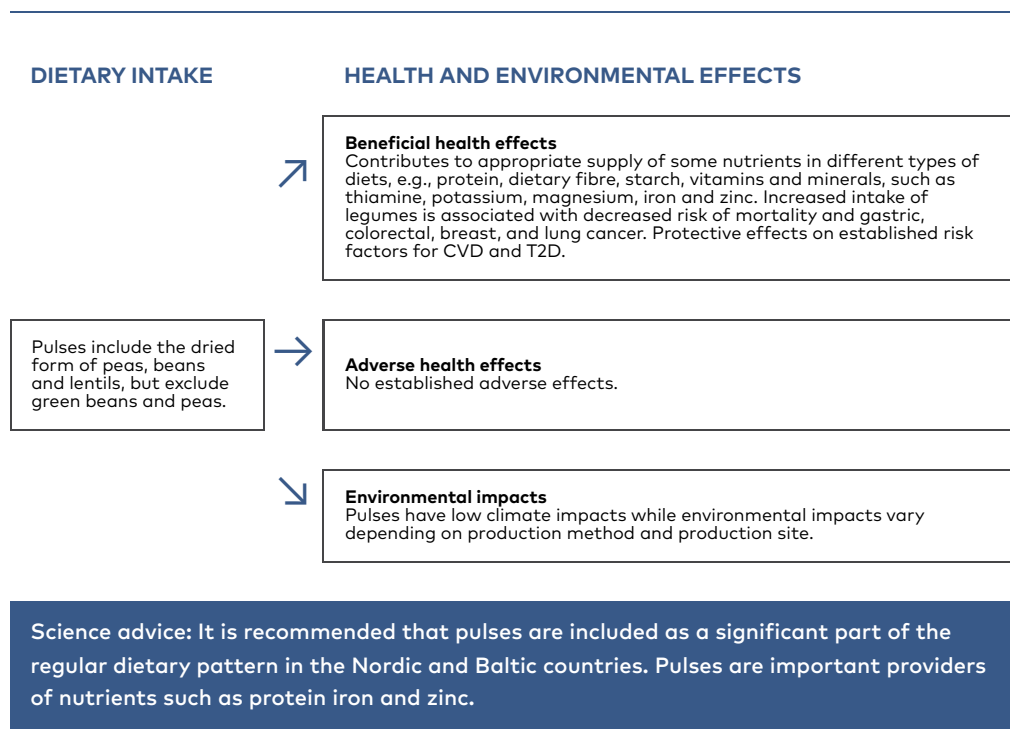


## Pulses/legumes



For more information about the health effects, please refer to the background paper by Liv Elin Torheim and Lars T. Fadnes (Torheim & Fadnes, 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 legumes includes peas, lentils and beans (excludes coffee and cacao beans). Peanuts are botanically legumes but are included in the nuts and seeds food group. The terms legumes and pulses are often used interchangeably. Legumes is a collective term for plants under the *Fabaceae* botanical family and include various types of beans, lentils, peas, and soybeans (Torheim & Fadnes, 2023).

Pulses is often used as the term for the ripened (or dried) form of peas and beans, including lentils, but excluding green beans and green peas.

**Dietary sources and intake.** The average intake of pulses (legumes) ranges from 1 to 18 g/d (Lemming & Pitsi, 2022). Among the food groups, pulses contain the most dietary fibre. Pulses are also good sources of protein and essential amino acids, complex carbohydrates, and are low in total fat and saturated fatty acids. The content of micronutrients differs between varieties, but several pulses are rich in folate, potassium, magnesium, iron, zinc, and thiamine, as well as bioactive compounds such as phytochemicals (Torheim & Fadnes, 2023).

**Health effects.** Four qSRs are relevant for the role of pulses and health outcomes, including one *de novo* qSR (Thórisdóttir et al., 2023). The *de novo* qSR by Thórisdóttir et al. had mixed findings on legume consumption and risk of cardiovascular disease and type 2 diabetes, with observational studies suggesting no association in healthy adult populations with generally low legume consumption. However, protective effects on blood lipids and glycaemic markers seen in RCTs support recommending legume consumption as part of diverse and healthy dietary patterns (Thórisdóttir et al., 2023).

