	Low intakes (22.6%)	Low intakes (22.5%)	Low intakes (23.8%)
Vitamin B_1 (mg/MJ)	7-17	Boys	Seems adequate	Seems adequate	Seems adequate
Vitamin B_1 (mg/MJ)	7-13	Girls	Seems adequate	Seems adequate	Seems adequate
Vitamin B_1 (mg/MJ)	14-17	Girls	No statement	No statement	No statement
Vitamin B_1 (mg/MJ)	18-69	Men	Adequate intakes (97.6%)	Adequate intakes (99.1%)	Adequate intakes (99.6%)
Vitamin B_1 (mg/MJ)	18-69	Women	Adequate intakes (98.9%)	Adequate intakes (99.8%)	Adequate intakes (99.2%)
Vitamin B_2 (mg)	7-17	Boys	Seems adequate	Seems adequate	Seems adequate
Vitamin B_2 (mg)	7-17	Girls	Seems adequate	Seems adequate	Seems adequate
Vitamin B_2 (mg)	18-69	Men	Low intakes (15.2%)	Low intakes (21.1%)	Low intakes (23.7%)
Vitamin B_2 (mg)	18-69	Women	Low intakes (30.9%)	Low intakes (38.1%)	Low intakes (40.4%)
Vitamin B_3 (mg/MJ)	7-17	Boys		Seems adequate	Seems adequate
Vitamin B_3 (mg/MJ)	7-17	Girls		Seems adequate	Seems adequate
Vitamin B_3 (mg/MJ)	18-69	Men		Adequate intakes (98.5%)	Adequate intakes (98.8%)
Vitamin B_3 (mg/MJ)	18-69	Women		Adequate intakes (96.9%)	Adequate intakes (95.3%)
Vitamin B_6 (mg)	7-17	Boys	Seems adequate	Seems adequate	Seems adequate
Vitamin B_6 (mg)	7-13	Girls	Seems adequate	Seems adequate	Seems adequate
Vitamin B_6 (mg)	14-17	Girls	Seems adequate	Seems adequate	No statement
Vitamin B_6 (mg)	18-50	Men	Adequate intakes (98.8%)	Adequate intakes (98.5%)	Adequate intakes (96.9%)

Micronutrients	Age	Gender	2007-2010	2012-2016	2019-2021
Vitamin B_6 (mg)	51-69	Men	Adequate intakes (95.1%)	Adequate intakes (91.3%)	Adequate intakes (90.2%)
Vitamin B_6 (mg)	18-69	Women	Adequate intakes (93.3%)	Low intakes (12.1%)	Low intakes (12.5%)
Vitamin B_6 (mg)	7-17	Boys	No high intakes (99.9%)	No high intakes (99.9%)	No high intakes (100.0%)
Vitamin B_6 (mg)	7-17	Girls	No high intakes (99.6%)	No high intakes (99.5%)	No high intakes (99.7%)
Vitamin B_6 (mg)	18-69	Men	No high intakes (100.0%)	No high intakes (100.0%)	No high intakes (100.0%)
Vitamin B_6 (mg)	18-69	Women	No high intakes (100.0%)	No high intakes (100.0%)	No high intakes (100.0%)
Vitamin B_{12} (µg)	7-17	Boys	Seems adequate	Seems adequate	Seems adequate
Vitamin B_{12} (µg)	7-17	Girls	Seems adequate	Seems adequate	Seems adequate
Vitamin B_{12} (µg)	18-69	Men	Adequate intakes (99.2%)	Adequate intakes (99.0%)	Adequate intakes (98.0%)
Vitamin B_{12} (µg)	18-69	Women	Adequate intakes (96.5%)	Adequate intakes (96.7%)	Adequate intakes (94.9%)
Folic acid (µg)	7-17	Boys	No high intakes (99.8%)	No high intakes (99.9%)	No high intakes (100.0%)
Folic acid (µg)	7-17	Girls	No high intakes (99.9%)	No high intakes (100.0%)	No high intakes (100.0%)
Folic acid (µg)	18-69	Men	No high intakes (100.0%)	No high intakes (100.0%)	No high intakes (100.0%)
Folic acid (µg)	18-69	Women	No high intakes (100.0%)	No high intakes (100.0%)	No high intakes (100.0%)
Folate equivalents (DFE)	7-13	Boys	Seems adequate	Seems adequate	Seems adequate
Folate equivalents (DFE)	14-17	Boys	No statement	No statement	No statement
Folate equivalents (DFE)	7-8	Girls	Seems adequate	Seems adequate	Seems adequate
Folate equivalents (DFE)	9-13	Girls	No statement	No statement	Seems adequate
Folate equivalents (DFE)	14-17	Girls	No statement	No statement	No statement
Folate equivalents (DFE)	18-69	Men	Adequate intakes (90.2%)	Adequate intakes (90.1%)	Adequate intakes (92.3%)
Folate equivalents (DFE)	18-69	Women	Low intakes (19.5%)	Low intakes (22.3%)	Low intakes (16.6%)
Vitamin C (mg)	7-13	Boys	Seems adequate	Seems adequate	Seems adequate
Vitamin C (mg)	14-17	Boys	Low intakes (16.1%)	Low intakes (17.0%)	Low intakes (21.8%)
Vitamin C (mg)	7-13	Girls	Seems adequate	Seems adequate	Seems adequate
Vitamin C (mg)	14-17	Girls	Low intakes (11.1%)	Low intakes (13.0%)	Low intakes (18.5%)
Vitamin C (mg)	18-69	Men	Low intakes (13.1%)	Low intakes (13.7%)	Low intakes (13.6%)
Vitamin C (mg)	18-69	Women	Adequate intakes (92.9%)	Low intakes (10.2%)	Adequate intakes (90.5%)
Vitamin D (µg)[a]	7-17	Boys	No statement	No statement	No statement
Vitamin D (µg)[a]	7-17	Girls	No statement	No statement	No statement
Vitamin D (µg)[a]	18-69	Men	No statement	No statement	No statement
Vitamin D (µg)[a]	18-69	Women	No statement	No statement	No statement
Vitamin D (µg)[a]	7-17	Boys	No high intakes (100.0%)	No high intakes (100.0%)	No high intakes (99.6%)
Vitamin D (µg)[a]	7-17	Girls	No high intakes (100.0%)	No high intakes (100.0%)	No high intakes (100.0%)

