

Nutrition Society of New Zealand



59th Annual Conference

Advancing Nutrition: Evidence, Translation, and Action

26 - 28 November, 2025

Tūhura Otago Museum Otago, New Zealand



Mā te kimi ka kite, Mā te kite ka mōhio, Mā te mōhio ka Mārama

Seek & discover,
Discover & know,
Know & become enlightened















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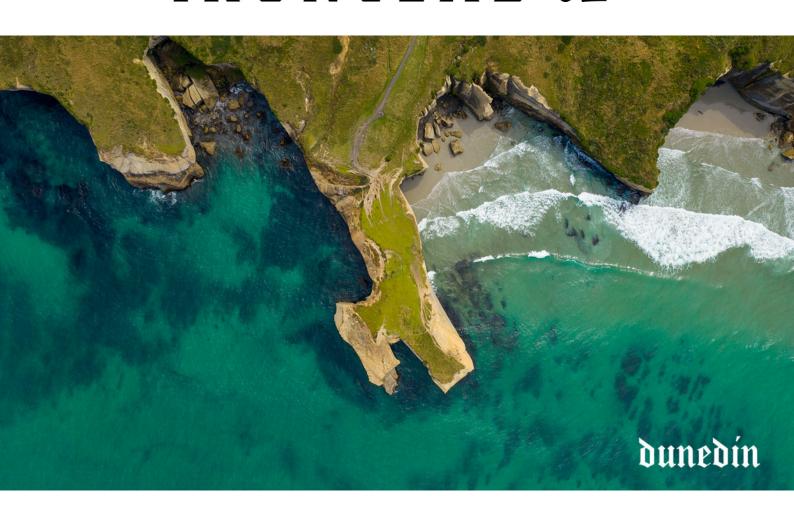


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Please remember to bring your own drink bottle!

Welcome





Nutrition Society of New Zealand Annual Conference

Advancing Nutrition: Evidence, Translation, and Action

Mā te kimi ka kite, Mā te kite ka mōhio, Mā te mōhio ka Mārama Seek and discover, discover and know, know and become enlightened

It is our pleasure to welcome you to the 59th Nutrition Society of New Zealand Annual conference, 2025.

We are proud to host this year's conference in Ōtepoti, Dunedin—a city where natural coastal beauty meets rich history and vibrant culture. Nestled on the southeast coast of New Zealand's South Island, Ōtepoti Dunedin is known for its Scottish heritage, striking Victorian and Edwardian architecture, and dramatic coastal landscapes. Home to the University of Otago, the city buzzes with creativity, innovation, and a youthful energy. Where culture meets nature—from unique wildlife encounters, including the rare, yellow-eyed penguin and royal albatross, to thriving arts, music, and culinary scenes.

Our venue, Tūhura Otago Museum, is just a short 10-minute walk from the CBD and right next-door to the University of Otago. With its world-class facilities and exceptional catering, it provides the perfect setting to gather, connect, and learn at this year's conference.

The 2025 programme centres on the theme of **Advancing Nutrition: Evidence**, **Translation**, **and Action**. **Mā te kimi ka kite**, **Mā te kite ka mōhio**, **Mā te mōhio ka Mārama - Seek and discover**, **discover and know**, **know and become enlightened**. The programme covers a range of topics including sustainable food systems, best practice research methods and data sovereignty, Pacific nutrition and health, GLP-medications, and sports nutrition.

A heartfelt thank you to all the volunteers who make this conference possible — including the local organizing committee, programme committee, sponsorship committee, and social media team.

We are looking forward to connecting with our nutrition whānau and sharing the latest in nutritional science from Aotearoa, Oceania, and beyond. See you in the deep south!

Co-chairs of the conference organizing committee:

Mary Spiers and Rachel Brown

Conference Team 🗞





Nutrition Societyof New Zealand

Organising Committee

Rachel Brown
Mary Spiers
Tessa Scott
Kirsten Webster

Scientific and Programme Committee

Michelle Gibbs
Pam von Hurst
Sherly Parackal
Claire Smith
Kathryn Bradbury
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Social Media

Elisa Mendez-Weiss Kathryn Sinclair

Student and Early Career Researcher Committee

Emma Gray Lana Kennett Sophie Nichols Kitty McClurg

The Conference committee would like to thank:

Ali Hill (Treasurer, Nutrition Society Council) and Tessa Scott (Nutrition Society Council, Admin) for their support.

In addition, thank you to all the volunteers who reviewed abstracts, chaired sessions and those who judged presentations and posters.

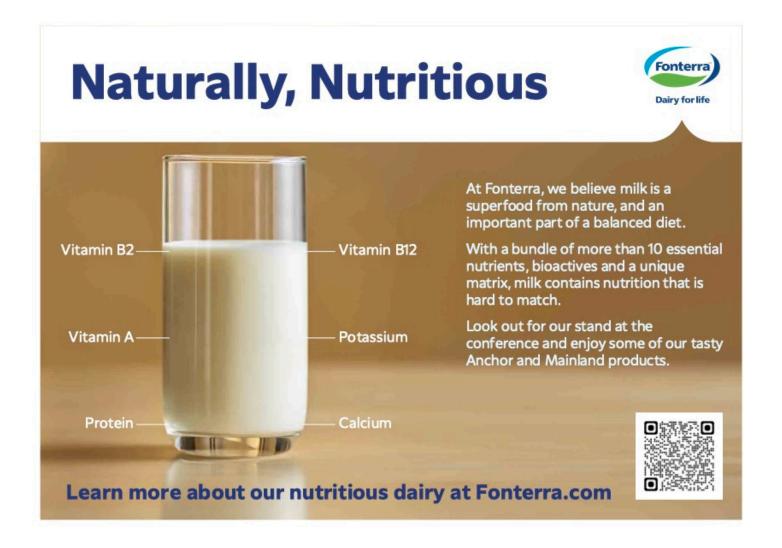
WiFi Access



Conference delegates can access Tūhura Otago Museum WiFi on:

Link Name: OM-FUNCTIONS

Password: PVTX_IRJO







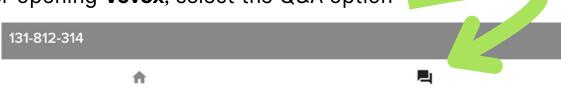


- We are using **Vevox**, an app which you can access on your mobile or laptop to facilitate questions for speakers
- Note this app will <u>not</u> be used for the workshop sessions
- A slide with the Vevox link and barcode will be displayed during sessions

Participant Link: https://vevox.app/#/m/131812314



After opening Vevox, select the Q&A option



• When you submit a question, include the name of the speaker and label the lecture theatre you are in



He Wātaka 2025



Programme 2025

Rāapa 26 Whiringa-ā-rangi - Wednesday 26th November 2025			
8:00 - 8:50	Registration Sponsored by Harraways		
Session	He Mihi Whakatau - Welcome Hutton Theatre		
9:00 - 9:30	He Mihi Whakatau - Welcome and official conference opening Mr Mark Brunton (University of Otago)		
9:30 - 10:00	Paramanawa - Morning refreshments & posters		
Session	Plenary 1: Sustainable food systems Hutton Theatre		
10:00 - 11:00	Dr Jessica Bogard (CSIRO Agriculture and Food, Brisbane) Towards nutrition-sensitive agriculture and food systems in the Pacific and beyond		
11:00 -11:30	Paramanawa - Morning refreshments & posters		
Session	Abstract 1: Te Ao Māori & Pasifika lenses on nutrition Hutton Theatre Abstract 2: Functional foods & digestive heatre		
11:30 - 13:00	Joanne Urlich & Sarah Williams (Te Hiku Hauora) Marae-based Diabetes Care in Muriwhenua Jamie Iro (University of Auckland) Kai ā nuku: nourishing whānau through an Aotearoa-centred nutrition approach Cherise Pendergrast (Massey University) Developing a food literacy assessment tool for the Aotearoa NZ context Olivia Young (University of Auckland) Conceptualising the role of Kai for Mental Wellbeing among rangatahi Māori Elti Sannyasi (Massey University) Weight stigma and bias in healthcare settings in Aotearoa: Pacific women's voice Dr Hannah Rapata (Te Wānanga o Aotearoa) Food colonialism and the role of food professions in Aotearoa New Zealand: unpacking the problem and pathways for change	Simon Robert Gilmour (Fonterra) Beyond total protein: understanding amino acid variation in dairy powders Ben Wright (Lincoln University) Supplementation of Aotearoa New Zealand hemp seed protein improves arterial health indices in adults with increased cardiovascular risk Syed Ubaid Shah (Massey University) Enhancing protein digestibility in red clover and lucerne seeds through lactic acid fermentation Dr Rachel Scriven (Toi Ohomai Institute of Technology) The impact of a 48-h high-carbohydrate lowfermentable oligo-, di-, monosaccharide and polyol diet in athletes with concurrent exercise-associated gastrointestinal symptoms and detected small intestinal bacterial overgrowth Laura Ombasa (University of Otago) Effects of Lepteridine™ mānuka honey on functional dyspepsia symptoms and quality of life: a randomised controlled feasibility study.	
13:00 - 14:00	Poupoutanga o te rā - Lunch & poster se Sponsored by Beef & Lamb New Zealan		



Session	Workshop 1 TG01 College of Education	Workshop 2 Hutton Theatre	Workshop 3 Barclay Theatre	Workshop 4 Kākāpo Room
14:00 - 15:30	W1. Culinary nutrition Julie North (Foodcom) & Tansy Boggon (Joyful Eating)	W2. GLP-1 medication Dr Maria Casale (Massey University)	W3. Co-design ACT based approaches to support healthy eating Dr Sara Styles & Jo Murphy (University of Otago)	W4. Reducing dementia through lifestyle change Khai Mardon & Juliet Slattery (Ara Institute of Canterbury)
15:30 - 16:00	Paramanawa - Afternoon refreshments			
Session	Plenary 2: Best practice: research methods and data sovereignty Hutton Theatre			
16:00 - 17:30	Associate Professor (Honorary) Andrew Sporle (The University of Auckland) Te Ao Māori considerations for New Zealand researchers on data sovereignty Associate Professor Karen Murphy (University of South Australia) Extension of the CONSORT reporting guidelines for randomized controlled trials in nutrition			
Session	Conference side event Register via Gecco			
17:30 - 18:30	Taraka kai Outside the Union Building, University of Otago University of Otago Food truck dinner			

Rāpare 27 Whiringa-ā-rangi - Thursday 27th November 2025			
Session	Plenary 3: Women's health Hutton Theatre		
9:00 - 10:00	Dr Wendy Sweet (My MT) Does Menopause need a new (lifestyle) narrative?		
Session	Abstract 3: Nutrition for mental wellbeing Hutton Theatre	Abstract 4: Tackling chronic disease Barclay Theatre	
10:00 - 11:00	Dr Nicola Gillies (University of Auckland) Design and evaluation of the "Feel Good" Feasibility Study – A multi-component fruit and vegetable intervention in children measuring cognitive and mental health outcomes Lauren Zwalue (University of Auckland) Food, feelings, and the future – exploring the connections between dietary behaviours, the environment and wellbeing among young adults in Aotearoa, New Zealand Georgia Smith (University of Auckland) Food and Mood Study – Exploring the determinants of dietary behaviours that support wellbeing in young adults with symptoms of depression, anxiety, and/or stress in Aotearoa, New Zealand Charlotte Mawson (Fonterra) Therapeutic potential of milk fat globule membrane for stress, anxiety, and depression: a meta-analysis	Vanessa Knowles (University of Otago) Navigating food choices during colorectal cancer: The patient experience in New Zealand Dr Sherly Parackal (University of Otago) Understanding saturated fat knowledge and dietary behaviours among South Asians who self-reported hypercholesterolemia: A mixed-methods study Frances Arenhold & Alexandria Nicholas (Heart Foundation) Enhancing heart health nutrition resources for Pacific communities: Insights from a talanoa focus group Kate Jaffray (University of Otago) Alongside technology: a qualitative study exploring the role of nutrition education in the care of youth with type 1 diabetes in Aotearoa New Zealand	

Rāpare 27 Whiringa-ā-rangi - Thursday 27th November 2025 (continued)				
11:00 -11:30	Paramanawa - Morning refreshments			
Session	Abstract 5: Food systems: policy, data, and trends Hutton Theatre Abstract 6: Formative years: from infancy to independence Barclay Theatre			
11:30 - 13:00	Prof Sheila Skeaff (University of Otago) Food loss and waste in New Zealand: a baseline estimate Dr Karen Mumme (Massey University) How does the government-funded school lunch programme contribute to the daily nutrient intake of New Zealand adolescents? Dr Kathryn Bradbury (University of Auckland) Trends in population food and macronutrient availability in Aotearoa New Zealand from 1961 to 2022 Deb Sue (Heart Foundation) Heart Foundation's Food Reformulation Programme and its impact on the food supply – past, present and future Prof Helen Eyles (University of Auckland) Changes in the sodium content of New Zealand packaged breads: 2013 to 2023 Lucy Pakenham (University of Auckland) Development of the Intake24 New Zealand dietary feedback function: review of existing 24-hour recall tools and expert input Dr Carolyn Lister (Bioeconomy Science Institute) Updating the New Zealand Food Composition Database 2024 Dr Nick Smith (Bioeconomy Science Institute) Expanding the New Zealand Food Composition Database for greater usefulness to the nutrition community		Meiliana Meiliana (Liggins Institute) Standardised reporting framework for nutrition and growth in preterm nutrition studies: A Delphi study Farah Nisa (University of Otago) Low birth weight in Indonesia: a systematic review and meta-analysis Stephanie Cox (Massey University) Macronutrient composition of donor human milk from the first human milk bank in New Zealand Mitchelle Kale (University of Otago) Missed opportunities: Infant feeding practices and caregiver knowledge in Papua New Guinea Judith Yeabsley (Massey University) An appreciative inquiry into positive healthcare provider appointments by parents help-seeking for their child's picky eating in Aotearoa New Zealand Prof Kathryn Beck (Massey University) Exploring ultra-processed food consumption and associations with nutrient intake in New Zealand adolescents Kate Hammond (Massey University) UPF consumption in New Zealand adolescents: the role of eating context Dr Berit Follong (University of Auckland) Understanding student food insecurity in Aotearoa: revealing the tip of the iceberg	
13:00 - 14:00	Poupoutanga o te rā - Lunch & poster session Sponsored by Glycaemic Index New Zealand Research 13:30 - 14:00 Human Nutrition Gardens Visit 530 Castle Street			
Session	Workshop 5 Hutton Theatre	Workshop 6 Rm G01 530 Castle St	Workshop 7 Kākāpo Room	Workshop 8 Rm 7c9 Human Nutrition, 7th floor
14:00 - 15:30	W5. Workshop to apply CONSORT to nutrition RCTS Assoc Prof Karen Murphy (University of South Australia)	W6. Standards of Practice for Sports Nutrition Dr Kirsty Fairbairn, Sara Richardson & Dr Rebecca Cooke (HP Sports Nutrition Practitioners)	W7. From insight to action: Co-design to build a behaviour change toolkit Elena Pierre (University of Otago)	W8. Beyond the brush - can we eat our way to a healthy smile? Sarah Chisnall, (Community Oral Health Service (Southern), Health New Zealand)
15:30 - 16:00	Paramanawa - Aft	ternoon refreshments		

