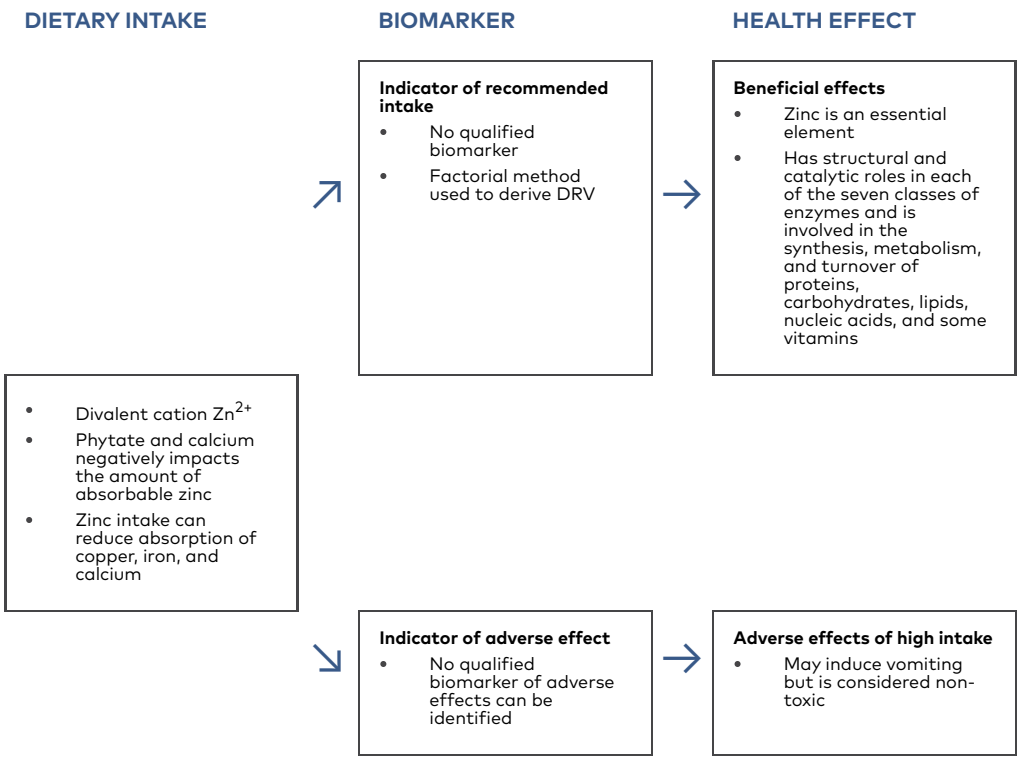
Zinc



	Females	Males
AR (mg/d)	8	11
RI (mg/d)	10	13

For more information about the health effects, please refer to the background paper by Tor A. Strand and Maria Mathisen (Strand & Mathisen, 2023).

Dietary sources and intake. Meat, milk and dairy products, legumes, eggs, liver grains, and grain-based products are rich dietary sources of zinc. The average zinc intake ranges from 7.2 to 14.1 mg/d (Lemming & Pitsi, 2022).

Main functions. Zinc is a widespread element which exists as a stable divalent cation (Zn^{2+}). It has a wide range of vital physiological functions and is present in every cell of the human body. Zinc has a structural and catalytic role in each of the seven classes of enzymes and is involved in the synthesis, metabolism, and turnover of proteins, carbohydrates, lipids, nucleic acids, and

some vitamins. An essential structural role of zinc is zinc motifs (zinc fingers) for transcription factors, and account for a significant part of the zinc requirement. Zinc acts as a cofactor for key enzymes for reducing oxidative stress. Strong homeostatic mechanisms keep the zinc content of tissues and fluids constant over a wide range of intakes through changes in excretion and absorption (Strand & Mathisen, 2023).

Interaction with other nutrients. The luminal content of phytate and calcium negatively impacts the amount of zinc available for absorption. Zinc intake can also reduce the absorption of other divalent cations such as copper, iron, and calcium.

A more plant-based diet with a higher content of chelating substances such as phytic acid and tannins increase zinc requirements. In 2014, EFSA updated their population reference intake (PRI) for zinc adjusted for the intake of phytic acid (EFSA, 2014h). The scenario with the lowest phytate intake (300 mg per day) gave a population reference intake close to the RIs in NNR 2012. In EFSA, the ARs for adults were estimated as the zinc requirement at levels of phytate intake of 300, 600, 900 and 1 200 mg/day. Data on population intake of phytate is scarce, but according to the EFSA opinion this ranged between 300 to 1400 mg/day, depending on diet composition (EFSA, 2014h). The phytate content of foods can be modified through preparation methods, e.g., soaking, fermenting and sprouting of pulses and grains.

Main data gaps. The consequences of mild or moderate zinc deficiency and the identification of reliable biomarkers for zinc status are important knowledge gaps. Furthermore, it is expected that the intake of animal-source foods will decrease, and how this will influence zinc status and the risk for zinc deficiency is important to study.

Deficiency and risk groups. Zinc deficiency is rare in the Nordic and Baltic countries. Although it may induce vomiting, zinc is not considered to be toxic even in relatively high doses. Excess zinc in the diet is not absorbed and stored in the body for later use. People with restriction of animal products in their diets, such as vegans, are at risk of becoming zinc inadequacy unless consuming supplements or fortified foods.

Dietary reference values. Recommendations for children and adolescents are set based on factorial methods that considered daily losses through the kidneys, skin, semen, or menses, and the gastrointestinal tract (faeces) (EFSA, 2014h). For adults, the AR is based on the physiological requirement related to body weight. The dietary requirement is also dependent on the fraction of zinc absorbed from the diet, which is dependent on zinc content and on diet composition, including intake of phytate. In NNR2023, AR and RI for adults are

based on a phytate intake of 600 mg/day, reflecting a semi-refined diet. The DRVs set by EFSA for a diet with a lower or higher phytate content (300, 900 or 1200 mg per day) can be used. For children, there is an extra need for zinc for growth. The extra need during pregnancy is smaller than for lactating women. With a phytate intake of 600 mg, the AR is set to 8 µg/day in females and 11 mg/day in males. Based on a CV of 10%, the RI is set to 10 and 13 mg/day in females and males, respectively. UL of zinc is 25 mg/d.