Micronutrients	Age	Gender	2007-2010	2012-2016	2019-2021
Vitamin D (µg)[a]	18-69	Men	No high intakes (100.0%)	No high intakes (100.0%)	No high intakes (99.9%)
Vitamin D (µg)[a]	18-69	Women	No high intakes (100.0%)	No high intakes (100.0%)	No high intakes (99.8%)
Vitamin E (mg)	7-17	Boys	No high intakes (100.0%)	No high intakes (100.0%)	No high intakes (100.0%)
Vitamin E (mg)	7-17	Girls	No high intakes (100.0%)	No high intakes (100.0%)	No high intakes (100.0%)
Vitamin E (mg)	18-69	Men	No high intakes (100.0%)	No high intakes (100.0%)	No high intakes (100.0%)
Vitamin E (mg)	18-69	Women	No high intakes (99.9%)	No high intakes (100.0%)	No high intakes (100.0%)
Vitamin K_1 (µg)	7-17	Boys		Seems adequate	Seems adequate
Vitamin K_1 (µg)	7-17	Girls		Seems adequate	Seems adequate
Vitamin K_1 (µg)	18-69	Men		Seems adequate	Seems adequate
Vitamin K_1 (µg)	18-69	Women		Seems adequate	Seems adequate
Calcium (mg)	6-8	Boys	Seems adequate	Seems adequate	Seems adequate
Calcium (mg)	9-17	Boys	No statement	No statement	No statement
Calcium (mg)	6-8	Girls	Seems adequate	Seems adequate	Seems adequate
Calcium (mg)	9-17	Girls	No statement	No statement	No statement
Calcium (mg)	18-69	Men	Low intakes (13.7%)	Low intakes (16.4%)	Low intakes (14.8%)
Calcium (mg)	18-24	Women	Low intakes (44.0%)	Low intakes (58.6%)	Low intakes (59.4%)
Calcium (mg)	25-49	Women	Low intakes (22.0%)	Low intakes (24.7%)	Low intakes (28.8%)
Calcium (mg)	50-69	Women	No statement	No statement	No statement
Calcium (mg)	7-17	Boys	No high intakes (100%)	No high intakes (100%)	No high intakes (100%)
Calcium (mg)	7-17	Girls	No high intakes (100%)	No high intakes (100%)	No high intakes (100%)
Calcium (mg)	18-69	Men	No high intakes (99.8%)	No high intakes (99.6%)	No high intakes (99.9%)
Calcium (mg)	18-69	Women	No high intakes (99.9%)	No high intakes (100%)	No high intakes (99.9%)
Copper (mg)	7-13	Boys	Seems adequate	Seems adequate	Seems adequate
Copper (mg)	14-17	Boys	Adequate intakes (98.7%)	Adequate intakes (99.3%)	Adequate intakes (99.6%)
Copper (mg)	7-13	Girls	Seems adequate	Seems adequate	Seems adequate
Copper (mg)	14-17	Girls	Adequate intakes (93.3%)	Adequate intakes (97.2%)	Adequate intakes (98.4%)
Copper (mg)	18-69	Men	Adequate intakes (99.4%)	Adequate intakes (99.7%)	Adequate intakes (99.9%)
Copper (mg)	18-69	Women	Adequate intakes (97.3%)	Adequate intakes (99.3%)	Adequate intakes (99.6%)
Copper (mg)	7-17	Boys	No high intakes (99.8%)	No high intakes (99.6%)	No high intakes (100%)
Copper (mg)	7-17	Girls	No high intakes (100%)	No high intakes (99.9%)	No high intakes (100%)
Copper (mg)	18-69	Men	No high intakes (99.9%)	No high intakes (99.9%)	No high intakes (99.9%)
Copper (mg)	18-69	Women	No high intakes (100%)	No high intakes (100%)	No high intakes (100%)
Iron (mg)	7-13	Boys	No statement	No statement	No statement

