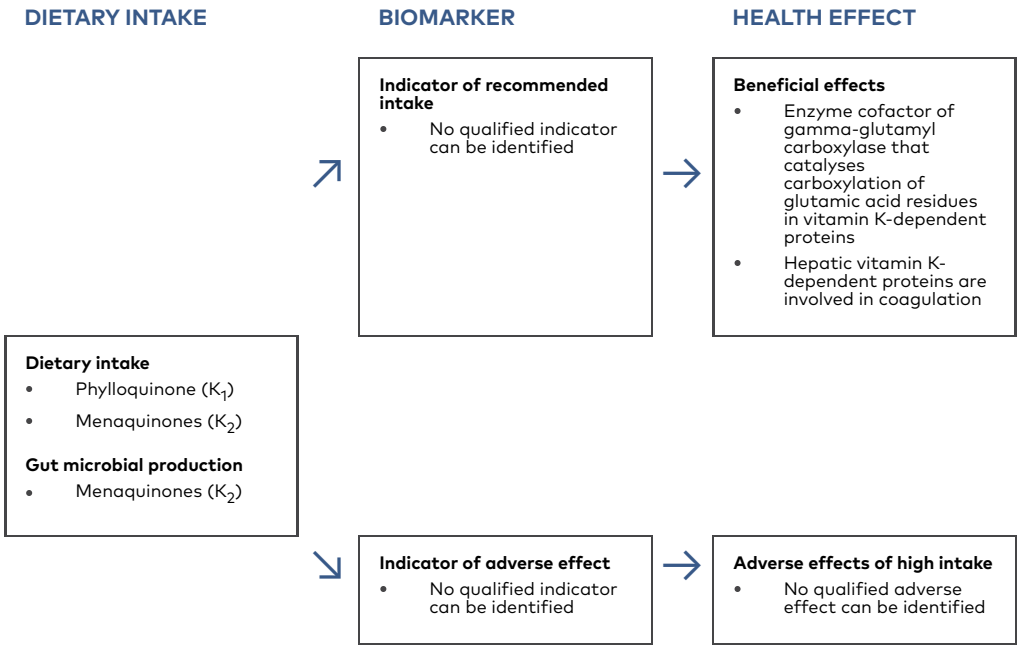
# Vitamin K




| | Females | Males |
|---|---|---|
| Provisional AR (µg/d) | 50 | 60 |
| AI (µg/d) | 65 | 75 |

For more information about the health effects, please refer to the background paper by Arja Lyytinen and Allan Linneberg (Lyytinen & Linneberg, 2023).

**Dietary sources and intake.** Vitamin K is the collective term for fat soluble compounds with the common 2-methyl-1,4-naphtoquinone ring structure. It occurs in foods as phylloquinone (vitamin $K_1$; 2-methyl-3-phytyl-1,4-naphtoquinone) and menaquinones (vitamin $K_2$; multi-isoprenylquinones). Phylloquinone is plant-based, and sources are leafy green vegetables, and certain vegetable oils (soybean, canola/ rapeseed, olive oils) and fat spreads made from the oils. Menaquinones-5 through -13 have bacterial origin, and main sources are fermented foods, meat and dairy products. Sources of menaquinone-4 are meat and dairy products. Menaquinones are also produced by gut microbiota. Phylloquinone is regarded as the predominant form of vitamin K in Western diets (Lyytinen & Linneberg, 2023). For most of

the Nordic and Baltic countries no intake data are available (Lemming & Pitsi, 2022).

**Main functions.** Vitamin K functions as an enzymatic cofactor in the gamma-carboxylation of vitamin K dependent proteins. Hepatic vitamin K dependent proteins are involved in coagulation. Extrahepatic vitamin K dependent proteins have a role e.g., in bone health and vascular calcification. The amount of vitamin K needed for optimal functioning of the different vitamin K dependent proteins is not known (Lyytinen & Linneberg, 2023).

**Indicator for recommended intake.** There are several biomarkers that reflect vitamin K intake; however, none are considered sufficient to be used alone, and no qualified indicator can be identified (Lyytinen & Linneberg, 2023).

**Main data gaps.** Data on vitamin K intake from nationally representative samples in Nordic and Baltic countries are missing. It is not known to which extent gut bacterial production plays a role in human physiology and health. In food composition databases, vitamin K content data mostly include only phylloquinone, not menaquinones. The relative bioavailability of different forms of vitamin K is poorly known. More research is also needed on dose-response, optimal level of gamma-carboxylation, relationships with health outcomes and what biomarker to choose (Lyytinen & Linneberg, 2023).

**Deficiency and risk groups.** Bleeding and haemorrhage are the classic signs of vitamin K deficiency affecting coagulation. Vitamin K deficiency in adults is rare and usually limited to people with malabsorption disorders or those taking drugs, e.g., vitamin K antagonists, which interfere with vitamin K metabolism. Breast-fed new-borns can develop vitamin K deficiency (Lyytinen & Linneberg, 2023).

**Dietary reference values**. For prevention of vitamin K deficiency bleeding, all new-born infants should receive vitamin K prophylaxis. In NNR2012, a provisional recommended intake of 1 µg phylloquinone/kg body weight per day was given for both children and adults. This level is maintained in NNR2023, since the limitations to set a DRV have not been resolved, and the data used to derive this are limited. A similar recommendation on adequate intake of phylloquinone has been set by EFSA (2017b). There is limited data available on the need for vitamin K during pregnancy and lactation and health outcomes during pregnancy, and the same AI as for adult women applies to pregnant and lactating women (EFSA, 2017b; Lyytinen & Linneberg, 2023). AI based on reference weights: 65 µg/day (females), 75 mg/day (males). Provisional AR, based on AI: 50 µg/day (females), 60 µg/day (males). Not sufficient data to derive UL.