Rāpare 27 Whiringa-ā-rangi - Thursday 27th November 2025 (continued)		
Session	Plenary 4: Pacific health & nutrition Hutton Theatre	
16:00 - 16:45	Elisiva Na'ati (The Pacific Community) The multi-sectoral nutritional approach to address NCDs in the Pacific region (inclusive of the monitoring with the MANA dashboard)	
Session	Muriel Bell Lecture Hutton Theatre	
17:00 - 18:00	Mafi Funaki-Tahifote (MAS Foundation) Feeding Futures: Advancing nutrition through action and evidence in our communities.	
Session	Conference side event Register via Gecco	
18:15 - 21:00	Tühura Otago Museum's Tropical Forest and Science Centre	

Rāmere 28 Whiringa-ā-rangi - Friday 28th November 2025		
Session	Plenary 5: GLP-1 medications Hutton Theatre	
8:45 - 10:00	Dr Maria Casale (Massey University) GLP-1 medications: from mechanism to measured impact Simon Erickson (University of Otago) Physiological pathways of weight stigma: a scoping review of biomarker evidence and methodological challenges	
10:00 - 10:30	Paramanawa - Morning refreshments Sponsored by Crafty Weka	
Session	Plenary 6: Sports nutrition Hutton Theatre	
10:30 - 11:30	Associate Professor Katherine Black & Penelope Matkin-Hussey (University of Otago) Female athlete nutrition across the lifecycle: Misfed or misled	
Session	Conference close and awards Hutton Theatre	
11:30 - 12:00	Awards & closing ceremony	





Events



Student & Early Career Evening





Student & Early Career Evening

Tues 25th November 2025 | 5:30pm - 7:30pm Otago Museum | Postmaster's Gallery







Featuring expert panelists:

Jen Gale, Sharon Sutton, and Finau Taungapeau

Tickets \$25Register via conference website
Snacks & drinks provided



Taraka Kai



NSNZ Nutrition Society

Located in front of the University of Otago Union Building

Conference 2025 - Dunedin

5.30 - 6.30 PM



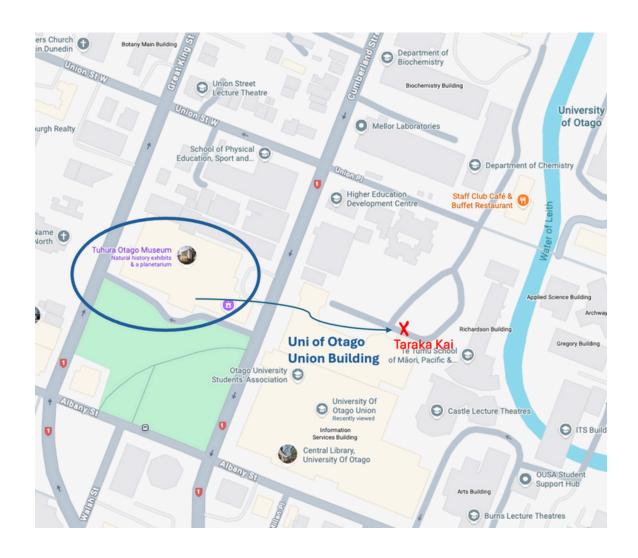
Taraka Kai

Location - see map below:

Outside the University of Otago Union Building

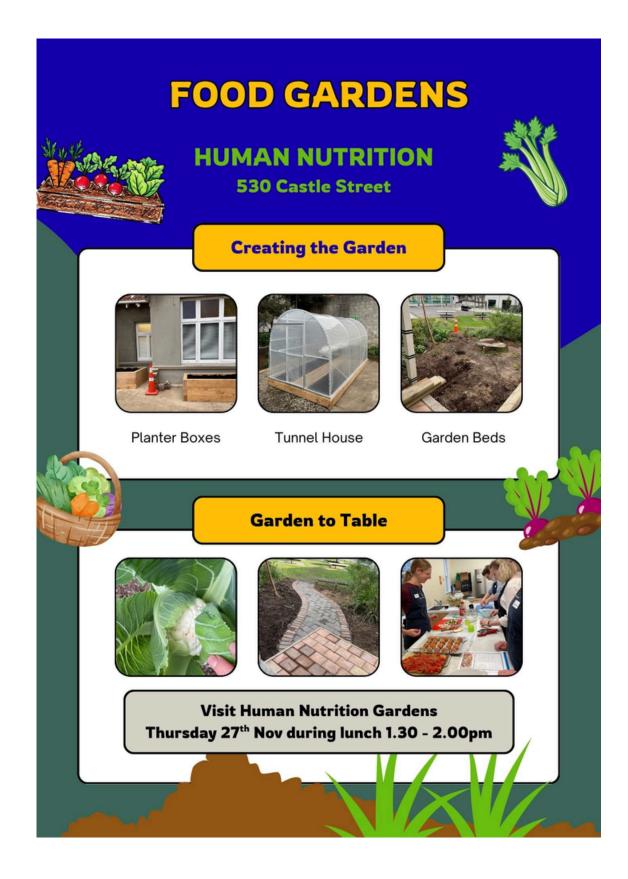
Date/time:

Wednesday 26 November, 5:30 - 6:30pm





Human Nutrition Gardens Visit



Fühura Science Centre NSI & Tropical Rain Forest





TUHURA **SCIENCE CENTRE &** TROPICAL RAIN FOREST

Enjoy an evening exploring the science centre, visiting the tropical forest or mingling with colleagues.

Follows on from the **Muriel Bell Lecture**



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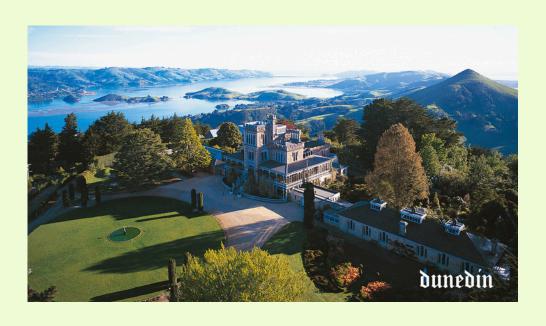
6.15pm - 9.00pm



Thursday 27th November



Speakers, Posters, & Workshops





Muriel Bell Lecture

Thursday 27 November 5pm, Hutton Theatre

Mafi Funaki-Tahifote

Feeding Futures: Advancing nutrition through action and evidence in our communities.

Mafi Funaki-Tahifote is one of the few New Zealand registered and practicing dietitians of Pacific ethnicity who is fluent in her mother tongue, Tongan. She is also one of the few registered dietitians with an MBA, graduating from the University of Auckland during the COVID year, in 2020. She spent nearly two decades of her early career as a dietitian in public health, eventually progressing into senior management roles. During this time, Mafi also served on various technical advisory groups and was often the media spokesperson on Pacific peoples' nutrition. Mafi also has considerable governance experience across a range of settings, including community organisations, education board of trustees, non-government-organisation boards, and government appointed boards.

Towards the end of her full-time work in public health, Mafi accepted a clinical dietitian opportunity to work weekends where she could use her Tongan language abilities to contribute meaningfully. This opportunity provided a pathway for her to courageously embrace and integrate a number of different ngāue/mahi, allowing her to continue serving others in a way that aligned with her values and current circumstances.

Mafi is humbly privileged to continue working part-time in the nutrition and dietetic fields— as a clinical dietitian, Pacific nutrition and dietetic technical advisor, Pacific cultural advisor, and volunteer in various nutrition organisations. Most recently, this has included an exciting journey with the Federated Nutrition Society of Oceania, which contributes to advancing nutrition in Oceania, impacting Mafi's homeland of the Kingdom of Tonga. This ongoing contribution is made possible from the support of the MAS Foundation, where, for most of the week, Mafi is privileged to work alongside clinical psychologist Dr Julie Wharewera-Mika as the Tangata Tiriti Head of Foundation in the philanthropic sector.

She is also an active member of her Tongan community through her local church, and enjoys walking, table tennis, and spending time with her family of seven and wider extended fāmili and kāinga. Mafi is passionate about improving health and wellbeing equity, and about supporting community-led solutions to issues that are 'very preventable' yet often systemic.

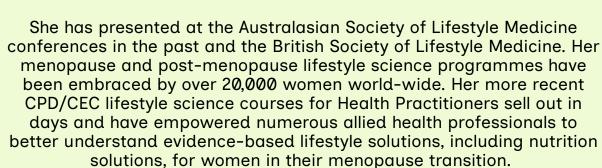
The Muriel Bell Lecture is named in honour of Dr. Muriel Bell, a pioneering nutritionist and public health advocate in New Zealand. Dr. Bell was instrumental in advancing nutrition science and improving public health policies throughout her career. In recognition of her significant contributions, the lecture series was established to celebrate her legacy. Each year, a distinguished individual who has made outstanding contributions to nutrition or related sciences is selected to deliver the Muriel Bell Lecture, sharing insights and advancements in the field of nutrition.



Speakers

Does Menopause need a new (lifestyle) narrative?

Dr Wendy Sweet (PhD) has been an internationally recognised and award-winning presenter and educator in the New Zealand health and exercise industry for over 30 years. Her doctoral studies were through the Faculty of Health, Sport and Human Performance at the University of Waikato, where she lectured for a number of years in sport and exercise physiology, nutrition and health promotion. Her master's thesis was on lifestyle behaviour change and she is a former nurse with a degree in Physical Education.



Website and videos: My Menopause Transformation



Dr Wendy Sweet

Female athlete nutrition across the lifecycle: Misfed or misled

Katherine Black is an associate professor at the University of Otago within the Human Nutrition department, where she leads the sport and exercise nutrition papers and research. Her research interests are in the area of elite sporting performance, nutrition and health. She has worked with some leading athletes within New Zealand to investigate nutritional practices to optimise their performance. Recently, her research has focused on the health of female athletes, both high- performance and recreational, to assess the impact of inappropriate energy intakes on reproductive and bone health.



Associate Professor Katherine Black

Dr Penelope

Matkin-Hussey

Penelope Matkin-Hussey recently studied for her PhD "The identification and recovery of clinically diagnosed Relative Energy Deficiency in Sport (REDs)" with the Department of Human Nutrition at the University of Otago (supervised by Katherine). Her research interests are female athlete health, in particular prevention and recovery from Relative Energy in Sport (REDs).



Speakers

GLP-1 Medications: From Mechanism to Measured Impact

Dr Maria Casale is a registered dietitian, researcher, and lecturer in nutrition and dietetics at Massey University. She has extensive clinical experience, having worked as an outpatient dietitian specialising in gastroenterology and in Health at Every Sizealigned practice. Since completing her PhD, Maria has continued to work clinically through Massey's student-led dietetic clinics, supervising and consulting on a wide range of cases, including patients prescribed weight loss injections. Her academic work spans public health and clinical nutrition, with a strong focus on culturally grounded, equity-focussed approaches to nutrition promotion. Her current research examines experiences of weight stigma among Pacific women in Aotearoa's healthcare system. Maria is particularly interested in weight-neutral and non-diet approaches to care and contributes to national discussions in this space. She teaches across undergraduate and postgraduate programmes in nutrition and dietetics, leads student placements in public health that centre Te Tiriti-led practice, and brings a reflective, questioning approach to both teaching and clinical practice. She is committed to advancing ways of practising and teaching nutrition that are inclusive, respectful, and effective for the communities they serve.



Dr Maria Casale

Towards nutrition-sensitive agriculture and food systems in the Pacific and beyond



Dr Jessica Bogard

Dr Jessica Bogard is a Senior Research Scientist in the Sustainability Program at CSIRO and an international expert in the field of nutrition-sensitive agriculture, fisheries and food systems. With a background in dietetics and public health nutrition, she is interested in understanding how agriculture and food systems can be leveraged to improve nutrition and health outcomes, particularly among women and young children. Her recent work has focused on developing methods and tools to evaluate healthiness and sustainability of diverse food environments throughout Asia and the Pacific. She has been recognised for her contributions to the field as the 2021 winner of the international APEC Aspire Prize for Innovation, Research and Education. She completed her PhD at the University of Queensland which examined the contribution of fisheries and aquaculture to nutrition and food security in Bangladesh. She has worked extensively throughout the Asia-Pacific region, particularly Bangladesh, Timor-Leste, Kiribati and the Solomon Islands, bringing a nutrition-lens to agricultural research for development programs.



Speakers



Elisiva Na'ati

The multi-sectoral nutritional approach to address NCDs in the Pacific region

Elisiva Na'ati is from the Kingdom of Tonga, a dietitian with over 20 years of experience in dietetics and non-communicable diseases (NCDs). She currently serves as the NCD Adviser for Public Health Nutrition with the Pacific Community (SPC), based in Suva, Fiji. In her role, she provides support to the 22 Pacific Island Countries and Territories to enhance their efforts in preventing and controlling NCDs. Prior to this position, she worked for the Ministry of Health in Tonga, where she contributed to advancing nutrition and diabetes prevention and care.

Te Ao Māori considerations for New Zealand researchers on data sovereignty

Andrew Sporle is an international award-winning data and health/social research innovator with over 30 years' experience in research governance, policy and ethics. His current work is mainly focused on data strategy, social/health inequity, statistical literacy or making statistical information resources more useful to decisionmakers beyond government. This work is carried out through iNZight Analytics Ltd, a Māori-owned research, analytics and data visualisation company. He is an Honorary Associate Professor in Statistics and serves on numerous research advisory boards including the Growing Up in NZ and The Dunedin Multidisciplinary Health and Development longitudinal studies' steering groups, StatsNZ's Data Ethics Advisory Group and Census Quality Assessment Panel, and as a Associate Professor member of the Ministry of Health's National AI & Algorithm Expert Advisory Group. He was a founding member of Te Mana Raraunga (Māori Data Sovereignty Network) and the Global Indigenous Data Alliance.