Micronutrients	Age	Gender	2007-2010	2012-2016	2019-2021
Iron (mg)	14-17	Boys	Adequate intakes (94.0%)	Adequate intakes (92.7%)	Adequate intakes (92.9%)
Iron (mg)	7-13	Girls	No statement	No statement	No statement
Iron (mg)	14-17	Girls	Low intakes (70.6%)	Low intakes (76.1%)	Low intakes (74.8%)
Iron (mg)	18-69	Men	Adequate intakes (99.7%)	Adequate intakes (99.6%)	Adequate intakes (99.6%)
Iron (mg)	18-50	Women	Low intakes (25.6%)	Low intakes (31.1%)	Low intakes (27.6%)
Iron (mg)	51-69	Women	Adequate intakes (99.1%)	Adequate intakes (98.7%)	Adequate intakes (97.3%)
Magnesium (mg)	7-13	Boys	Seems adequate	Seems adequate	Seems adequate
Magnesium (mg)	14-17	Boys	No statement	No statement	No statement
Magnesium (mg)	7-9	Girls	Seems adequate	Seems adequate	Seems adequate
Magnesium (mg)	10-17	Girls	No statement	No statement	No statement
Magnesium (mg)	18-69	Men	Seems adequate	Seems adequate	Seems adequate
Magnesium (mg)	18-69	Women	Seems adequate	Seems adequate	Seems adequate
Magnesium (supplements) (mg)	7-14	Boys	No high intakes (100%)	No high intakes (100%)	No high intakes (100%)
Magnesium (supplements) (mg)	15-17	Boys	No high intakes (100%)	No high intakes (99.9%)	No high intakes (99.0%)
Magnesium (supplements) (mg)	7-17	Girls	No high intakes (100%)	No high intakes (100%)	No high intakes (100%)
Magnesium (supplements) (mg)	18-69	Men	No high intakes (99.9%)	No high intakes (99.5%)	No high intakes (97.7%)
Magnesium (supplements) (mg)	18-69	Women	No high intakes (0.9%)	High intakes (2.6%)	High intakes (5.6%)
Potassium (mg)	7-9	Boys	Seems adequate	Seems adequate	Seems adequate
Potassium (mg)	10-17	Boys	No statement	No statement	No statement
Potassium (mg)	7-9	Girls	Seems adequate	Seems adequate	Seems adequate
Potassium (mg)	10-17	Girls	No statement	No statement	No statement
Potassium (mg)	18-69	Men	Seems adequate	Seems adequate	Seems adequate
Potassium (mg)	18-69	Women	No statement	No statement	No statement
Sodium (mg)	7-17	Boys		High intakes (77.5%)	High intakes (70.4%)
Sodium (mg)	7-17	Girls		High intakes (51.7%)	High intakes (42.3%)
Sodium (mg)	18-69	Men		High intakes (91.1%)	High intakes (85.8%)
Sodium (mg)	18-69	Women		High intakes (62.2%)	High intakes (52.1%)
Zinc (mg)	7-9	Boys	Seems adequate	Seems adequate	Seems adequate
Zinc (mg)	10-13	Boys	No statement	No statement	No statement
Zinc (mg)	14-17	Boys	Adequate intakes (98.9%)	Adequate intakes (98.8%)	Adequate intakes (99.0%)
Zinc (mg)	7-13	Girls	Seems adequate	Seems adequate	Seems adequate
Zinc (mg)	14-17	Girls	Adequate intakes (98.3%)	Adequate intakes (97.9%)	Adequate intakes (97.5%)
Zinc (mg)	18-69	Men	Adequate intakes (99.5%)	Adequate intakes (99.4%)	Adequate intakes (99.6%)

