

Heavier people are not getting enough vitamin C, says study

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An international study involving the University of Otago, Christchurch, has found that inadequate vitamin C status is significantly linked to increased body weight—raising public health concerns due to the rising prevalence of obesity worldwide.

The results, [published](#) in the journal *Critical Reviews in Food Science and Nutrition*, show that heavier people require a substantially higher recommended daily allowance (RDA) of the essential [vitamin](#) to maintain good health, and that much of the world's population is not covered by the current recommended intakes of vitamin C.

"Our data suggests current vitamin C recommended daily allowances internationally are severely underestimated," says lead researcher Professor Anitra Carr, Director of the Christchurch campus's Nutrition in Medicine Research Group.

"Current international vitamin C recommended daily allowances for men, women and children are all extrapolated from calculations for a healthy, young, 70-kilogram male, allowing for a 10 percent deviation—a guideline that's supposed to cover 97.5 percent of the population," Professor Carr says.

"Clearly, with the global increase in body weight, a substantial and growing proportion of the world's population are no longer covered by these recommended intakes."

Aotearoa New Zealand has a current daily vitamin C recommendation of 45 milligrams per day as recommended by the World Health Organization. According to Professor Carr, this is currently one of the lowest recommended daily allowances in the world.

She says these new findings estimate that an additional 17 mg to 22 mg of vitamin C is needed daily per 10 kg of additional body weight to reach adequate vitamin C levels, as compared to a 70 kg individual.

"We feel this new evidence highlights the need for an updated set of vitamin C recommended daily allowances—both here and internationally—to guide future public health recommendations," she

says.

The study, co-authored with researchers from the Universities of Copenhagen and Aberdeen, analyzed two large international data sets—the 2017-2018 US National Health and Nutrition Examination Survey (NHANES) including 2,828 adults, and the 1993-1997 European Prospective Investigation into Cancer (EPIC)-Norfolk study, including 20,692 participants.

It showed that only about two-thirds of both cohorts achieved an "adequate" vitamin C plasma concentration by consuming the recommended daily allowance or above, while only between one-third and half of the cohorts achieved "adequate" status with an intake of the RDA plus or minus 10 percent.

International research suggests that obesity may affect the body's vitamin C dose-concentration relationship as a result of low-grade inflammation, which can increase oxidative stress and a potential increased turnover of vitamin C in the body. Obesity is also known to increase the risk of type 2 diabetes and [non-alcoholic fatty liver disease](#), both of which are associated with lower vitamin C status.

The study authors suggest that additional vitamin C intake can be easily achieved through either diet or supplements.

"An average-sized apple contains 10 milligrams of vitamin C, so if you weigh 70 to 80 kilograms, achieving the optimal amount of vitamin C your body needs could be as easy as eating an extra apple or two to give your body the extra 10 to 20 milligrams of daily vitamin C it needs. If you weigh more than this, then perhaps an orange, which contains 70 milligrams of vitamin C, or a kiwifruit with 100 milligrams, may be the easiest solution," Professor Carr says.

"My advice for those who choose to get their vitamin C from a multivitamin is to check the exact amounts of vitamin C per tablet, as some multivitamin formulations may only contain it in very low doses."

She says there is growing evidence internationally that vitamin C is vital for disease prevention.

"While vitamin C was originally only thought to be useful for the prevention of scurvy, evidence is now compelling that adequate levels of the vitamin may play an important role in risk reduction of more common diseases such as heart disease and cancer.

"Other studies show conditions associated with vitamin C deficiency—such as increased infection risk, poor wound healing, risk of depression and fatigue—show an increased prevalence with increased weight," Professor Carr says.

More information: Anitra C. Carr et al, An increasing proportion of the population is not covered by the current RDA for vitamin C – interrogation of EPIC-Norfolk and NHANES 2017/2018 cohorts, *Critical Reviews in Food Science and Nutrition* (2024). [DOI: 10.1080/10408398.2024.2356760](https://doi.org/10.1080/10408398.2024.2356760)

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