(Hon.) **Andrew Sporle**

See www.linkedin.com/in/andrew-sporle/

Extension of the CONSORT reporting guidelines for randomized controlled trials in nutrition

Dr Karen Murphy is an Associate Professor in Nutrition and Dietetics and a Dietitian at the University of South Australia. She has over 25 years' experience in this discipline across research, teaching and private practice. Karen uses an evidence-based approach to explore the effect of foods, supplements and whole diet and lifestyle patterns on chronic disease risk factors using randomised controlled trials with behaviour change techniques such as motivational interviewing, for empowering behavior change.

Associate Professor Karen Murphy

Karen is part of the Federation of European Nutrition Societies (FENS) working group who have developed a specific nutrition extension to the CONSORT guidelines (CONsolidated Standards Of Reporting Trials). CONSORT is a set of guidelines used to accurately report research trials, however given the complex nature of nutrition trials, they are often poorly reported leading to uncertainty in the results, which impacts on the effective translation of nutrition evidence into public health policy, practice, and guidelines. Karen is leading the CONSORT-Nut taskforce for the global dissemination of the CONSORT-Nut guidelines.

Posters



On display at the back of the Hutton Theatre, Tūhura Otago Museum Lunch and poster sessions: Wednesday 26 and Thursday 27 November, 13:00 - 14:00 Authors will be with their posters during the **Thursday** session

Elisa Weiss (University of Auckland)

The impact of preconception parental obesogenic diets on offspring metabolic health in a rat model.

- **2.** Hasinthi Swarnamali (Liggins Institute, University of Auckland)
 Seaweed as a sustainable protein source: nutrient bioavailability, safety gastrointestinal tolerance, and sensory impacts in healthy adults.
- 3. Sukanya Chakraborty (BSI Plant & Food Research Group, University of Otago) Barley food structure: Implications for in vitro digestibility and glycaemic index.
- **4. Jeslin Sabatini Clement Jaikumar (University of Canterbury)** The role of skeletal muscle in adults with diabetes: A protocol for a systematic review and meta-analysis.
- **5.** Salanieta Naliva (Massey University)
 Food, nutrition and ageing: Are older adults in Fiji meeting their dietary needs?
- **6.** Bailey Bruckner (University of Otago)
 Maternal perception vs actual breast milk supply: is there a difference? Protocol for an observational study.
- 7. Ariella Weinberg (Massey University)
 Nutrient composition of human milk at 7-10 months postpartum and its contribution to infant energy.
- 8. Nan Hu (University of Otago)
 Quality assessment of white bread with potassium-enriched reduced-sodium salt.
- **9. Rahadyana Muslichah (University of Otago)**Improving sports nutrition knowledge and dietary intake in adolescent female athletes: a scoping review of nutrition education targeting low energy availability.



Workshops



This year's programme offers a diverse selection of workshops designed to engage both academics and practicing nutritionists. Whether you're looking to deepen your expertise or explore new areas of interest, there's something for everyone.

Workshops will take place on Wednesday and Thursday, with each session offering four concurrent workshops for attendees to choose from. Register via Gecco.

Wednesday 26 November, 14:00 - 15:30

Workshop 1: Culinary Nutrition – delivering applied health solutions through food and cooking Led by Julie North (Foodcom) & Tansy Boggon (Joyful Eating)

Explore the emerging field of culinary nutrition in this hands-on kitchen-based workshop. Culinary nutrition places importance on the full eating experience rather than a nutrient-led approach. Discover global innovations, delve into gastrophysics and "nudging," and learn practical tips for creating visually enticing, nourishing dishes perfect for anyone passionate about great food.

Workshop 2: Supporting clients using GLP-1 medicines: practical, weight-inclusive nutrition care Led by Dr Maria Casale (Massey University)

An interactive, case-based session to equip clinicians supporting clients who use GLP-1 medicines. Working in small groups, participants will practice implementing nutrition care across three key phases of GLP-1 medication use: initiation, maintenance, and discontinuation. They will troubleshoot GI side-effects, safeguard protein, fibre, and micronutrient adequacy during appetite suppression, screen for red flags (including disordered eating risk), and plan behaviour

maintenance after cessation. Activities will use a weight-inclusive, non-diet lens, focusing on sustainable change that centres the client's health goals in a non-stigmatising way.

Workshop 3: From Evidence to Action: Co-Designing ACT-Based Approaches to Support Healthy Eating in Aotearoa Led by Dr Sara Styles & Jo Murphy (University of Otago)

Build your psychology skills in Acceptance and Commitment Therapy (ACT) to support healthier eating and wellbeing. In this interactive workshop you will explore barriers to healthier eating among tangata whaiora and whanau, and co-design practical strategies to boost psychological flexibility—staying present, open, and values-driven, even when difficult to do so. You will

collaboratively select strategies to increase psychological flexibility that are likely to be feasible and acceptable in your practice.

Workshop 4: Reducing dementia through lifestyle change Led by Khai Mardon & Juliet Slattery (Ara Institute of Canterbury)

Discover how to cut dementia risk by up to 45% in this interactive, hands-on workshop! Explore 14 modifiable risk factors through Dr. Sherzai's NEURO framework—Nutrition, Exercise, Unwind, Restore, Optimize—and take part in memory games, quizzes, and group activities to build evidence-based prevention strategies that boost brain health and wellbeing. Empower yourself to apply practical, science-backed tools in your personal and professional life.

Workshops



Thursday 27 November, 14:00 - 15:30

Workshop 5: Workshop on how to apply the CONSORT reporting guidelines for randomized controlled trials in nutrition Led by Associate Professor Karen Murphy (University of South Australia)

The CONSORT (Consolidated Standards of Reporting Trials) guidelines provide a framework for reporting RCTs, until recently there was no specific guidance tailored to nutrition studies. The Federation of European Nutrition Societies (FENS) Working Group recently launched the CONSORT-Nut, a nutrition-specific extension of the CONSORT guidelines. This interactive workshop will introduce participants to the rationale behind CONSORT-Nut, explore its new items, and demonstrate how it can enhance the transparency and quality of nutrition

research reporting. Through hands-on activities and real-world examples of well- and poorly-reported nutrition RCTs, participants will gain practical experience applying CONSORT-Nut to improve reporting of nutrition trials.

Workshop 6: Presentation of NZ Standards of Practice for Sports Nutrition Practitioners in High Performance or Professional Sport Led by Kirsty Fairbairn, Sara Richardson & Rebecca Cooke (on behalf of the High Performance Sports Nutrition Practitioners group)

Calling all sports nutrition fans! Join this interactive session introducing the new Standard Operating Procedures (SOPs) for Sports Nutrition Practitioners. Learn how they define competencies, training, and professional standards for safe, evidence-based athlete nutrition. Engage in group discussions to explore their value in your role, how you can support their use, and share questions or feedback to help shape future practice across sport, education, and professional nutrition settings.

Workshop 7: From insight to action: applying co-design to build a behaviour change toolkit Led by Elena Piere (University of Otago)

Are you passionate about behaviour change? This workshop will showcase a behaviour change toolkit, developed to reduce food waste in aged residential care. You will get to take part in a simulation of the co-design process used to develop the tool as a stakeholder in the process. You will explore a realistic scenario, consider diverse perspectives, and generate practical intervention ideas. You will emerge with an understanding of how this process could be adapted and applied to a range of other nutrition, sustainability, or behaviour change challenges.

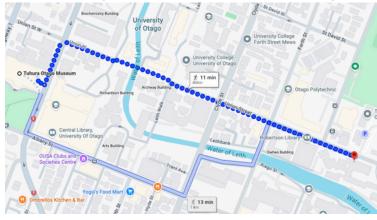
Workshop 8: Beyond the Brush - Can we also eat our way to a healthy smile? Led by Sarah Chisnall (Community Oral Health Service - Health New Zealand)

Let's flip the narrative on the strong relationship between nutrition and oral health! Brushing, flossing and dental check-ups are key for tip top teeth, but WHAT and HOW we eat/drink are just as important for our oral health. Our daily dietary habits can positively or negatively influence oral health. In this workshop you will find out how the caries process can help inform daily dietary advice. With the use of live polls, audience participation and activities you will identify areas where nutritional recommendations might not align and generate potential solutions to better support oral health outcomes.

Workshop locations ST

Workshop 1: Culinary Nutrition (Wed) College of Education Food Tech Rm, TG01

Tūhura Otago Museum → College of Education admin building



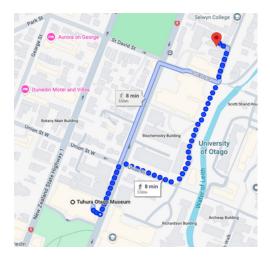


College of Education admin building → TG01



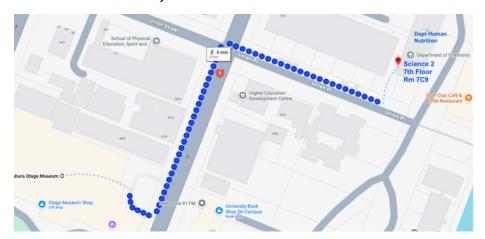
Workshop 6: Standards of Practice for Sports Nutrition (Thurs)

530 Castle St, Nutrition Clinic Rm G01 (Gym)





Workshop 8: Beyond the Brush (Thurs) Science 2 Human Nutrition, Rm 7C9





Abstracts



Plenary 1: Sustainable food systems



A food systems approach to improved nutrition in the Pacific region and beyond

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With multiple forms of malnutrition rising; transgression of planetary boundaries being driven by food system activities; and important inequities in access to healthy diets, global food systems are failing on multiple fronts (1). Contributing to such failings, is the multiple and often competing objectives of different food system actors and sectors. For example, this presentation reveals new analysis showing how Australian agriculture largely focuses on massproduction of export-oriented commodities such as wheat and livestock, whilst failing to produce sufficient vegetables for the population to consume recommended quantities. 'Food systems approaches' including efforts that recognise the multiple objectives of food systems, and actively seeking opportunities to maximise synergies and minimise trade-offs when intervening in food systems, offer unique potential to make progress (2). This presentation uses two examples to demonstrate the application of a 'food systems approach' to nutrition research. The first is the Australian Food System Policy Dashboard; an interactive tool that can be used to visualise and explore the various Federal level policies shaping the Australian food system ⁽³⁾. It maps 56 individual policy activities across 12 federal portfolios according to two primary aspects: 1) the food system activity that the policy directly influences, 2) the food system outcome the policy aims to achieve. It serves as a first step in identifying relevant food system policies across diverse portfolios and their points of intersection across food system activities and outcomes. It also demonstrates how a simple, visual interactive tool allows the user to begin navigating a complex policy landscape. The second example highlights new research on food environments in the Pacific region and their relationship with diet quality. This work includes three components; 1) regional and national analysis of reliance on different food environments, 2) participatory mapping of community food environments and 3) co-design of in-depth food environment assessment tools. Using nationally representative data from 12 Pacific Island Countries and Territories we show that Pacific households are reliant on diverse food environments to access food. All households access retail food environments, 80% of households grow their own food, two-thirds access food via kinship networks and nearly half of all Pacific households harvest food from the wild. Participatory mapping in Timor-Leste and Kiribati highlight the rapid infiltration of imported and processed foods and the increasingly dominant kiosk/canteen as a source of food. Co-design of assessment tools highlight the need for data on food safety and hygiene, food availability and accessibility at local levels.

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Keywords

food systems; food environments; Pacific

Conflict of interest

No conflict of interest to declare.

Abstract 1: Te Ao Māori & Pasifika lenses on nutrition

Marae-based diabetes care in Muriwhenua



Joanne Urlich ¹, Sarah Williams ¹

1. Te Hiku Hauora

Whakapiri Ora (Community Programs and Outreach) of Te Hiku Hauora ran a pilot to provide comprehensive outreach marae-based diabetes clinic across Muriwhenua to provide culturally appropriate hauora support with diabetes management in a setting that is whanau-centred and culturally appropriate from March - September 2024. This is a mostly rural and remote region, and Māori in this region have nearly double the estimated national rate of diabetes (1,2). The estimated rate of diabetes nationally is 4.7%, with this rate increasing to 8.24% in Māori⁽³⁾. Across Northland an estimated 7.79% of Māori with type 2 diabetes⁽²⁾ of that number 6.41% have a HBA1c >100. Within the 10 marae-based clinics, over 100 people with diabetes attended and received comprehensive checks and or treatment, with 57 also having retinal screening completed. This kaupapa was externally evaluated to assess the effects of the Marae Diabetes Clinics on whānau with diabetes and determine whether these clinics could be beneficial for managing other long-term conditions. The clinics were highly successful, and feedback was collated from interviews and surveys with whānau, marae representatives and kaimahi indicates that the clinics resulted in increased awareness and knowledge, increased confidence and motivation, appreciation of accessibility and convenience. Providing holistic and culturally appropriate care in a marae context was appreciated by whānau, kaimahi and marae. Key findings include:

- 1. Increased Awareness and Knowledge: The Marae Diabetes Clinics significantly increased awareness and knowledge among whānau about diabetes and available health services. 89% of whānau members reported increased awareness of services, and 93% reported increased knowledge of their health conditions
- 2. Improved Confidence and Motivation: The clinics also boosted confidence and motivation among whānau to manage their health. 93% of whānau felt more confident to ask their GP or nurse questions, and 89% felt more motivated to care for their health.
- 3. Accessibility and Convenience: The marae-based clinics were highly accessible and convenient for whānau, providing a range of services in one place. Whānau appreciated the proximity to their homes and the familiar, welcoming environment of the marae.
- 4. Holistic and Culturally Appropriate Care: The clinics provided holistic care that was culturally appropriate, making whānau feel comfortable and respected. The marae setting helped reduce fear and anxiety associated with mainstream health services.
- 5. Positive Outcomes Beyond Diabetes: The clinics also addressed other health issues, such as breast and cervical screenings, smoking cessation, and general wellness support.

The Marae Diabetes Clinics have been successful in increasing awareness, knowledge, confidence, and motivation among whānau to manage their health. The clinics' accessibility, convenience, and culturally appropriate care have made them a valuable resource for whānau living with diabetes. The positive outcomes extend beyond diabetes management, demonstrating the effectiveness of a holistic, one-stop-shop approach to healthcare on marae throughout Muriwhenua.

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Keywords

marae-based; diabetes; whanau-centric

Funding

Te Puni Kōkiri supported Te Hiku Hauora to run ten Diabetic Clinics between 14 May and 30 September 2024, across Muriwhenua.

