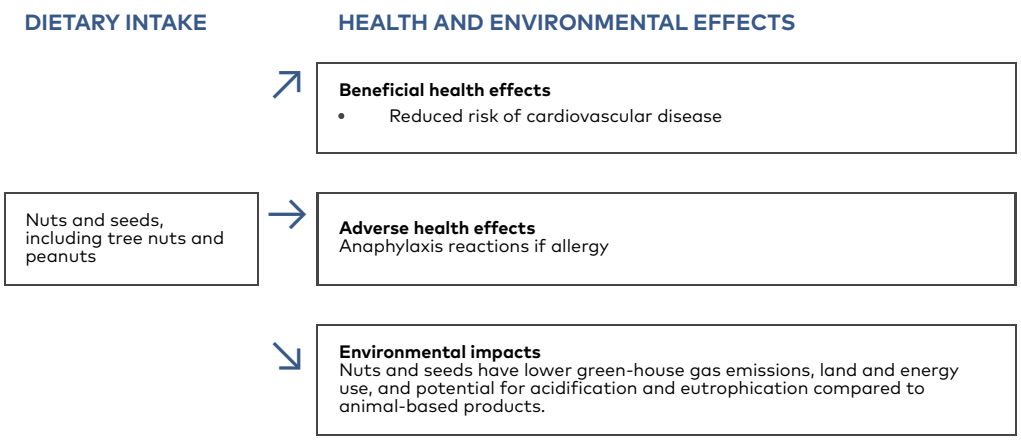
Nuts and seeds



Science advice: **It is recommended to consume 20-30 grams nuts per day. It is also recommended to include seeds in the diet due to the nutrient content; however, evidence for a certain quantity is not available. Nuts and seeds are important in plant-based diets as they have low GHG emissions and a high nutrient density.**

For more information about the health effects, please refer to the background paper by Lars T. Fadnes and Rajiv Balakrishna (Fadnes & Balakrishna, 2023). For more information about the environmental impacts, please refer to the following background papers (Benton et al., 2024; Harwatt et al., 2024; Meltzer et al., 2024; Trolle et al., 2024).

A culinary definition of nuts, includes tree nuts, peanuts, and seeds. Peanuts, almonds, walnuts, hazelnuts, cashew, Brazil nuts, macadamias, pistachio, sesame, and sunflower seeds, are some of the frequently consumed nuts and seeds (Fadnes & Balakrishna, 2023).

Dietary sources and intake. The average intake of nuts and seeds ranges from 3 to 9 g/d (Lemming & Pitsi, 2022). Nuts and seeds are nutrient-dense and contain mostly mono- and polyunsaturated fatty acids, protein, fibre, micronutrients such as magnesium, selenium, zinc, vitamin E and a range of other metabolites such as phenolic compounds (Fadnes & Balakrishna, 2023).

Health effects. One *de novo* qSR is available on the role of nuts and seeds and health outcomes demonstrating an inverse dose-response relationship with a risk of cardiovascular disease, in particular coronary heart disease, in prospective cohort studies (Arnesen et al., 2023). A modest effect on blood lipids as seen in randomized controlled trials suggests a plausible, partial mechanism for the association. Thus, the causality was judged as probable. There was no evidence for stronger associations for nut intakes beyond 20-30 grams per day (Arnesen et al., 2023; Fadnes & Balakrishna, 2023). There was also suggestive evidence for a modestly protective effect of nut consumption on stroke, while the evidence was insufficient regarding risk of type 2 diabetes. In the *de novo* qSR it was not possible to separate nuts from seeds in the cohort studies, and all RCTs were on nuts, not seeds.

As discussed in Fadnes and Balakrishna 2023 (Fadnes and Balakrishna 2023), there is also suggestive evidence for associations between nut consumption and lower all-cause mortality, cancer, respiratory disease and infectious disease mortality, less cognitive decline and lower risk of depression. Despite having a high energy density, nut consumption does not seem to increase the risk of weight gain (Fadnes & Balakrishna, 2023; Fogelholm et al., 2012; Hjelmesæth & Sjöberg, 2022).

Environmental impacts. Nuts and seeds have lower green-house gas emissions, land use, and potential for eutrophication compared to most animal products (Harwatt et al., 2024). However, nuts and seeds production contributes to overall high land use compared to other plant-based foods due to a relatively low yield of the edible nuts (Harwatt et al., 2024; Meltzer et al., 2024; Trolle et al., 2024). The environmental impacts vary widely among nuts and seeds. Impacts of nuts and seeds production on biodiversity may be positive (flowering crops such as flax and sunflower in crop rotations benefit pollinators) or negative (in intensive, large-scale cropping systems with low diversity). For some nuts, the use of plant protection products (e.g., pesticides) can be high. Current nut production contributes to and is affected by water stress in many regions (Harwatt et al., 2024). Groundnuts generally have less water impacts per kg and per g of protein than tree nuts such as almonds.

Main data gaps. There is a lack of data on the effects of individual types of nuts and seeds, and on seeds separately on health outcomes. There is a need for data on the environmental aspects other than climate impact such as biodiversity and ecotoxicity aspects for nuts and seeds in general and for the variation within product groups.

Risk groups. People with allergies and related adverse reactions to nuts (1-2% of adult populations). For some people such allergies could cause severe anaphylaxis reactions that can be life-threatening if not handled promptly and properly. Regular consumption of Brazil nuts may cause too high intakes of selenium.

Science advice:

- **Based on health outcomes:** It is recommended to consume 20-30 grams nuts per day. It is also recommended to include seeds in the diet due to the nutrient content; however, evidence for a quantitative recommendation is not available.
- **Based on environmental impacts:** Nuts and seeds have low GHG emissions. However, when increased consumption is achieved, more detailed recommendations are warranted to avoid the potential water stress and biodiversity loss associated with nut and seed consumption.
- **Overall science advice:** It is recommended to consume 20-30 grams nuts per day. It is also recommended to include seeds in the diet due to the nutrient content; however, evidence for a certain quantity is not available. Nuts and seeds are important in plant-based diets as they have low GHG emissions and a high nutrient density.