*Proceedings of the Nutrition Society* (2025), **84 (OCE1)**, E78 doi:10.1017/S0029665125000886

*The 48th Annual Scientific Meeting of the Nutrition Society of Australia, 3-6 December 2024*

# Modelling vitamin D fortification scenarios for the Australian population

E. Dunlop[1,2], A.S. Lawrence[3], B. Neo[4], M. Kiely[5], A. Rangan[6], C. Nowson[1], P. Adorno[7], P. Atyeo[8], E. Tescari[9], D. Russo-Batterham[9], K. Doyle[9] and L.J. Black[1,2]

[1]*Institute for Physical Activity and Nutrition, Deakin University, Geelong, Victoria, Australia*
[2]*Curtin School of Population Health, Curtin University, Bentley, Western Australia, Australia*
[3]*School of Agriculture and Food, and Ecosystem Sciences, The University of Melbourne, Parkville, Victoria, Australia*
[4]*Curtin Medical School, Curtin University, Bentley, Western Australia, Australia*
[5]*Cork Centre for Vitamin D and Nutrition Research, School of Food and Nutritional Sciences, University College Cork, Cork, Ireland*
[6]*Faculty of Medicine and Health, The University of Sydney, Camperdown, New South Wales, Australia*
[7]*National Measurement Institute, Port Melbourne, Victoria, Australia*
[8]*Australian Bureau of Statistics, Canberra, Australian Capital Territory, Australia*
[9]*Melbourne Data Analytics Platform, The University of Melbourne, Parkville, Victoria, Australia*

Low vitamin D status (circulating 25-hydroxyvitamin D [25(OH)D] concentration < 50 nmol/L) affects nearly one in four Australian adults(1). The primary source of vitamin D is sun exposure; however, a safe level of sun exposure for optimal vitamin D production has not been established. As supplement use is uneven, increasing vitamin D in food is the logical option for improving vitamin D status at a population level. The dietary supply of vitamin D is low since few foods are naturally rich in vitamin D. While there is no Australia-specific estimated average requirement (EAR) for vitamin D, the Institute of Medicine recommends an EAR of 10 µg/day for all ages. Vitamin D intake is low in Australia, with mean usual intake ranging from 1.8–3.2 µg/day across sex/age groups(2), suggesting a need for data-driven nutrition policy to improve the dietary supply of vitamin D. Food fortification has proven effective in other countries. We aimed to model four potential vitamin D fortification scenarios to determine an optimal strategy for Australia. We used food consumption data for people aged ≥ 2 years (n = 12,153) from the 2011–2012 National Nutrition and Physical Activity Survey, and analytical food composition data for vitamin $D_3$, 25(OH)$D_3$, vitamin $D_2$ and 25(OH)$D_2$(3). Certain foods are permitted for mandatory or voluntary fortification in Australia. As industry uptake of the voluntary option is low, Scenario 1 simulated addition of the maximum permitted amount of vitamin D to all foods permitted under the Australia New Zealand Food Standards Code (dairy products/plant-based alternatives, edible oil spreads, formulated beverages and permitted ready-to-eat breakfast cereals (RTEBC)). Scenarios 2–4 modelled higher concentrations than those permitted for fluid milk/alternatives (1 µg/100 mL) and edible oil spreads (20 µg/100 g) within an expanding list of food vehicles: Scenario 2—dairy products/alternatives, edible oil spreads, formulated beverages; Scenario 3—Scenario 2 plus RTEBC; Scenario 4—Scenario 3 plus bread (which is not permitted for vitamin D fortification in Australia). Usual intake was modelled for the four scenarios across sex and age groups using the National Cancer Institute Method(4). Assuming equal bioactivity of the D vitamers, the range of mean usual vitamin D intake across age groups for males for Scenarios 1 to 4, respectively, was 7.2–8.8, 6.9–8.3, 8.0–9.7 and 9.3–11.3 µg/day; the respective values for females were 5.8–7.5, 5.8–7.2, 6.4–8.3 and 7.5–9.5 µg/day. No participant exceeded the upper level of intake (80 µg/day) under any scenario. Systematic fortification of all foods permitted for vitamin D fortification could substantially improve vitamin D intake across the population. However, the optimal strategy would require permissions for bread as a food vehicle, and addition of higher than permitted concentrations of vitamin D to fluid milks/alternatives and edible oil spreads.

## References

1. Australian Bureau of Statistics (2013) Vitamin D https://www.abs.gov.au/articles/vitamin-d
2. Dunlop E, Boorman JL, Hambridge TL *et al.* (2022) *J Hum Nutr Diet* **36**, 203–215.
3. Dunlop E, James AP, Cunningham J *et al.* (2021) *Food Chem* **358**, e129836.
4. National Cancer Institute (2020) Usual Dietary Intakes: The NCI Method https://epi.grants.cancer.gov/diet/usualintakes/method.html