Also, of relevance for pulses, consumption of foods containing dietary fibre probably protects against colorectal cancer according to the qSR from WCRF/AICR (WCRF/AICR, 2018j). There is also strong evidence from the qSR by Reynolds et al. (2019) that dietary fibre reduce risk of all-cause mortality, coronary heart disease, and colorectal cancer. The qSR from SACN found moderate evidence for an effect of legume fibre on increased faecal weight (SACN, 2015).

Further, the *de novo* qSR by Lamberg-Allardt et al. (Lamberg-Allardt et al., 2023b) found that replacement of animal proteins (most often dairy protein) with plant protein (e.g., soy protein) was shown in RCTs to modestly lower total and LDL cholesterol, while there were no effects on HDL cholesterol or triglycerides. There was *limited/suggestive* evidence for favourable associations between higher intake of plant protein as a replacement for animal protein and CVD mortality and type 2 diabetes, based on a limited number of prospective cohort studies.

As discussed in Torheim and Fadnes 2023, increasing consumption of legumes/pulses is associated with a lower risk of mortality from gastric, colorectal, breast, endometrial, and lung cancers (Torheim & Fadnes, 2023). A high consumption of legumes is also associated with reduced mortality (Torheim & Fadnes, 2023). Based on meta-analyses and data from the Global Burden of Disease study, one modelling study showed sustained change in the consumption of legumes from none to 100 grams per day was associated with an increase in life expectancy of approximately 1 year for male and female

adults in the age range 30 to 50 years (Nordic Council of Ministers, 2020b; Torheim & Fadnes, 2023).

Some early studies suggested hormonal effects of soy products. However, an extensive review of potential endocrine disruption, does not support such concerns (Torheim & Fadnes, 2023)(Nordic Council of Ministers, 2020b)

Pulses also contain anti-nutritional compounds such as amylase inhibitors, phytate and tannins, which are considerably lowered or eliminated during preparation such as soaking and boiling. Correct preparation methods are important, due to the content of lectins in raw form of most dry beans.

**Environmental impacts** Pulses and legumes (both domestically produced and imported) have among the lowest relative climate impacts, for example in comparison to all types of meat (Meltzer et al., 2024; Trolle et al., 2024). However, only 7 % of global soy production is used to produce products directly for human consumption, with most soy (77 %) being used as farmed animal feed – largely for chickens and pigs. Growing practices greatly influence the environmental impacts of pulses and legume production, in terms of both scale and type. As legumes and pulses fix nitrogen in the soil, they do not require nitrogen fertilizers. Despite this, high amounts of nitrogen fertilizer are sometimes used to increase yields e.g., cultivating soya beans in intensive large-scale cropping systems. These production systems require the use of chemical plant protection products (e.g., pesticides).

Monocultures with fertilizer and pesticide application can adversely impact the landscape and surrounding biodiversity (Harwatt et al., 2024). Organic production minimizes the use of chemical plant protection and fertilizers.

**Main data gaps.** More prospective studies on different health outcomes are warranted at a wide range of intakes. There is insufficient data available on environmental impacts beyond climate impact for both domestically produced and imported products. There is a need for data on environmental impact of processed products made from pulses and legumes.

**Risk groups.** People with specific allergies for foods within the food group.

**Science advice:**

- **Based on health outcomes:** Pulses are important providers of nutrients such as dietary fibre, protein, iron and zinc in plant based diets, especially with limited amounts of meat. Higher intake of pulses may also protect against cancer and lower mortality. Overall, the current health evidence and supply of nutrients supports an increased legume consumption. Adequate soaking and rinsing of legumes are needed for beneficial effects.

- **Based on environmental impacts:** Pulses have low climate impacts while environmental impacts vary depending on production method and production site.
- **Overall science advice:** It is recommended that pulses are included as a significant part of the regular dietary pattern in the Nordic and Baltic countries. Pulses are important providers of nutrients such as dietary fibre, protein, iron and zinc.