

## Abstract

# Nutrient Intake from Fortified Foods and Supplements in Vegan, Vegetarian, and Omnivorous Participants Aged 6 to 18 Years in Germany: Results from the VeChi Youth Study <sup>†</sup>

Joelina Dietrich <sup>1</sup>, Vanessa Keller <sup>1</sup>, Morwenna Fischer <sup>2</sup>, Stine Weder <sup>1</sup>, Ute Alexy <sup>2</sup>, Andreas Michalsen <sup>3</sup>, Alfred Längler <sup>4</sup>, Andreas Sputtek <sup>5</sup> and Markus Keller <sup>1,\*</sup>

<sup>1</sup> Research Institute for Plant-Based Nutrition, 35444 Biebertal, Germany; joelina.dietrich@ifpe-giessen.de (J.D.); vanessa.keller@ifpe-giessen.de (V.K.)

<sup>2</sup> Department of Nutritional Epidemiology, Institute of Nutritional and Food Science, University of Bonn, 44225 Dortmund, Germany; morwenna.fischer@gmx.de (M.F.); alexy@uni-bonn.de (U.A.)

<sup>3</sup> Institute for Social Medicine, Epidemiology and Health Economics, Charité Universitätsmedizin, 14109 Berlin, Germany; andreas.michalsen@immanuelalbertinen.de

<sup>4</sup> Faculty of Health, Witten Herdecke University and Gemeinschaftskrankenhaus Herdecke, 58313 Herdecke, Germany; a.laengler@gemeinschaftskrankenhaus.de

<sup>5</sup> Medical Laboratory Bremen GmbH, 28359 Bremen, Germany; andreas.sputtek@mlhb.de

\* Correspondence: keller@ifpe-giessen.de

<sup>†</sup> Presented at the 14th European Nutrition Conference FENS 2023, Belgrade, Serbia, 14–17 November 2023.

**Abstract:** Introduction: The German market for dietary supplements and fortified foods is of considerable size, and many target-group-specific products, e.g., for vegans and vegetarians, are available. Growing sales volumes in recent years reflect the large demand for these products. However, the broad variety and easy availability may lead to unfavorable use of these products. Methods: The VeChi Youth Study (2017–2019) was a cross-sectional study among vegan (VN), vegetarian (VG), and omnivorous (OM) participants aged 6 to 18 years ( $n = 401$ ). Dietary data were collected from 3-day weighed dietary records ( $n = 390$ ). The present analysis investigates nutrient intake from dietary supplements and unfortified/fortified foods. Results: VN had the highest dietary supplement use and the highest intake of fortified foods (both significantly different from OM;  $p < 0.0001$  and  $p = 0.0342$ , respectively). Among VN and VG, vitamins B12 and D were the most frequently supplemented nutrients, while among OM, this was vitamin C. The mean nutrient intake from dietary supplements (excluding vitamins B12 and D) and fortified foods contributed up to 49% and 11% of the German reference values, respectively. Except for iron, VN had the highest mean intake of all nutrients from dietary supplements. Including unfortified and fortified foods as well as supplements, the mean intake in all three diet groups reached the reference values for vitamin B12, vitamin C, iron, and zinc but not for calcium and iodine. Discussion: Dietary supplements, and to a smaller extent fortified foods, increased the nutrient intake of the participants of the VeChi Youth Study. In order to achieve recommended intakes, the intake of dietary supplements and fortified foods was either unnecessary (e.g., vitamin C), not sufficiently effective (e.g., calcium and iodine), or effective (e.g., vitamin B12). Conclusions: Specific intake of dietary supplements is useful to improve the intake of critical nutrients in VN and VG diets, especially for vitamins B12 and D. In Germany, fortified foods appear to contribute only to a small extent to the intake of critical nutrients in VN and VG children and adolescents.

**Keywords:** child nutrition; fortified foods; dietary supplements; nutrient intake; critical nutrients; vegan diets; vegetarian diets



**Citation:** Dietrich, J.; Keller, V.; Fischer, M.; Weder, S.; Alexy, U.; Michalsen, A.; Längler, A.; Sputtek, A.; Keller, M. Nutrient Intake from Fortified Foods and Supplements in Vegan, Vegetarian, and Omnivorous Participants Aged 6 to 18 Years in Germany: Results from the VeChi Youth Study. *Proceedings* **2023**, *91*, 429. <https://doi.org/10.3390/proceedings2023091429>

Academic Editors: Sladjana Sobajic and Philip Calder

Published: 15 May 2024



**Copyright:** © 2024 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

**Author Contributions:** U.A., M.K. and S.W. designed the VeChi Youth study; U.A. and M.K. supervised the study; M.F., S.W., A.M. and A.L. were responsible for the implementation and data collection; J.D. analysed the data and drafted the manuscript; A.S. supervised the laboratory analysis; V.K. presented the manuscript at the 14th European Nutrition Conference FENS 2023, Belgrade, Serbia, 14–17 November 2023. All authors have read and agreed to the published version of the manuscript.

**Funding:** The VeChi Youth Study (data collection, basic data analysis) was commissioned to the 14th DGE Nutrition Report 2020 published by the German Nutrition Society (DGE) and financially supported by the Federal Ministry of Food and Agriculture (BMEL), Germany.

**Institutional Review Board Statement:** The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of the University of Witten Herdecke (139/2017, 21 September 2017).

**Informed Consent Statement:** Informed consent was obtained from all subjects (or their parents) involved in the study.

**Data Availability Statement:** The data described in the manuscript might be made available on request.

**Conflicts of Interest:** All authors declare no conflicts of interest.

**Disclaimer/Publisher’s Note:** The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.