






Abstract

# Nutrient Intakes and Associations with Socioeconomic Deprivation in Young Children Living in New Zealand <sup>†</sup>

Rosario Jupiterwala <sup>1,\*</sup>, Cathryn Conlon <sup>1</sup>, Kathryn Beck <sup>1</sup>, Rachael Taylor <sup>2,‡</sup>, Anne-Louise Heath <sup>3,‡</sup>, Jillian Haszard <sup>4</sup>, Lisa Te Morenga <sup>5</sup>, Ridvan Firestone <sup>5</sup>, Elizabeth Fleming <sup>3</sup>, Ioanna Katiforis <sup>3</sup>, Jenny McArthur <sup>2,3</sup>, Rebecca Paul <sup>1</sup>, Kimberley Brown <sup>1</sup>, Maria Casale <sup>1</sup>, Emily Jones <sup>1</sup>, Andrea Wei <sup>1</sup>, Louise Fangupo <sup>2</sup>, Bailey Bruckner <sup>3</sup>, Veisia Pulu <sup>5</sup>, Megan Healy <sup>5</sup> and Pamela Von Hurst <sup>1,\*</sup>

<sup>1</sup> School of Sport Exercise and Nutrition, Massey University, Auckland 0745, New Zealand; c.conlon@massey.ac.nz (C.C.); k.l.beck@massey.ac.nz (K.B.); r.paul@massey.ac.nz (R.P.); k.brown1@massey.ac.nz (K.B.); m.casale@massey.ac.nz (M.C.); e.jones@massey.ac.nz (E.J.); a.wei@massey.ac.nz (A.W.)

<sup>2</sup> Department of Medicine, University of Otago, Dunedin 9054, New Zealand; rachael.taylor@otago.ac.nz (R.T.); jenny.mcarthur@otago.ac.nz (J.M.); lou.fangupo@postgrad.otago.ac.nz (L.F.)

<sup>3</sup> Department of Human Nutrition, University of Otago, Dunedin 9054, New Zealand; anne-louise.heath@otago.ac.nz (A.-L.H.); liz.fleming@otago.ac.nz (E.F.); ioanna.katiforis@postgrad.otago.ac.nz (I.K.); bruba664@student.otago.ac.nz (B.B.)

<sup>4</sup> Biostatistics Centre, University of Otago, Dunedin 9054, New Zealand; jill.haszard@otago.ac.nz

<sup>5</sup> Research Centre for Hauora and Health, Massey University Wellington 6140, New Zealand; l.temorenga@massey.ac.nz (L.T.M.); r.t.firestone@massey.ac.nz (R.F.); v.pulu@massey.ac.nz (V.P.); m.healy1@massey.ac.nz (M.H.)

\* Correspondence: r.p.monzales@massey.ac.nz (R.J.); p.r.vonhurst@massey.ac.nz (P.V.H.)

† Presented at the Annual Scientific Meeting of the Nutrition Society of New Zealand 2022, Wellington, New Zealand, 1–2 December 2022.

‡ Joint Principal Investigators.



**Citation:** Jupiterwala, R.; Conlon, C.; Beck, K.; Taylor, R.; Heath, A.-L.; Haszard, J.; Te Morenga, L.; Firestone, R.; Fleming, E.; Katiforis, I.; et al. Nutrient Intakes and Associations with Socioeconomic Deprivation in Young Children Living in New Zealand. *Med. Sci. Forum* **2023**, *18*, 9. <https://doi.org/10.3390/msf2023018009>

Academic Editors: Claire Smith, Sally Mackay, Shabnam Jalili-Moghaddan and Michelle Gibbs

Published: 8 March 2023



**Copyright:** © 2023 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/>).

**Abstract:** Optimal nutrition during early childhood is essential to support physiological and cognitive development. However, data on nutrient intakes and associations with socioeconomic deprivation are lacking in young children living in New Zealand (NZ). As a component of Young Foods NZ, a multi-centre cross-sectional study, this research aims to determine nutrient intakes and their associations with socioeconomic deprivation in young NZ children aged 1–3.9 years. Dietary intake data (two 24 h diet recalls) and socioeconomic deprivation (NZDep2018) were collected from 289 children living in Auckland, Wellington, and Dunedin. The multiple source method was utilised to determine the usual dietary intake. All participants exceeded the Estimated Average Requirement (EAR) for protein (12 g/day), with a mean (SD) intake of 45.5 (10.4) g/day. Using the full probability approach, the prevalence of inadequate intake for iron was 38.2%, with an overall mean (SD) intake of 6.6 (2.2) mg/day. The prevalence of inadequate intake for fibre (<14 g/day) was 54.3%, with a mean (SD) intake of 14.0 (4.4) g/day. Saturated fat contributed 14%, and total sugars contributed 23% of the total energy intake. Living in a neighbourhood of low deprivation (NZDep1–3) is a significant predictor of higher dietary fibre and iron intakes and lower fat intake for young children compared with those living in deprivation (NZDep4–10). In this cohort, a high proportion of children do not have the best start in life due to the suboptimal intake of iron and dietary-fibre-containing foods, and the disproportionate consumption of saturated fat and sugar-rich foods. Children living in areas of deprivation are particularly at risk. Effective policies are needed to reduce these disparities and ensure that all children have equitable access to healthy and nutritious foods.

**Keywords:** diet; children; socioeconomic deprivation; toddlers; nutrient intake

**Author Contributions:** Conceptualization, R.T. and A.-L.H.; methodology, R.T., A.-L.H., P.V.H., C.C., K.B. (Kathryn Beck), L.T.M. and R.F.; formal analysis, J.H. and R.J.; investigation, R.J., E.F., I.K., K.B. (Kimberley Brown), M.C., E.J., A.W., L.F., B.B., V.P. and M.H.; writing—original draft preparation, R.J.; writing—review and editing, R.T., A.-L.H., K.B. (Kathryn Beck), C.C., P.V.H. and L.T.M.; supervision, P.V.H., C.C. and K.B. (Kathryn Beck); project administration, J.M. and R.P.; funding acquisition, R.T. and A.-L.H. All authors have read and agreed to the published version of the manuscript.

**Funding:** The authors acknowledge support from the New Zealand Ministry for Primary Industries (MPI) with funding number 406047, and Massey University for the first author's doctoral scholarship.

**Institutional Review Board Statement:** The study was conducted in accordance with the Declaration of Helsinki, and approved by the University of Otago Human Ethics Committee with project reference code H20/040.

**Informed Consent Statement:** Informed consent was obtained from all adult respondents involved in the study.

**Data Availability Statement:** The data are not publicly available.

**Conflicts of Interest:** The authors declare no conflict 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.