Kai ā nuku: nourishing whānau through an Aotearoa-centred nutrition approach

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Long-term conditions (LTC) such as diabetes, cardiovascular disease (CVD), overweight and obesity have a significant impact in Aotearoa. Māori and Pasifika communities are disproportionately affected, making LTCs a critical equity issue for the country⁽¹⁾. These inequities are not incidental but reflect the direct legacy of colonisation. An intervention shown to have a positive impact across a range of LTCs is a plant-based diet⁽²⁾, yet nutrition trials in Aotearoa are limited. No published controlled nutrition trials consider a Māori worldview of kai (food) or acknowledge that for Māori, weight may not be the best anthropometric measure. Nutrition is a key determinant of improving health outcomes. To enable equitable health outcomes, research must value Western science alongside mātauranga Māori and incorporate traditional food sources. The purpose of this project is therefore to determine the impact of an Aotearoa-specific nutrition approach with a Māori worldview of kai and prioritising plants. The study is a non-randomised, mixed-methods, single-arm pilot in Gisborne with 16 participants, guided by Kaupapa Māori methodology. The research upholds tino rangatiratanga, ensures Māori governance and oversight, and honours Te Tiriti o Waitangi principles. Outcome measures will be performed at baseline and 12 weeks, including quality of life using a Kaupapa Māori questionnaire and semi-structured interviews, and metabolic health markers (HbA1c, lipids, blood pressure, weight, waist-to-hip ratio). Adherence is not assessed by monitoring energy intake, but rather supported with recipes, meal plans, weekly check-ins, and a Facebook group to encourage kōrero, pātai, and whanaungatanga. The programme focuses on sustainable lifestyle changes responsive to whānau needs. Kai ā Nuku is a nutrition programme, integrating mātauranga Māori and nutrition science. Approximately 90% of food is sourced from seasonal plants. Core principles include daily beans or lentils, fermented foods (sauerkraut, kimchi, apple cider vinegar), sourdough bread, and unprocessed grains (quinoa, buckwheat, black rice). Limitations include red meat for special occasions, eggs fewer than three per week, no dairy except goat products, no added sugar, and limited processed foods, alcohol, and caffeine. Māori kai practices are integrated: fish and kaimoana three times per week, rewena bread as sourdough, karengo (seaweed), and kaanga pirau and toroi (traditional fermented foods). We hypothesise that a 12-week, Aotearoa-specific, plant-focused nutrition program will provide a culturally meaningful intervention that enhances the health and well-being of Māori and non-Māori with LTCs. The project explores 1) the acceptability of an Aotearoa-specific nutrition approach for Māori, and for non-Māori; and 2) the impact of an Aotearoa-specific nutrition approach on metabolic health markers. The presentation will explore Kai ā Nuku as a culturally meaningful intervention while sharing insights from the current pilot study. By integrating mātauranga Māori with evidence-based nutrition, the research aims to improve LTC health outcomes and advance health equity.

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Keywords

plant-based nutrition; mātauranga Māori; long-term conditions; health equity

Funding

This research has received funding from the University of Auckland postgraduate student fund.

Developing a food literacy assessment tool for the Aotearoa NZ context

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1. School of Sport, Exercise and Nutrition, College of Health, Massey University, 2. School of Health Sciences, College of Health, Massey University

Food literacy is a distinct and complementary concept to nutrition literacy, and both are predictors for health outcomes, including for chronic disease. The food literacy status of people living in Aotearoa New Zealand is unknown. Current food literacy assessments do not encompass concepts of a te ao Māori worldview of health such as collective wellbeing, engagement with whānau (family), the environment, spiritual and cultural aspects. Staff from He Toa Taua (Harbour Sport), delivering Green Prescription and Active Families programmes, indicated providing nutrition education is constrained by not knowing what clients need or want. Identifying the skills, knowledge, and confidence people have about food would support better provision of nutrition education. The aim of this work was to develop a food literacy assessment tool that included concepts aligned with a Māori worldview for use in the Aotearoa NZ context. The conceptual model of food literacy by Vidgen and Gallegos (1) outlines four domains pertaining to skills, knowledge and attitudes, and was used as a foundation for this tool. Co-designed with four Māori staff from He Toa Taua, and with contributions from 7 Māori dietitians/nutritionists, concepts from Te Whāre Tapa Whā (2) were also considered. The tool was styled after the Hua Oranga (3,4) wellbeing checklist. Twenty whānau engaged with He Toa Taua also had input to the tool development. The completed tool included 20 items under the four domains of Plan and manage, Select, Prepare, and Eat. Following completion, 38 clients and staff from six community services trialled the tool. A five-point Likert scale identified the level of agreement for statements describing the tool use. Twenty-three clients provided feedback and there were high levels of agreement that the tool was dignifying, mana-enhancing, highlighted topics of importance, was easy to understand and helped to identify support. Suggestions for improvement were to include items more relevant to people living alone and capture more detailed information. Nine staff completed feedback and indicated the checklist was quick to complete, increased staff confidence to support a person with food/nutrition needs, invited kōrero (conversation) and was strengths focused. Involvement of whānau and practitioners in the development of this tool was a critical factor to ensure it was relevant to the needs of both people seeking and providing nutrition information and guidance. The contributions of codesigners, whānau, and Māori nutrition practitioners resulted in a checklist that can be used to help clients and staff identify the areas where support is needed and appropriate. Further refinement of the tool and testing in more community settings is warranted, but the evaluation completed thus far indicated the tool was acceptable in the Aotearoa NZ context, facilitates opportunity to explore what is important and meaningful for people, and enables activating appropriate support.

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Keywords

food literacy; nutrition education

Funding

This work was supported by the Health Research Council (grant number 23/979)

Conceptualising the role of kai for mental wellbeing among Rangatahi Māori

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Mental health is a leading health concern for rangatahi (young people) in Aotearoa, especially rangatahi Māori. Symptoms of depression doubled between 2012-2019 among rangatahi Māori, and mental health inequities have unacceptably widened during this time (1). The role of nutrition in promoting mental wellbeing is an emerging area of research; however, it is primarily grounded in Western paradigms. Limited research explores the relationship between kai (food) and mental wellbeing seen through a te ao Māori lens. The aim of this research is to conceptualise the role of kai in supporting mental wellbeing among rangatahi Māori who have experienced mental health challenges. This project is grounded in Participatory Action Research methodologies informed by kaupapa Māori principles of whanaungatanga (relationships), manaakitanga (respect) and tino rangatiratanga (self-determination). Researchers partnered with The Kindness Institute, an organisation with the aspirations to empower marginalised communities and support wellbeing through kaupapa Māori-aligned programs. Rangatahi who had previous engagement with The Kindness Institute were eligible to participate. Photovoice methodology was utilised to explore rangatahi perspectives, values and beliefs around kai and their mental wellbeing in response to three key questions - "what does kai mean to you?", "what role does kai play in your mental wellbeing?" and "what helps you or makes it hard for you when it comes to kai?". Five wahine Maori took part in this study. Participants then engaged in a focus group to discuss their photographs more deeply. Reflexive Thematic Analysis was used to develop themes based on the focus group that explore rangatahi perspectives. Themes were generated based on the overarching theme of 'Nā te kai ka ora', through kai, there is wellbeing. This captures the concept that there is more to kai than just the food and nutrients we consume. Within this notion, key themes that were developed included 'Kai hei Haerenga, Kai hei Oranga' (Kai as a journey, kai as wellbeing), 'Ko te Kai he Taura Here' (Kai as the Binding Cord), Kai i te Ao Matihiko' (Kai in the Digital World) and 'He ara kai, He ara hinengaro' (Kai as a pathway to mental wellbeing). By learning from the lived experiences of wahine rangatahi, this research helps to build a deeper understanding of what is important for the hauora and mental wellbeing of rangatahi Māori in the kai and nutrition field. We hope to create a foundation from which approaches utilising kai can be used for healing, centring and valuing Māori culture and beliefs to support mental wellbeing.

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Keywords

mental health; rangatahi; kai

Funding

This research was supported by the Research Development Fund

Weight stigma in healthcare settings in Aotearoa: Pacific women's voice



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Pacific women's accounts of weight stigma in healthcare settings highlight longstanding harms that have been overlooked within both health services and research. Internationally, weight stigma has been shown to contribute to many adverse health outcomes ranging from impact on clinical markers of health risk to healthcare avoidance (1). Pacific women experience the compounded effects of weight stigma, racism and gender bias in healthcare, making their perspectives particularly important to understand ⁽²⁾. This study aimed to explore their experiences of weight stigma in healthcare, its impact, and their recommendations for change from a Pacific perspective. Using the Talanoa research method (3), 10 interviews were conducted with Pacific women aged 28-65 years who had experienced weight stigma in their interactions with health professionals. Talanoa were held face-to-face and guided by the principles of the Fonofale model to capture the multifaceted impact of this phenomenon (4). Interviews were audio-recorded, transcribed automatically via Zoom, checked for accuracy, and then coded manually. A reflexive thematic analytic approach was used to identify key themes. Key themes generated relating to the weight stigma experienced by Pacific women in healthcare settings were (1) experiences of dismissal and stigma in healthcare (2) healthcare for women transcends clinical spaces, extending into family, cultural identity, spirituality and self-worth, (3) underlying systemic and interpersonal biases must be addressed (4) racism intersects with gender and weight stigma undermining trust in health professionals and (5) impacts of weight stigma on health behaviours. Pacific women's stories highlight weight stigma as a structural issue, compounded by ethnicity and gender, that undermines equitable healthcare. The women of this study recommend that to address this healthcare professionals receive meaningful cultural safety training in recognising and addressing weight bias, to ensure respectful and culturally safe care for Pacific peoples.

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Keywords

Weight stigma, Pacific health, women's health, fatphobia

Funding

This study is supported by the Health Research Council (HRC) of New Zealand (24/1338)

Food colonialism and the role of food professions in Aotearoa New Zealand: unpacking the problem and pathways for change



Hannah Rapata¹

1. Te Wānanga o Aotearoa

This presentation draws on findings from a doctoral research project exploring the intersections of kai with race, data, and identity for Māori in Aotearoa New Zealand (1). Using a critical kaupapa Māori methodological approach, this presentation will focus on the concept of food colonialism—defined as the ongoing disruption of Indigenous food systems and relationships with food—and its relevance to contemporary public health and nutrition practice. Kaupapa Māori theory is a form of critical theory that is politically grounded and culturally anchored in Māori ways of knowing, being and doing (2). The impacts of settler colonialism on Indigenous lands, languages, knowledge systems, and wellbeing are well established (2,3). Recent literature in Indigenous food sovereignty and health highlights how food systems are central sites of colonial disruption (4). This presentation builds on these works, offering a conceptual landscape for understanding how food colonialism operates through professional practice, public policy, and the dominance of Western food ideologies. The analysis and presentation are structured around key tenets of food colonialism: denial of Indigenous rights, cultural assimilation, colonial control, and appropriation. These are used to examine the role of food sectors—particularly nutrition professions—in marginalising Indigenous food systems and knowledges. While grounded in the specific histories and political context of Aotearoa New Zealand, these issues are highly relevant to other settler-colonial states and the wider Oceania region (1). This presentation will unpack the problem of food colonialism by tracing the mechanisms through which nutrition and public health professions may reinforce colonial structures—such as through dietary guidelines, education curricula, and institutional policy. It will then offer pathways for change, introducing abolitionist theory as a framework to support transformative, relational approaches that move beyond reform. This theory offers a space for collaboration and collective action among those working in food, health, and policy sectors (1). These research findings will stimulate deeper reflection on the roles of individuals and organisations in food sectors and professions. It will invite deep reflection on these roles within colonial systemsand how we might collectively move toward decolonial futures rooted in food justice for all and self-determination for Indigenous peoples.

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Keywords

Māori, nutrition, colonialism, health

Funding

This work was supported by the Health Research Council (grant number 21/581); Ngā Pae o te Māramatanga - Doctoral Research Scholarship; Te Atawhai o te Ao, Te Whatu Ora Health New Zealand and Te Rūnanga o Ngãi Tahu

Abstract 2: Functional foods & digestive health



Beyond total protein: Understanding amino acid variation in dairy powders

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Dairy proteins are widely considered the benchmark for high-quality dietary protein, owing to their balanced amino acid (AA) composition, high digestibility, and substantial essential amino acid (EAA) content (1). Recent years have seen a rise in consumer demand for protein resulting in the "proteinification" of the food environment. The dairy industry in New Zealand produces large quantities of proteins that are utilised as ingredients in a wide range of consumer products globally, while these products all originate from raw milk, they differ in their AA profiles as they are fractionated into different product streams to optimise their functionality for a variety of applications. Previously, the data pool for the AA content of various dairy powders was limited with unverified accuracy. This study addresses some of these gaps in the data and explains the variation in AA profiles between a variety of dairy powders. AA content was determined by high performance liquid chromatography. Products examined included whole milk powder (WMP), skim milk powder (SMP), cheese whey protein concentrate (WPC-C), lactic acid casein whey protein concentrate (WPC-L), high-fat whey protein concentrate (WPC-HF), hydrolysed whey protein concentrate (WPH), whey protein isolate (WPI), and demineralised whey protein (D90). The AA content for WMP and SMP were different between 12 of the 18 AAs measured (p < 0.05), attributed to milk fat globular membrane proteins present in the WMP samples. WPC-C and WPC-L comparison indicated higher levels of threonine (MD (95% C.I.) = 22.92 (21.96, 23.88) ;p<0.001), serine (MD (95% C.I.) = 9.33 (8.41, 10.24) ;p<0.001), glutamic acid (MD (95% C.I.) = 11.73 (9.58, 13.88) ;p<0.001), and proline (MD (95% C.I.) = 18.27 (17.29, 19.24); p<0.001) in WPC-C but lower levels of tyrosine (MD (95% C.I.) = -3.67 (-4.24, -3.09); p<0.001), phenylalanine (MD (95% C.I.) = -3.71 (-4.22, -3.20); p<0.001), and tryptophan (MD (95% C.I.) = -4.74 (-5.30, -4.18); p<0.001), attributed to the different methods of separation from casein proteins. WPI and WPC-HF varied in all AAs except histidine (MD (95% C.I.) = -0.33 (-0.75, 0.09); p=0.113) due to minor protein components. D90 and WPC-C demonstrated significant differences (p<0.05) in all but three AAs, Proline (MD (95% C.I.) = -1.63 (-6.28, 3.02); p=0.467), Tyrosine (MD (95% C.I.) = -3.39 (-7.00, 0.22); p=0.064) and Arginine (MD (95% C.I.) = -1.19 (-2.61, 0.24); p=0.096) due to filtering and demineralisation processes. Protein sources originating from the same raw material can end up with significantly different AA profiles due to fractionation and extraction processes. Understanding that these differences exist increases awareness of the need to formulate protein rich foods based on total protein and AA content to ensure the key benefits of protein are being delivered to the consumer.