Micronutrients	Age	Gender	2007-2010	2012-2016	2019-2021
Zinc (mg)	18-69	Women	Adequate intakes (98.5%)	Adequate intakes (98.3%)	Adequate intakes (97.6%)
Zinc (mg)	7-10	Boys	High intakes (5.8%)	High intakes (4.6%)	High intakes (6.2%)
Zinc (mg)	11-14	Boys	No high intakes (2.0%)	High intakes (4.2%)	High intakes (3.0%)
Zinc (mg)	15-17	Boys	No high intakes (99.0%)	No high intakes (99.2%)	No high intakes (98.2%)
Zinc (mg)	7-10	Girls	High intakes (2.6%)	No high intakes (99.1%)	No high intakes (98.0%)
Zinc (mg)	11-14	Girls	No high intakes (99.1%)	No high intakes (98.6%)	No high intakes (99.2%)
Zinc (mg)	15-17	Girls	No high intakes (99.6%)	No high intakes (98.8%)	No high intakes (99.8%)
Zinc (mg)	18-69	Men	No high intakes (98.3%)	No high intakes (97.9%)	High intakes (4.7%)
Zinc (mg)	18-69	Women	No high intakes (99.2%)	No high intakes (98.0%)	High intakes (2.7%)
Iodine (µg)	7-9	Boys		Seems adequate	Seems adequate
Iodine (µg)	10-13	Boys		Seems adequate	Seems adequate
Iodine (µg)	14-17	Boys		Adequate intakes (97.5%)	Adequate intakes (98.7%)
Iodine (µg)	7-9	Girls		Seems adequate	Seems adequate
Iodine (µg)	10-13	Girls		No statement	Seems adequate
Iodine (µg)	14-17	Girls		Adequate intakes (91.4%)	Adequate intakes (92.6%)
Iodine (µg)	18-69	Men		Seems adequate	Seems adequate
Iodine (µg)	18-69	Women		Seems adequate	Seems adequate
Iodine (µg)	7-10	Boys		No high intakes (98.2%)	No high intakes (98.3%)
Iodine (µg)	11-14	Boys		No high intakes (99.8%)	No high intakes (99.6%)
Iodine (µg)	15-17	Boys		No high intakes (100%)	No high intakes (99.9%)
Iodine (µg)	7-10	Girls		No high intakes (99.8%)	No high intakes (99.5%)
Iodine (µg)	11-14	Girls		No high intakes (100%)	No high intakes (100%)
Iodine (µg)	15-17	Girls		No high intakes (99.9%)	No high intakes (100%)
Iodine (µg)	18-69	Men		No high intakes (100%)	No high intakes (100%)
Iodine (µg)	18-69	Women		No high intakes (100%)	No high intakes (100%)

Appendix I Habitual intake of sodium and iodine

Habitual intake distribution

The habitual intake, also known as usual intake, was estimated from the observed daily intakes by correction for the intra-individual (day-to-day) variance using SPADE[19]. The version of SPADE was SPADE.RIVM.4.1.31. The habitual intake of iodine and sodium was modelled using the SPADE multi-part model in order to estimate the intake from different food sources and using the 'first-shrink then add' method. The approach is based on that of Verkaik[20] and van Rossum[21].

Intake of sodium

In the approach, a distinction is made in the following sources of sodium: intake from foods, intake from dietary supplements, and intake from added salt at the table or during preparation.

Foods

For each measurement day of each individual, the total intake of sodium was calculated by summing all intakes of sodium from all consumed foods based on the food composition database NEVO.

Dietary supplements

The number of users of dietary supplements in which sodium was registered was too low to take this into account in the estimation of the habitual intake.

Added salt

One other source of sodium is salt added at the table or during preparation. Participants indicated in the general questionnaire whether they add salt during preparation or at the table, to which food groups exactly, and how often (not-sometimes-usually). Furthermore, they had to indicate the most commonly used salt by each food group, e.g. lo-salt or iodized salt.