References

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Keywords

dairy protein; amino acid; whey protein concentrate; milk powder variability; protein fractionation; nutritional composition

Funding

Supplementation of Aotearoa New Zealand hemp seed protein improves arterial health indices in adults with increased cardiovascular risk



Ben Wright¹, Keegan Burrow¹, Alison Wallace², Michael Hamlin¹

1. Lincoln University, 2. Plant and Food, New Zealand Institute for Bioeconomy Science Limited

The consumption of hemp derived protein has shown potential to improve cardiovascular disease risk factors⁽¹⁾ For example, Samsamikor et al.⁽²⁾ showed the efficacy of hemp seed protein in ameliorating high blood pressure in adults with hypertension. However, the effects of hemp seed protein consumption on arterial stiffening has not, to our knowledge, been investigated in humans. The present study aimed to investigate the effects of New Zealand hemp seed protein on blood pressure and measures of arterial stiffness in adults. Inclusion criteria were one or more risk factor for cardiovascular disease; a waist circumference greater than 102 cm (male) or 88 cm (female), fasting triglycerides ≥150mg/dL, high density lipoprotein cholesterol <40mg/dL (male) or <50mg/dL (female), SBP ≥130 mmHg and/or DBP ≥85 mmHg, fasting glucose greater than 110 mg/dL. A randomised control trial was conducted with 33 participants for 16 weeks in which the experimental group consumed 28 g of hemp seed protein extract for 5 days each week while 15 participants acted as a control group instructed to keep their regular daily diet over the experimental period. Blood pressure and arterial stiffness were measured at weeks 1, 8 and 16 using a SphygmoCor Excel device. A linear mixed model was used to analyse the repeated measures for affect differences between weeks, featuring Welches T-Test for uneven variance and an ANOVA test for p-values of the fixed effects. The model included a covariate analysis of the baseline measurement and used Tukey post hoc analysis for pairwise comparisons within and between the experimental and control groups. Results showed that compared to the control group, the experimental group decreased central systolic blood pressure -5.1 ± 2.4 mmHg (mean ± SE, 95% CI [-9.8, -0.3], p <0.05), mean arterial pressure -6.0 ± 2.3 mmHg (95% CI [-10.5, -1.5], p <0.05)), augmentation index at 75 bpm -11.8 \pm 1.8 mmHg (95% CI [-15.8, -7.9], p <0.05) augmented pressure -4.1 ± 0.6 mmHg (95% CI [-5.3, -3.0], p <0.05), and reflection magnitude -7.2 ± 1.7% (95% CI [-10.6, -3.8], p <0.05). However, no significant changes were observed in brachial blood pressures. These results suggest that hemp seed protein improves central arterial health in at risk adults after 16 weeks of supplementation.

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Keywords

Cardiovascular disease, protein, supplementation, arterial health

Funding

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Enhancing protein digestibility in red clover and lucerne seeds through lactic acid fermentation



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Red clover (Trifolium pratense) and lucerne (Medicago sativa) seeds are promising alternative protein sources due to their high crude protein content and rich nutrient profile (1). However, their potential is limited by the presence of anti-nutritional factors (ANFs) such as phytic acid, trypsin inhibitors, and chymotrypsin inhibitors ⁽²⁾. These compounds interfere with protein digestion, thereby reducing protein bioavailability ⁽³⁾. Lactobacillus fermentation has been proposed as a strategy to improve the nutritional quality of plant-based ingredients by enhancing protein hydrolysis, increasing the availability of bioactive compounds, and reducing ANFs. This study aimed to evaluate the effect of Lactobacillusfermentation on ANFs and protein digestion. Red clover and lucerne seed flours were fermented using three Lactobacillus strains, including L. plantarum, L. acidophilus and L. casei. ANFs, including phytic acid, trypsin inhibitory activity (TIA), and chymotrypsin inhibitory activity (CIA), were quantified using standard colorimetric assays. The INFOGEST protocol was used to evaluate in vitro protein hydrolysis (digestion), which was quantified by the o-phthaldialdehyde (OPA) method at three stages: before digestion, after the gastric phase, and after the intestinal phase. All the experiments were replicated three times (n=3) and the results were expressed as mean \pm standard deviation. Statistical analysis was performed by SAS 9.4 using a two-way analysis of variance (ANOVA) with 4 legume seed samples × 4 treatments (three Lactobacillus cultures and one unfermented) on antinutritional factors and protein digestion. Fermentation significantly reduced (p < 0.05) all measured ANFs in both seed types. For example, TIA decreased by 33-82% depending on the Lactobacillus strain and seed type. Before in vitro digestion, fermented samples exhibited an average fourfold increase (p < 0.05) in protein hydrolysis compared to unfermented controls. Furthermore, the gastric and intestinal protein hydrolysis values were significantly higher (p < 0.05) in the fermented samples, indicating improved digestibility compared to the unfermented controls. Lactobacillus fermentation significantly enhanced the nutritional profile of lucerne and red clover seeds, reducing ANFs and improving protein bioavailability. The findings of this study suggest the potential application of Lactobacillus fermentation in developing nutritionally enhanced plant-based protein products using lucerne and red clover seeds.

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Keywords

Lactobacillus fermentation; Lucerne seeds; Red clover seeds; Alternative proteins; Functional foods; Antinutritional factors; Protein digestion

Funding

The impact of a 48-h high-carbohydrate low-fermentable oligo-, di-, monosaccharide and polyol diet in athletes with concurrent exercise-associated gastrointestinal symptoms and detected small intestinal bacterial overgrowth



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Small intestinal bacterial overgrowth (SIBO) is a condition characterised by an increased concentration of bacteria in the small intestine, leading to fermentation and subsequent gas production. SIBO symptoms are similar to those reported by athletes who experience exerciseassociated gastrointestinal symptoms (Ex-GIS), including abdominal bloating and pain, and abnormal defecation (1). A low fermentable oligo-, di-, monosaccharide and polyol (FODMAP) diet has previously been shown to reduce the incidence and severity of Ex-GIS (1). This case-series explored the efficacy of a low-FODMAP diet in trained athletes with SIBO who become symptomatic during exercise. Three recreational to elite-level athletes who were retrospectively diagnosed with SIBO, and experienced severe recurrent Ex-GIS, volunteered to participate. Athletes were encouraged to implement their typical nutrition and hydration strategies 48-h before and during a gastrointestinal assessment during exercise (GastroAxEx). During the GastroAxEx, athletes ran on a motorised treadmill (average ± SD, 9.2 ± 2.7 km/h) for 3-h in temperate ambient conditions (19.7 \pm 0.8°C, 64 \pm 10% RH), with physiological strain and Ex-GIS outcomes measured. To determine orocaecal transit time, athletes consumed a 150 mL solution containing 20 g of lactulose 30 min into the final hour of exercise. Breath samples were collected at baseline and every 15 minutes during recovery to measure breath hydrogen (H₂) and methane (CH₄). Following the GastroAxEx, individualised therapeutic intervention and management strategies based on collected data and best-practice guidelines were recommended, including the implementation of a 48-h high-carbohydrate low-FODMAP (HC-LFOD) diet before endurance exercise sessions (>3-h). Follow-ups were conducted to facilitate compliance. This enabled anecdotal feedback on the efficacy of the strategies. During the GastroAxEx, athletes consumed approximately 450 mL/h (range: 242-693 mL/h) of fluid and 43 g/h (12-100 g/h) of carbohydrate, resulting in a 1.8% (1.6-2.4%) body mass loss. Loose stools were the predominant severe symptom (rated 10/10) experienced before (n=1), during (n=3/3) and the recovery period after exercise (n=3/3). Baseline breath H_2 and CH_4 concentrations were 24 ppm (3-45 ppm) and 34 ppm (13-74 ppm), respectively. Orocaecal transit time was normal (45-60 min) for all athletes. All athletes successfully implemented a 48-h HC-LFOD diet [(carbohydrate 9.2 g/kg/d (8.6-9.8 g/kg/d) FODMAP 3.5 g/d (2.6-5.1 g/d)] before a prolonged endurance event. In response to a 48-h HC-LFOD diet, athletes reported improved performance and reduced incidence and severity of Ex-GIS, including total gut discomfort, total-GIS, upperand lower-GIS, nausea, dizziness and stitch, during an endurance event. No athletes experienced loose stools. The most severe symptom reported was belching (5/10), experienced by one athlete. Athletes with SIBO who implemented a 48-h HC-LFOD diet reported reduced incidence and severity of Ex-GIS, which may have favourable performance implications, warranting further investigation.

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Keywords

SIBO, Ex-GIS, FODMAP, breath-testing

Funding

Effects of Lepteridine™ mānuka honey on functional dyspepsia symptoms and quality of life: a randomised controlled feasibility study.



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Functional dyspepsia (FD) is a chronic upper gastrointestinal disorder marked by abdominal symptoms without a structural cause. It includes two subtypes: epigastric pain syndrome (EPS) and postprandial distress syndrome (PDS). FD affects up to 30% of adults worldwide, impairs quality of life (QoL), yet effective treatment options are limited, leaving many seeking alternative treatments. Mānuka honey has unique bioactive compounds, such as Lepteridine™ (1), that may improve digestive symptoms. While used anecdotally for managing digestive disorders, its efficacy in FD has not been studied clinically. Seventy-five adults with mild-moderate symptoms of FD participated in a three-arm, randomised controlled feasibility trial. Participants consumed 10g of mānuka honey containing 10 (L10) or 25 (L25) mg/kg of Lepteridine™, or a honeyflavoured maple syrup control, twice daily for six weeks. Primary feasibility outcomes examined the initial effect of Lepteridine™ standardised mānuka honey on FD symptoms and QoL using the Nepean Dyspepsia Index (NDI) (2). Secondary outcomes included examining changes in Patient-Reported Outcomes Management Information System (PROMIS) scores for gastrointestinal symptoms, anxiety, and depression. Differences in changes in NDI and PROMIS scores between intervention groups were examined using general linear models that included baseline values. Prespecified subgroup analyses were performed in participants with EPS or PDS, using linear models that included main effect (with/without subtype), interaction term (treatment*subtype) and baseline values. Post-hoc pairwise comparisons were conducted to assess the effects of each intervention. After six weeks, compared with the control, FD symptom scores decreased by -7.01 (95%CI: -19.74, 5.72, p=0.275) and -7.04 (95%CI: -19.60, 5.51, p=0.267) points in L10 and L25 groups, respectively (overall treatment p=0.438). QoL scores increased by 3.72 (95%CI: -3.42, 10.85, p=0.302) and 2.01 (95%CI: -4.97, 8.99, p=0.568) points in L10 and L25 groups, respectively compared with the control (overall treatment p=0.586). There was a suggestion that participants with EPS had a greater treatment response in symptom scores (interaction p=0.062) and QoL scores (interaction p=0.036) than those without EPS. In participants with EPS, symptom scores decreased by -12.29 (-26.09, 1.51; p=0.080) and -16.99 -31.09, -2.90, p=0.019) points and QoL scores increased by 7.99 (-0.12, 16.10; p=0.053) and 8.30 (0.65, 15.95, p=0.034) in L10 and L25 groups, respectively, compared to control. No significant differences were observed in PROMIS scores at week six (p>0.05). Although this feasibility study showed no statistically significant improvements in overall FD symptoms or QoL with Lepteridine™ standardised mānuka honey in the overall FD cohort, the confidence intervals of the differences in symptom severity include potentially clinically meaningful benefits. Subtype analyses suggest Lepteridine™ standardised mānuka honey may improve symptoms and QoL in participants with EPS subtype of FD. These feasibility data will support the design of future randomised controlled trials.

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Keywords

functional dyspepsia; quality of life; Lepteridine; mānuka honey

Funding

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Plenary 2: Best practice: research methods & data sovereignty



Te Ao Māori considerations for New Zealand researchers on data sovereignty

<u>Associate Professor (Honorary) Andrew Sporle</u>

Plenary 2: Best practice: research methods and data sovereignty



A nutrition extension of the CONSORT 2025 statement for reporting nutrition trials: CONSORT-Nut.

<u>Karen J. Murphy</u> ^{1,2} on behalf of the FENS Dissemination Taskforce: Jessica Rigutto-Farebrother ¹, Anne-Marie Minihane ¹, Sangeetha Shyam ¹, Connie Weaver ¹, Philip C. Calder ¹, Neha Khandpur ¹, Jonathan Tammam ¹, Colby J Vorland ¹ and Carl Lachat ¹.

¹ Federation of European Nutrition Societies (FENS) Dissemination Taskforce.

CONSORT (CONsolidated Standards Of Reporting Trials) is a set of guidelines used for improving the accuracy of and reporting completeness of randomised controlled trials (RCTs). However, nutrition RCTs, due to their complex and intricate nature, may be incompletely reported. Well designed and conducted RCTs, when reported well, allow for estimation of causal effects with fewer assumptions than observational studies, however insufficient and vague reporting lead to uncertainty in the interpretation of the findings, and ineffective translation of evidence for the development of public health policy, dietary guidelines and clinical practice. The CONSORT-Nut guidelines were prepared by scholars active in nutrition research and its reporting. The author group brings together representatives from working groups of the Federation of European Nutrition Societies (FENS) and the Supporting Transparency And Reproducibility in studies of NUTritional interventions (STAR-NUT) group from EQUATOR. This extension was developed through a multi-step, iterative and consultative process with input from journal editors and nutrition researchers globally followed by a consensus meeting in collaboration with EQUATOR and piloted with early career researchers (1-3). CONSORT-Nut 2025 contains nine nutrition-specific recommendations (4). If there is no CONSORT-Nut 2025 reporting recommendation for a particular item, CONSORT 2025 is deemed sufficient for users. However, in some cases examples and/or explanations, to facilitate application of that CONSORT 2025 item to nutrition trials have been provided.

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Keywords

reporting guidelines; RCTs; nutrition; CONSORT-Nut.

Conflict of interest

No conflict of interest to declare.

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Plenary 3: Women's health



Does Menopause Need a New (Lifestyle) Narrative?

Dr Wendy Sweet (PhD)

Oestrogen receptors are distributed throughout tissues and organs, all of which are affected by declining levels of reproductive hormones during midlife menopause. This can lead to a multitude of symptoms which many women don't associate with their transition through menopause, including sore joints, cardiac palpitations, chronic fatigue, exercise intolerance and weight gain.

So, they spend hundreds of dollars on various treatments and other health solutions, as I used to do too.