To calculate the intake, first it was determined to which product groups salt could be added and in what quantities. We used the following amounts salt per food group:

Table I.1 Amount of added salt.

Food group	g salt/100 g food
Potato	0.375
Mashed potatoes	0.625
Rice, pasta, etc.	0.375
Vegetables	0.625
Meat	1.250
Fish	1.250
Meat substitutes	1.250
Eggs	1.250
Sauces and gravy	0.750
Pancakes	0.200

Secondly, for all participants who indicated that he/she add a specific type of salt to a food group on a regularly basis (usually or sometimes), the total amount of added salt for that individual and measurement day was calculated. The assumption was made that diet salt (lo-salt) contains 30% of the sodium content which is available in 'normal' salt.

Intake of iodine
In the approach for iodine, a distinction is made in the following sources: intake from food (naturally present and industrially added), intake from dietary supplements and intake from iodized added salt at the table or during preparation.

Dietary supplements
To estimate the amount of iodine derived from dietary supplements for each measurement day of each individual the total amount of iodine from dietary supplements indicated in the 24-hr recalls was determined. The use of dietary supplements with iodine was also based on the information gathered from the general questionnaire (food frequency).

Added salt
Another source of iodine is iodinised salt which is added at the table or during preparation. The procedure to take into account this source was similar to that used for the calculation of the amount of added salt for sodium. Participants could indicate in the general questionnaire whether they add salt during preparation or at the table and to which food groups exactly and how often (not-sometimes-usually). Furthermore, they had to indicate the most commonly used salt for each food group, e.g. lo-salt or iodine salt.

For each measurement day and individual the total intake of iodine added at the table or during preparation was calculated. First, it was determined to which product groups salt could be added and in what quantities. For each type of salt the amount of iodine was the same (21 μg per 100 gram salt).

Subsequently, for all participants who indicated to add a specific type of salt to a food group on a regularly basis (usually or sometimes), the total amount of iodine from added salt was determined.

Foods
Food products can contribute to the intake of iodine if the food naturally contains iodine or iodine has been added to the food product by the industry (as iodised salt). First for each consumed food product the amount of iodine naturally present or added via the industrial was estimated by research dieticians. However, for certain foods, not all specific branded foods contain iodised salt. This is taken into account in the estimation of the iodine intake.

Naturally available iodine
The total intake of iodine from food naturally containing iodine was determined by multiplying the quantity of the consumed product by its iodine content.

Industrially added

It is known that iodised salt may have been added by the industry to only a percentage of all the food (groups), so not all the food (groups) are supplemented (see Table I.2). However, within the data of the DNFCS it is unknown whether an individual consumed food is food with or without iodine. Therefore, a probability method was used to estimate the iodine intake from industrially added iodised salt. Random samples were taken among consumers of these food (groups) in order to select persons who have consumed the variants of these foods to which iodised salt had been added. The samples have been drawn separately for the different food (groups). The size of the samples was determined on the basis of market share estimates (see Table I.2). For example, it has been estimated that 95% of the market share of bread will contain iodised salt. In addition, LEDA was searched for foods available in the Netherlands with iodised salt or baker's salt as an ingredient. This showed that mainly bread, cookies, pastries, cake and some crackers contain iodised salt. This inventory also showed that foods produced with iodised salt occur in various product groups, but that this is a relatively small number within those product groups. Market shares have been roughly estimated at 0.5-1%.

Table I.2 Use of iodised salt by food groups.

Productgroup	%	Type of salt
Bread	95	High
Pizza	40	Low
Cookies and pastries, cake	1	High
Rusk	0.5	Low
Crackers	0.5	Low
Meats	0.5	Low

* Salt high in iodine = bakkerszout 58 mg iodine per kg salt; salt low in iodine = 21 mg iodine per kg salt.

Results

With these data of iodine in all food sources the habitual intake distribution was estimated. The results on the habitual intake distribution were presented by means of mean, median and 5th, 25th, 75th, 95th percentiles. In addition, 95% confidence intervals for the means and medians were calculated with SPADE, based on 200 bootstrap iterations.[19] SPADE consists of several modelling options, depending on the frequency of consumption of the underlying dietary components.

Estimating the sodium and iodine intake in food consumption research is challenging as quantifying the amount of (iodised) salt during preparation is complex for participants. Therefore, assumptions were made about the amounts of added salt, and this will have introduced inaccuracy. In addition, the amount of sodium added by industry to foods can differ greatly between various brands of a similar product. Consequently, the estimated intake of iodine and sodium should be interpreted as an indication.

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