However, every symptom is a sign that the HPA-Thyroid-Ovarian Axis is out of balance as the body tries to re-balance itself to adjust to a changing hormonal environment. As such, women may not be changing their lifestyle to accommodate this important life stage, one which is the biological entry into their ageing years.

Viewing menopause through the lens of the evidenced Theories of Ageing, and exploring menopause through a cross-disciplinary, integrative approach, concentrating on the biological, psychological and social aspects of ageing, changed my life and I hope I can bring this lens to your attention too.

Since the 1970s, the menopause transition has been heavily medicalised, and yes, women deserve the best treatments that help them to cope. However, there are other changes that women might like to think about. These changes are to do with their lifestyle, which can have such an impact on their health as they age, especially cardiovascular health. The Studies of Women Across the Nation (SWAN), reported that women who transition through menopause into post-menopause had a significantly greater increase in central arterial stiffness (Samargandy et al, 2020), especially in those who were overweight. This aligns with world-renown women's Cardiologist, Dr Angela Maas, who reports that around 30% to 50% of women develop hypertension during menopause, however, for women especially, prevention through lifestyle pays off (Maas, 2019, p.30).

Midlife women today are the older women of tomorrow. Whilst HRT continues to be the dominant paradigm in menopause management, what about the evidenced lifestyle science that has known benefits for women's health as they age?

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Keywords

menopause; inflammation, lifestyle, cardiovascular health

Abstract 3: Nutrition for mental well-being



Design and evaluation of the "Feel Good" Feasibility Study – A multi-component fruit and vegetable intervention in children measuring cognitive and mental health outcomes.

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Observational evidence suggests that increasing fruit and vegetable (FV) intake has the potential to improve children's cognitive function and mental well-being ^(1,2), but this has not yet been empirically tested in intervention research. This study assessed the feasibility and acceptability of a multi-component FV intervention, informed by behaviour change science, which measures mental and cognitive health outcomes in children. The 'Feel Good Study' was a cluster-randomised wait-list controlled feasibility study conducted in four New Zealand primary schools, with equal allocation of schools to intervention and wait-list control arms. The intervention group received a 10-week FV intervention which included a programme informed by behavioural theory. designed to improve FV availability and acceptance. The wait-list control group received a simplified 5-week version of the intervention. Dietary, cognitive, and mental health outcomes were completed by children and parents/caregivers at the start and end of the 10-week study period. Primary outcomes of this feasibility study were recruitment, retention, and data collection rates. Process evaluation captured measures of intervention fidelity and dose, acceptability, reach, and barriers or facilitators to implementation. Seventy children were recruited (79% recruitment rate), with an average retention rate of 89%. Diet, cognitive, and mental health data collection procedures were feasible, with all data valid for analysis except for 6% of children's dietary questionnaires. All intervention components were delivered (100%) dose delivered), with high levels of fidelity (82% - 100% of components implemented as planned). All teachers and parents strongly agreed that they would recommend other schools/families take part in the study, indicating high levels of acceptability. The process evaluation revealed areas for refinement, including more cohesive connections between schooland home-based intervention components, enhancing or adding new intervention components, and simplifying enrolment procedures with extended recruitment periods. The key feasibility and acceptance measures in the Feel Good Study were met. We recommend refining the intervention and progression to a definitive trial. This will allow for the first evaluation of the impact of increased FV intake on children's mental health and cognitive function.

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Keywords

fruit and vegetables; cognition; mental health; children

Funding

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Food, feelings, and the future – exploring the connections between dietary behaviours, the environment and wellbeing among young adults in Aotearoa, New Zealand



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Climate change is one of the most serious global health threats of the 21st century. The modern food system is accelerating climate change through greenhouse gas emissions, deforestation, biodiversity loss, excessive water and energy use, soil erosion, and pollution (1). Environmental degradation, in turn, is fuelling climate change worry, defined as a persistent fear of ecological catastrophe, particularly affecting youth and young adults (2). Environmentally friendly diets, such as those low in animal products and high in seasonal and local produce, are known to benefit both planetary and human health (1). However, little is known about how young adults in Aotearoa New Zealand understand and engage in sustainable eating behaviours, and how this relates to climate change worry. The Food, Feelings and the Future project developed and applied a survey to assess knowledge, attitudes, and behaviours (KAB) towards environmentally-friendly diets, and examined the relationship between climate change worry and dietary behaviours among young adults (18–35 years) in Aotearoa New Zealand. Our study employed a mixed-methods, cross-sectional online questionnaire guided by the KAB framework. The 60-item questionnaire included Likert-scale and open-ended questions, which was reviewed by an expert panel for content validity and piloted for usability prior to dissemination. Participants were recruited using a stepwise convenience sampling approach via the research team's social media, in-person promotions, and targeted organisational outreach. Quantitative data was analysed descriptively, and qualitative data was analysed using an inductive thematic approach. Two hundred participants (25 ± 5 years; 80% female) completed the survey, with representation from NZ European (57%), Chinese (11%), Māori (7%), Indian (5%), Cook Island Māori (1%) and 'Other' (18%) ethnicities. The majority of participants were omnivores (71%), followed by flexitarian/pescatarian (15%) and vegetarian/vegan (14%). Over half of participants strongly agreed or agreed that it is important their food and drink choices are environmentally friendly, only 37% reported following such patterns 'often' or 'always'. The most common barriers for following an environmentally friendly diet were price and convenience. When questioned what an environmentally friendly diet means to them as a young adult living in Aotearoa New Zealand, participants highlighted themes of minimally processed, locally sourced kai with minimal wastage along the food supply chain. Furthermore, climate change worry was widespread: 87% reported experiencing this at least sometimes, and 68% reported that this caused them to feel 'distressed' or 'very distressed'. Participants reported that climate change worry has caused a shift in dietary behaviours, with changes including reduced meat consumption, increased purchase of local/seasonal foods, and avoiding products with excessive packaging. Climate change worry was highly prevalent among young adults in Aotearoa New Zealand and appeared to motivate shifts towards more sustainable eating patterns; however, cost and convenience remain key barriers. Enhancing the affordability and accessibility of locally sourced, minimal processed and environmentally friendly food options would better align environmental values with dietary behaviours, benefiting both planetary and human health.

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Keywords

diet; behaviour; sustainability; eco-anxiety

Funding

Food and Mood Study – Exploring the determinants of dietary behaviours that support wellbeing in young adults with symptoms of depression, anxiety, and/or stress in Aotearoa, New Zealand



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Poor mental health symptoms are prevalent amongst young adults in Aotearoa New Zealand, with almost one in four aged 15-24 experiencing high levels of psychological distress in 2023/24 (1). There is growing evidence for the link between diet quality and positive mental health outcomes in both observational and intervention contexts (2). However, understanding the holistic and complex determinants of dietary behaviours for wellbeing in young adults with poor mental health has largely been neglected from nutrition research, limiting the development of practical solutions. The 'Food and Mood' project aims to explore the determinants of dietary behaviours that support wellbeing in young adults experiencing symptoms of anxiety, depression, and/or stress in Aotearoa New Zealand. A 48-item mixed-methods survey was designed for this project, utilising the COM-B (capability, opportunity, motivation and behaviour) model and the Theoretical Domains Framework (TDF) to inform the survey structure. Young adults aged 18–30y experiencing at least mild symptoms of anxiety, depression, and/or stress according to the DASS-21 were recruited across Aotearoa New Zealand to take part in the cross sectional, anonymous study. Participants were recruited through university channels, community mental health organisations, social media advertising, and flyers. Open-ended questions were analysed through inductive thematic analysis, and Likert scale questions were descriptively analysed. Participants (n=131) were predominantly female (84%) and had a mean age of 23.2 + 4.1 years. Majority of the participants identified as NZ European (76%), with smaller proportions identifying as Māori (14.2%), Chinese (6.3%), Indian (4.7%), and Samoan (2%). Participants demonstrated a high level of psychological capability, where 92% of participants considered it "very" important to eat a diet that supports wellbeing, and 70% agreed that limiting highly processed foods is important for wellbeing. These findings are supported by the key theme of 'nourishment' identified in the thematic analysis, where participants highlighted that consuming nourishing foods can support physical wellbeing, which in turn positively influences mental and social health. Although 71% of participants indicated willingness to change their diet if they knew it would improve their mental wellbeing, almost half (48%) reported that they do not have adequate physical capability (e.g., skills and resources) to make these dietary changes. The majority of participants (90%) expressed that their mood influenced the way they eat, where 48% strongly agreed that it is more challenging to eat for wellbeing when mental health is worse. These results are supported by the qualitative theme of 'emotional barriers', with participants illustrating that negative emotions such as stress and depression inhibit their ability to engage in behaviours that enhance wellbeing. In conclusion, greater psychological capability appears to support young adults in eating for wellbeing. Poor mental health inhibits automatic motivation, suggesting that nutrition interventions should prioritise addressing emotional barriers to behaviour change.

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Keywords

depression; anxiety; stress; eating behaviours; young adults

Funding

Therapeutic potential of milk fat globule membrane for stress, anxiety, and depression: a meta-analysis



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Mental health conditions such as stress and anxiety are increasingly targeted by nutritional strategies that modulate neurobiological and inflammatory pathways (1,2). Milk fat globule membrane (MFGM) is a complex structure of polar lipids, gangliosides, and glycoproteins that has demonstrated anti-inflammatory, neuroprotective, and gut-modulatory effects in preclinical and human studies (3). However, its effects on adult psychological outcomes have not been systematically synthesised. We conducted a systematic literature search through to September 2025 across multiple databases, including PubMed, Scopus, Web of Science, the Cochrane Library, Google Scholar, ACS Publications, Academic Search Index, BMJ Journals, and BNP Media. The search strategy combined relevant keywords and MeSH terms, with manual reference checks to ensure comprehensiveness. Of the 35 articles initially identified, 12 underwent full-text review after screening for duplicates and relevance. 3 randomised controlled trials (RCTs, n = 438) met the inclusion criteria: adult participants (\geq 20 years), bovine MFGM supplementation, a placebo or control group, and outcomes measuring stress, anxiety, or depression. Exclusion criteria included non-RCT designs, special populations, mixed or acute interventions, and studies lacking appropriate controls. The review was conducted and reported according to PRISMA guidelines. A random-effects meta-analysis was performed, calculating standardised mean differences (Hedge's g) for stress, anxiety, and depression outcomes. Heterogeneity was evaluated with I² and publication bias was explored with funnel plots and Egger's test. Two trials contributed two dose arms each, yielding five comparisons for synthesis. MFGM supplementation produced small but statistically significant reductions in stress (SMD = -0.20; 95% CI -0.41 to -0.00; p = 0.0495; I² = 0%) and anxiety (SMD = -0.22; 95% CI -0.44 to -0.01; p = 0.044; I^2 = 0%). Effects on depression were non-significant though directionally favourable (SMD = -0.15; 95% CI -0.37 to 0.07; p = 0.18; $I^2 = 0\%$). Risk-of-bias assessments were conducted using Cochrane criteria and indicated low concerns across trials. Funnel plots and Egger's tests did not indicate clear publication bias, but interpretation is limited by the small number of studies. These findings suggest that bovine MFGM supplementation may confer modest benefits for stress and anxiety in adults, while evidence for depression is inconclusive. Taken together, the results indicate that MFGM could be part of a nutritional strategy to support overall mental well-being.

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Keywords

mental well-being, milk fat globule membrane, stress, anxiety, depression, nutrition, dairy

Funding

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Abstract 4: Tackling chronic disease



Navigating food choices during colorectal cancer: The patient experience in New Zealand

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A diagnosis of colorectal cancer and its subsequent treatments can have a significant impact on dietary decisions, but what these drivers are in the New Zealand population and what information underpins these decisions requires further investigation. This research aimed to explore whether patients made dietary changes after a diagnosis of colorectal cancer, and what factors influenced these changes. In addition, what dietary information has been provided along the treatment pathway and does this meet the needs of this patient population? A qualitative study was used to explore the lived experiences of individuals undergoing treatment for colorectal cancer at Christchurch Hospital. Patients were recruited at the Computed Tomography (CT) radiotherapy planning appointment, and semi-structured interviews were conducted in week two or three of their chemoradiotherapy treatment. The interview questions focused on how diet is impacted by diagnosis, treatment side effects, access to information, and personal beliefs. Over five months, 14 patients were recruited, receiving concurrent chemoradiotherapy for Stage 3 & 4 Rectal Cancer. Audio-recorded interviews were transcribed verbatim, coded and analysed using reflexive thematic analysis (1). Participants described varying degrees of dietary change, with treatment side-effects, particularly nausea, fatigue, taste changes, and bowel changes emerging as key drivers of food choice. Many adopted a flexible, reactive approach to eating, often prioritising what was manageable over what was considered nutritionally optimal. Changes included reduced appetite, aversions to certain foods, decreased portion sizes, and a preference for bland or easy-to-prepare meals. Some participants experienced distress or uncertainty navigating treatment-imposed dietary routines (e.g., low-fibre diets or eating with medication), often without adequate support or explanation. Dietary changes were also influenced by personal beliefs (e.g., avoiding sugar, alcohol or processed meats perceived as harmful), and input from family, friends, or online sources. The emotional significance of food, including feelings of guilt around eating, further shaped dietary decisions. Logistical challenges, such as being away from home for treatment and limited access to cooking facilities also influenced participants' ability to maintain usual eating patterns. Participants reported inconsistent access to dietary guidance, with some receiving timely, helpful input while others felt information was lacking. The findings suggest a need for more personalised colorectal cancer-specific dietary advice and improved integration of nutrition into the cancer care pathway to better support patients' evolving needs.

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Keywords

colorectal cancer; dietary change; nutrition support; qualitative research

Funding

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Understanding saturated fat knowledge and dietary behaviours among South Asians who self-reported hypercholesterolemia: A mixed-methods study



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South Asians experience a disproportionate burden of early and aggressive atherosclerotic cardiovascular disease (ASCVD). Their diets are typically high in refined carbohydrates and saturated fats, and epidemiological evidence suggests a link between high saturated fat intake and increased ASCVD risk. (1) This study aimed to explore the knowledge and dietary behaviours related to saturated fat among SAs who self-reported hypercholesterolemia. Twenty South Asian adults who self-reported hypercholesterolemia were recruited through stakeholder engagement and advertisements in cultural and religious organisations. Demographic and dietary information were collected via an online Qualtrics survey (n = 20), and knowledge and behaviours related to saturated fat were explored through semi-structured telephone interviews (n = 19), which were thematically analysed. Participants included 12 of Indian ethnicity (India, Fiji, and NZ-born), five Sri Lankan, two Nepali, and one Afghan. Fourteen were male and six were female, with a mean age of 40 years (SD 9.8). Most expressed concern about their elevated cholesterol levels, particularly concerning family histories of cardiac events. Interview data revealed widespread confusion about whether saturated fats were harmful. Dairy products, particularly milk and yoghurt, were the main sources of saturated fat. Following diagnosis, many participants switched from standard (blue top) to reduced-fat (light blue top) milk after receiving general advice from their health professional. Nevertheless, few recognised that frequently consumed yoghurts (e.g., Gopala) were high in saturated fat. Ghee use was also prevalent, motivated either by cultural practices or beliefs that it is a healthier fat. Coconut oil consumption was less common, but coconut milk consumption—especially among Sri Lankan and South Indian participants—was widespread, with limited awareness of its saturated fat content. Knowledge of saturated fat sources was generally low, contributing to continued consumption of high-saturated-fat foods. These findings highlight the need for culturally tailored dietary education and resources to improve awareness and reduce ASCVD risk in South Asian populations.

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Keywords

South Asians, ASCVD, saturated fats, mixed methods

Funding

Otago Medical Research Foundation Laurenson award, 2024 (grant Number: LA-400)

Enhancing heart health nutrition resources for Pacific communities: Insights from a talanoa focus group



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1. Heart Foundation

Heart disease disproportionately affects Pacific peoples in New Zealand, yet culturally tailored, family-centered nutrition resources remain limited (1). Pacific Heartbeat is a dedicated team within the New Zealand Heart Foundation which focuses on empowering and enabling Pacific communities to lead fulfilling and longer lives through championing holistic change, equity and heart health awareness. This project employed a talanoa focus group approach to review and co-develop updates to the Heart Foundation's "Eat for Health" resource, aligning with the updated 2020 Ministry of Health guidelines (2) and Pacific cultural contexts. Thirteen participants of Samoan, Niuean, and Cook Islands Māori descent engaged in open dialogue about heart health, traditional foods, eating practices, and perceptions of existing nutrition resources. Through thematic analysis key themes that were identified included prioritising family wellbeing, necessitating family-centered health messaging over individual approaches. There are still barriers to translating nutrition knowledge into action include motivational, cultural, and practical challenges, with a tendency to focus on immediate needs and the cultural importance of traditional whole meals and side dishes. Participants expressed a strong preference for nutrition messaging incorporating simple, positive language and visual elements featuring Pacific foods, symbols (e.g., Samoan tanoa, woven heart, conch shell), and family-based contexts. Digital delivery via short, multi-language videos accessible through QR codes was favoured to improve accessibility and engagement across generations. Plate-based portion guides using familiar meals were preferred over hand-based methods for adults, though hand guides were useful for children. These insights from the Pacific community emphasise that culturally tailored, visually engaging, and family-focused resources are essential for advancing nutrition action in Pacific communities. The participatory approach provides a model for translating evidence into practice, ensuring resources are accessible, meaningful, and effective in promoting heart health. Ongoing community engagement offers a blueprint for nutrition interventions in diverse cultural contexts.

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Keywords

Pacific nutrition; Talanoa

Funding

Alongside technology: a qualitative study exploring the role of nutrition education in the care of youth with type 1 diabetes in Aotearoa New Zealand



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In Aotearoa New Zealand, the landscape of care for youth with type 1 diabetes (T1D) is evolving rapidly with the introduction of public funding for diabetes technologies such as continuous glucose monitors (CGMs), insulin pumps, and automated insulin delivery (AiD) systems (1). Previously, one of the requirements for youth with T1D to meet the Pharmac criteria for funded insulin pumps and consumables was participation in carbohydrate counting education delivered by a multidisciplinary team. However, with universal access now available, there is limited research on how diabetes teams across Aotearoa NZ are now providing nutrition and carbohydrate counting education to meet the needs of youth using diabetes technology. This qualitative study aimed to explore the perspectives of dietitians and diabetes nurses on the evolving role of carbohydrate counting and nutrition education in supporting youth (aged 12 to 24 years) with T1D to optimise their glucose outcomes, particularly in the context of increasing use of newer diabetes technologies. Semi-structured interviews were conducted with 13 participants, including dietitians (n = 8) and diabetes nurses (n = 5), who were purposively sampled to capture experiences from regional diabetes services and rural-based teams across diverse geographical regions of Aotearoa NZ. All participants took part in the study voluntarily and interviews were recorded, transcribed and coded using NVivo. Data were analysed thematically to generate insights relevant to clinical practice, guided by interpretive description methodology (2). Participants acknowledged that advances in diabetes technology, along with the universal funding of diabetes technology for T1D from October 2024, have enabled carbohydrate counting education to become more flexible and accessible for youth living with T1D. Importantly, many emphasised that dietitian input remains critical to achieving optimal diabetes outcomes and supporting overall health. In addition, while increased access to CGM and AiD data enables healthcare professionals to provide tailored follow-up and support, participants described a substantial increase in workload, making it challenging to manage within already limited resources. To address these challenges and improve access to carbohydrate-counting information, some regions reported an increase in the use of group nutrition education sessions as part of their pre-pump training programme. Of note, participants reported mixed results when using this approach (compared to individualised nutrition education), with low attendance to group sessions being a frequent challenge. Participants suggested that flexibility in the way education is provided - via one-on-one consultations, phone, email, and online webinars - has helped enhance access, particularly for vulnerable populations. In conclusion, this qualitative study suggests that healthcare professionals believe that providing carbohydrate counting and nutrition education remains vital to optimising the use of diabetes technology in youth with T1D in Aotearoa New Zealand.

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Keywords

type 1 diabetes; nutrition education; carbohydrate counting; diabetes technology

Funding

Lions Charitable Trust

Abstract 5: Food systems: policy, data, & trends



Food loss and waste in New Zealand: a baseline estimate

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Globally, it is reported that 30-40% of food is lost or wasted somewhere along the food supply chain (1). As a member state of the United Nations, New Zealand has a commitment to Sustainable Development Target 12.3 "to halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including postharvest losses" by 2030. In order to track progress against this target, an estimate of the total amount of food loss and waste (FLW) is required. There is no globally accepted definition of FLW which makes comparisons across countries difficult and explains why per capita FLW vary across countries: total FLW is 312 kg/person/year in Australia (2), 111 kg/person/year in the UK (3), and 132 kg/person/year in the European Union (3). In 2023, the Ministry for the Environment developed the first definition of FLW in New Zealand as "imported or domestically produced food and drink, including inedible parts, which leave the food supply chain from the point that crops and livestock are ready for harvest or slaughter onwards to the point of consumption, to be recycled, recovered or disposed of in Aotearoa New Zealand". Following this, in 2024, the Ministry for the Environment commissioned the first baseline study of FLW across the food supply chain, as outlined here. The methodological approach for this study was similar to Australia (2), which used a mass balance approach for key food commodities. For example, apples can be consumed as fresh fruit or turned into other foods such as apple juice, while wheat is milled and used to make bread or pasta. The study identified 61 of the most commonly consumed food commodities in New Zealand. Data for any 12-month period between 2015-2022 were obtained from a range of sources including industry reports, government and nongovernmental publications, scientific articles, interviews, and FAOSTAT food balances. Six stages of the supply chain were included: primary production (i.e., on farm), processing, wholesale/retail, transport, institutions, hospitality, and household. Of the ~ 30 million tonnes of available food, about 2.3 million tonnes is lost or wasted or 237 kg/person/year. However, there were many data gaps, particularly at primary production, processing, institutions and no data for transport. The majority of FLW occurred at primary production, followed by households, and then processing. Household food waste was 70 kg/person/year, which is comparable to the UK and EU. As a proportion of available food, FLW is lower in New Zealand than the global average; however, the waste of thousands of tonnes of edible food comes with substantial economic, environmental and social costs.

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Keywords

food waste; food loss; sustainability; New Zealand

Funding

Ministry for the Environment

How does the government-funded school lunch programme contribute to the daily nutrient intake of New Zealand adolescents?

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Food insecurity, in children, is associated with poorer health and academic outcomes. Around 27% of New Zealand households have reported food insecurity (1). The Ka Ora, Ka Ako | Healthy School Lunches Programme (2) initiative in New Zealand schools aims to reduce food insecurity (3). This cross-sectional study assesses the nutritional contribution of the government-funded school lunches to daily nutrient intake among adolescents. The study compares nutrient intake during school hours between consumers (students from schools with funded lunch programme who ate during school hours) and non-consumers (students from schools with funded lunch programme who did not consume a funded lunch) and students from schools ineligible for the funded lunch. Dietary data was collected in 2024 via an online 24-hour recall (Intake24) from 390 intermediate and secondary school students in Auckland, Waikato and Bay of Plenty. Demographic data was collected via survey. Nutrient intake from food consumed during the school day (between 9am-3pm) was considered 'school lunch' and expressed as a percentage of total daily intake. Students were grouped as consumers (n=95); non-consumers (n=109); and ineligible (n=186). Comparisons between groups were conducted using Kruskal-Wallis tests. The funded school lunch provided an average of 26% of daily energy and contributed proportionally higher amounts of several key nutrients when compared to energy provision, including fibre (31% of daily fibre intake), zinc (30%), and beta-carotene (37%). Consumers had significantly higher nutrient intakes than non-consumers. Nutrient contributions were comparable between consumers and ineligible students, except for total sugars, which were lower in consumers. In 2024, New Zealand's government-funded school lunches were nutrient-dense and provided better nutritional value than lunches sourced elsewhere from students in eligible schools and similar or better nutritional value than lunches of ineligible students. Findings support continued investment and potential expansion of the programme to improve adolescent nutrition and reduce health inequities.

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Keywords

adolescent nutrition; school meal programme; food insecurity; public health policy

Funding

New Zealand Heart Foundation (Project Grant #1961)

Trends in population food and macronutrient availability in Aotearoa New Zealand from 1961 to 2022



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Post World War II, there have been vast shifts in the global food supply which have influenced the burden of diet-related disease. The objective of this study was to use Food Balance Sheet data from the Food and Agricultural Organization of the United Nations⁽¹⁾ to describe trends in the population supply of main food commodities from 1961 to 2022 in New Zealand (NZ) – a high-income country with a rapid decline in ischaemic heart disease (IHD) mortality since the late 1960s⁽²⁾ and steadily increasing mean population body mass index, at least since the 1990s. Using Food Balance Sheet Data, which estimates population food supply, we calculated the percentage contribution of total fat from each of the main food commodity groups and also calculated mean population supply of food commodities in g/capita/day, as well as mean population supply of total energy in g/capita/day. For all analyses, we averaged data over 3-4 years. In 1961-63, the commodities 'butter' (37.0%) and 'meat & poultry' (35.6%) were the leading contributors to population supply of total fat. In 2019-22, 'vegetable oils' (23.3%) contributed most to total fat supply, whereas the contribution of butter had decreased to 15.8% and 'meat & poultry' to 21.6%. Per capita supply of 'red meat' decreased from 303g/day in 1961-63 to 162g/day in 2019-22, whilst per capita supply of poultry increased from 8g/day to 71g/day. In 1961-63, the per capita population supply of energy was 12,329 kJ/day; this had increased to 13.151 kJ/day in 2019-22. The considerable shifts in types of fat in the food supply from 1961 to 2022 have likely contributed significantly to marked decreases in rates of IHD over this time period in NZ. The supply of energy increased by 7% during the same time period, mirroring the increase in mean population body mass index over this time. This analysis underscores the profound importance of a country's food supply to population health.

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Keywords

food balance sheets; food supply; population diet; New Zealand

Funding

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Heart Foundation's Food Reformulation Programme and its impact on the food supply – past, present and future



Deb Sue 1

1. Heart Foundation

Since 2007, the National Heart Foundation of New Zealand has led a Food Reformulation Programme to improve population health by reducing salt and sugar levels in commonly consumed foods. The Programme began with bread and now encompasses over 50 nutrition targets across more than 40 food categories, focusing on high-volume, low-cost products such as bread, breakfast cereals, yoghurts, and processed meats. Recognising that most dietary salt and a significant proportion of sugar intake in New Zealand comes from processed and packaged foods, the Programme prioritises categories with the greatest potential public health benefit, given that adults in New Zealand consume more than double the recommended salt and triple the recommended sugar intakes per day (1), both of which are linked to increased risk of cardiovascular disease. Product-specific reformulation targets have been set in consultation with industry; to understand the technical function these nutrients serve in different food categories, as well as benchmarking against international targets (2,3). Collaboration with food companies representing over 80% market share in each targeted category has enabled widespread adoption of these targets. Targets are systematically reviewed and revised based on international benchmarks and national consumption patterns to encourage continuous improvement and ensure their ongoing relevance and feasibility. Ongoing stakeholder engagement and communications aim to increase awareness and support for reformulation among industry and the public. Annual monitoring and data collection indicate that the Programme has successfully removed approximately 760 tonnes of sugar and 335 tonnes of salt from targeted food products sold in New Zealand each year. Notable achievements include a 32% reduction in average salt content of puffed rice, cornflakes and other breakfast cereals, a 29% reduction in bread, a 28% reduction in tomato sauce, and a 20% reduction in ham. For sugar, there has been a 39% reduction in the average content of the ten top-selling yoghurts, a 20% reduction in leading breakfast cereals, and an 18% reduction in the ten top-selling flavoured milks. The Programme's approach ensures that reformulation strategies remain responsive to changing food environments and dietary habits, with upcoming reviews planned for categories including savoury snacks, sugar-sweetened beverages, savoury pies, and edible oil spreads. Continued progress in food reformulation offers an effective and equitable strategy for achieving population-wide reductions in sodium and sugar intake and consequently reducing the burden of diet-related chronic disease in New Zealand.

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Keywords

salt reduction; sugar reduction; reformulation; food industry

Funding

The Heart Foundation Food Reformulation Programme is funded by Health New Zealand, Te Whatu Ora.

Changes in the sodium content of New Zealand packaged breads: 2013 to 2023

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1. Heart Foundation

Adults in Aotearoa New Zealand (NZ) consume 3,386 mg of sodium per day (1), 40% more than the 2,000 mg per day recommended by the World Health Organization (WHO) for lowering blood pressure and reducing risk of stroke, heart disease, and gastric cancer (2). Packaged and processed foods are the main source of dietary sodium in NZ, with bread, a major staple food, being the single largest contributor. Initiatives to reduce the sodium content of NZ breads include: the Heart Foundation (HF) food reformulation programme which sets sodium reduction targets and works with food companies to meet them; the Australasian Health Star Rating front-of-pack nutrition label which encourages reformulation by bread companies; and the global WHO sodium reduction benchmarks. However, there is no recent objective evidence examining the impact of these voluntary initiatives on sodium in the NZ packaged bread supply. Our aim was to compare the mean sodium content of NZ packaged breads in 2013 and 2023 and assess their compliance with the NZ HF and WHO sodium reduction benchmarks. Sodium data for each year were obtained from the Nutritrack supermarket food composition database. Mean differences between years were assessed using independent samples t-tests and chisquare tests. A sensitivity analysis was also completed, including only breads available for sale in both years, thus investigating potential reformulation. There was a significant reduction in the mean sodium content of all bread from 2013 (n=345) to 2023 (n=309) of 46 mg/100g (p < 0.001). There was also a significant reduction in the sodium content of 90 identical breads available for sale in both years, from a mean (SD) of 422 (120) mg/100g in 2013 to 384 (97) mg/100g in 2023 (p<0.001). In 2013, 20% (n=70/345) of breads met the HF benchmarks, and 10% (33/345) met the WHO benchmarks; corresponding values for 2023 were 45% (n=138/309) and 18% (n=57/309) (p <0.001 for both). If continued, the modest reduction in sodium content and increase in the percentage of NZ breads meeting relevant sodium reduction benchmarks could positively affect public health, particularly if extended across the packaged food supply.

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Keywords

bread; sodium; salt; Aotearoa

Funding

The Heart Foundation of New Zealand (grant #1843 - Senior Fellowship to HE, and grant #3728679 - Senior Fellowship to KEB).

Development of the Intake24 New Zealand dietary feedback function: review of existing 24-hour recall tools and expert input



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National nutrition surveys are essential to inform public health policies and programmes by providing detailed information on the dietary intake and nutritional wellbeing of a population. In New Zealand (NZ), updated, high-quality population-level dietary data is urgently needed, as the last Adult Nutrition Survey was conducted in 2008/09. Researchers from the University of Auckland and Massey University developed tools and methods to support a future National Nutrition Survey, including Intake24-NZ, a web-based 24-hour dietary recall system (1). Beyond capturing dietary intake data, Intake24-NZ provides an opportunity to deliver tailored, evidence-based dietary feedback directly to participants and users, raising awareness of national dietary guidelines, directing users to reliable online resources, and improving nutrition literacy. This research describes the development of a tailored dietary feedback function within Intake24-NZ and its pilot testing with NZ registered nutrition professionals to identify improvements in accuracy, cultural safety and relevance for Māori and other ethnic groups, and appropriateness for public use. Key feedback features of three existing international 24-hour dietary recall tools (ASA24-United States, Intake24-United Kingdom, myfood24-Australia) were reviewed to guide the development of the Intake24-NZ dietary feedback function. Relevant nutrients were selected based on the reviews, alongside other relevant dietary data sources and expert consultation. Nutrient recommendations were based on the NZ Eating and Activity Guidelines for Adults, Australia/NZ Nutrient Reference Values, and World Health Organization guidelines. A sample of NZ registered dietitians and nutritionists reviewed a prototype dietary feedback report and completed an 18-item acceptability questionnaire. Quantitative data was summarised descriptively and qualitative feedback thematically analysed to identify suggestions for improvement. The review of feedback features of existing tools collated information on layout, content, tailoring, and use of disclaimers. Preliminary development of the Intake24-NZ feedback function resulted in an interactive design featuring 'nutrient tiles' with expandable 'tell me more' sections. These display intakes for 11 key nutrients, along with disclaimers, practical dietary tips, population-level recommendations, and culturally relevant food examples. Māori health concepts and links to evidence-based nutrition and behaviourchange resources are embedded, with guidance on how to access further support. Full findings from the review, development process, and acceptability testing will be presented at the conference. This study provides a reproducible process for developing tailored dietary feedback for use in online 24-hour recall dietary assessment tools. Expert feedback is a vital step in the development process, providing a foundation for iterative refinement toward future implementation.

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Keywords

dietary feedback; nutrition education; public health; digital health tools

Funding

This work was supported by the School of Population Health (University of Auckland) Grant for Masters research project expenses.

Updating the New Zealand Food Composition Database 2024

Carolyn Lister 1, Kris Tham 1



1. The New Zealand Institute for Bioeconomy Science

The New Zealand Food Composition Database (NZFCD), jointly owned by the Plant & Food Research Group, New Zealand Institute for Bioeconomy Science and the Ministry of Health, is the country's most comprehensive and authoritative source of high-quality food composition data. Widely used by researchers, the food industry, public health agencies, regulators, and educators, the NZFCD underpins a broad range of applications. The database is integral to national nutrition monitoring efforts, supporting national surveys and targeted dietary studies providing data for tools such as Intake24-NZ ⁽¹⁾. The NZFCD is reviewed annually and updates published every two years to reflect current dietary patterns. The key objectives of the 2024 release were to publish new data generated between 2022 and 2024 and remove outdated data. Most of the data for the 2024 release were derived from analytical laboratory results from appropriately accredited laboratories (2). The NZFCD now contains 2857 foods with up to 434 components per item. There were 74 new components added compared to the previous release in 2022, although there is not data for all these components for every food. These new components include enhanced fatty acid profiles and an additional method for quantifying dietary fibre. Beyond numerical data, the NZFCD offers insight into culturally significant and contemporary foods as well as providing updated entries for some key foods to ensure data is still current (e.g. to account for formulation and fortification changes). For the first time, traditional foods such as rēwena (Māori bread), along with popular ingredients like natto, paneer, jackfruit, and some types of lentils, are included. New entries also include foods to address dietary preferences and allergies/intolerances (e.g. lactose-free yoghurts and dairyfree cheeses), snack foods, frozen fruits and canned fruit and vegetables. Some of the new foods are notable for their high protein, dietary fibre, or plant-based nutrient content. The data are made freely available online in various formats — an online search tool, FOODfiles and The Concise New Zealand Food Composition Tables (3). A supporting manual offers technical guidance for users and computing personnel involved in setting up database management systems utilising FOODfiles data (2). Other recent developments include participation in the creation of a food list for a new 24-hour dietary recall tool tailored to New Zealand (Intake24-NZ)³. This tool incorporates data from 968 current FOODfiles entries and 558 newly developed recipes, which are intended for inclusion in future NZFCD updates. In conclusion, regular updates of the NZFCD ensure it remains a valuable resource and has data to reflect changing dietary patterns and diverse cultural dietary practices, ensuring its suitability for New Zealand's population.

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Keywords

nutrients; plant-based foods; dietary intake; nutrition surveys

Funding

Expanding the New Zealand Food Composition Database for greater usefulness to the nutrition community



Nick Smith 1, Carolyn Lister 1

1. The New Zealand Institute for Bioeconomy Science

A Te Ao Māori perspective teaches us that food cannot be separated from land, water, or people. This view is increasingly shared by scientists, policymakers, and industry leaders seeking to address the complexity of food system sustainability, but New Zealand (NZ) data systems have not caught up with this reality. Previous research in NZ that matches economic, environmental, nutrition and health data for food has been inconsistent or partial, leaving findings and positions less comparable. The one consistent resource has been the NZ Food Composition Database (NZFCD), the national standard repository for the nutritional content of food. The NZFCD is jointly owned by the New Zealand Institute for Bioeconomy Science and the Ministry of Health. It contains 2857 foods with up to 434 components, and its maintenance is funded by the NZ government. The NZ nutrition community place high trust in the NZFCD and its rigorous and transparent data, and it has diverse uses. Here we report on the planned expansion of the NZFCD into a multi-tiered resource spanning diverse food information, including food labelling, environmental impact, and economic indicators. This follows consultation with the sector on future-proofing the NZFCD, where branded foods data, along with data to support broader sustainability research, were raised as useful future directions. The current version of the NZFCD contains largely generic or aggregate food items of relevance to NZ food consumption and a set of core components for these foods. The data are highly reliable, drawing largely on analytical composition data produced by independent laboratories and using a nationally representative sample of each food. However, generating such data is expensive and time-consuming, meaning new foods are often added years after becoming widely consumed and existing records are only updated sporadically. A new tiered approach will extend the NZFCD and contain four classes of data:

- Class 1: NZ analytical data (the majority of the existing data in the NZFCD).
- Class 2: Data borrowed from international sources or calculated by recipe or extrapolation.
- Class 3: Branded food items, including nutrition information panel and claims data.
- Class 4: Specialised datasets for specific foods or components, e.g. phytochemicals.

In addition, sustainability indicators for food items and groups will be added, including greenhouse gas emissions, land use, and retail price. These data will be drawn from both NZ and international datasets ^(1,2), appropriately adjusted to provide representative NZ values. These data will be available via the interactive NZFCD website and available for download, with users able to specify which parts of the enlarged dataset they require. A unified source of broad sustainability data for NZ foods will standardise approaches to investigating the sustainability of diets and provide useful information for food formulation to meet nutritional and environmental targets.

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Keywords

data science; modelling; dataset; nutrients

Funding

New Zealand Ministry of Health.

Abstract 6: Formative years: from infancy to independence



Standardised reporting framework for nutrition and growth in preterm nutrition studies: A Delphi study

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In 2020, over 13.4 million babies globally (>10% of all live births) were born preterm (1). Nutrition during the neonatal period plays a crucial role in supporting optimal growth, brain development, and reducing the risk of metabolic diseases later in life (2). Current guidelines on nutrition for preterm infants contain inconsistent recommendations (3), most of which are based on very low certainty of evidence. Challenges in formulating recommendations for nutrition in preterm infants partly arise from inconsistent reporting of outcomes in nutrition intervention studies (4). We aimed to develop a standardised reporting framework for measures of nutrition intake and growth outcomes in preterm nutrition studies. Measures of nutrition intake and growth outcomes were identified in a scoping review, curated, and presented in two real-time Delphi surveys to participants from three stakeholder groups with experience in preterm infants, nutrition, and growth: healthcare consumer; healthcare professional, and researcher. The first survey was to identify measures deemed critical for reporting in a minimum reporting set; the second on how to report these measures. Questions were rated for their importance on a 9point Likert scale. Items were considered for inclusion when ≥80% of all participants scored the item as 7–9 (critical for inclusion) and <15% scored as 1–3, or when \geq 80% of healthcare consumers scored the item as 7–9. The standardised reporting framework was finalised during three online consensus meetings, where stakeholders were given the opportunity to discuss and then vote on the importance of each item. Items receiving ≥80% "critical for inclusion" votes from all attendees or from consumers were included. We recruited 313 participants from 32 countries for survey 1, and 121 participants from 26 countries for survey 2. The proportions of stakeholder groups in both surveys were similar: 12% consumers; 73-77% healthcare professionals, and 11-15% researchers. Eight measures are included in the final standardised reporting framework: (1) the type of milk the baby receives; (2) the type of supplement to milk that a baby receives; (3) the nutrition that the baby actually receives; (4) the time period over which the measurement of the nutrition that the baby actually receives was made; (5) baby's weight; (6) baby's length/height; (7) baby's head circumference; and (8) the time point at which, or the time interval over which, the measurement of size or growth was made. These eight measures are accompanied by 22 recommended measurement methodologies. This standardised reporting framework should be used in the development of future study protocols, evidence syntheses, and nutrition guidelines for preterm infants. Widespread adoption of this framework in preterm nutrition studies would improve the design of studies, the comparability of research findings, thereby facilitating reliable evidence synthesis, and potentially could support the development of evidence-based clinical guidelines and practice.

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Keywords

nutrition, growth, Delphi, reporting, preterm infants

Funding

Low birth weight in Indonesia: a systematic review and meta-analysis

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Low birth weight (LBW), defined as birth weight below 2,500 grams, continues to be a serious public health concern worldwide, particularly in low and middle-income countries. LBW is linked with a range of adverse health consequences for the infants, both short- and long-term (1, 2). Statistics Indonesia reported that LBW rates increased from 11.32% in 2019 to 12.58% in 2022 (3), although the actual burden is unknown due to inconsistent prevalence estimates across numerous independent surveys in the country. This systematic review and meta-analysis sought to estimate the prevalence of LBW in Indonesia. Four electronic databases were used to search for the relevant studies (PubMed, Scopus, Web of Science, ScienceDirect) up to August 2024. Findings were reported according to PRISMA guidelines. The meta-analysis used a randomeffects model with the restricted maximum likelihood (REML) estimation method. Heterogeneity was examined using the I^2 statistic, with a value $\geq 50\%$ indicating substantial heterogeneity. Twenty-six studies published between 1985 and 2023 were eligible to be included, comprising 119,556 livebirths. Meta-analysis revealed an overall pooled prevalence of LBW of 23% (95% CI: 15, 30%; I²: 99.93%), with the study setting identified as a potential source of high heterogeneity. Thus, separate analyses for population-based and hospital-based studies were performed showing LBW prevalence of 13% (95% CI: 8, 18%) and 32% (95% CI: 20, 44%), respectively. Such a difference suggests that the sampling frame and database significantly affect estimates in Indonesia, considering that those who came to the hospital were expected to be in the high-risk pregnancy group. Moreover, birth weight data were more precisely collected through measurement in a hospital survey, compared to those in a population-based survey. Regions also played an important role as each has different population characteristics and health issues that lead to different prevalence. Our study emphasises that LBW prevalence was higher than the official reported estimate in Indonesia, and that it differed between hospital and population surveys.

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Keywords

low birth weight; prevalence; Indonesia

Funding

Macronutrient composition of donor human milk from the first human milk bank in New Zealand



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A human milk diet for preterm infants is associated with significant reductions in the incidence and severity of several prematurity-related morbidities, such as Necrotizing Enterocolitis (1). When a mother's own milk is not available, donor human milk (DHM) is recommended as the best alternative by the ESPGHN (2) and the AAP (3). Although DHM is crucial for supporting the health of preterm infants, it's macronutrient composition is known to vary significantly, which poses challenges for fortification and clinical use (4). The present study is an observational, secondary data analysis which aims to describe the energy and macronutrient (fat, true protein and total carbohydrate) content of DHM from the Christchurch Women's Hospital Milk Bank in New Zealand. 784 samples of single-donor pooled, pasteurised DHM from 163 unique donors were analysed with the Miris Human Milk Analyser. Preliminary descriptive analysis was completed by using Microsoft Excel, expressed as mean (standard deviation), minimum and maximum values) were calculated using Microsoft Excel. The proportion of milk being donated to the milk bank was: 62.4% mature term(n = 489), 35.5% mature preterm (n = 278), 1.8% preterm colostrum (n = 14), 0.4% term colostrum (n = 3). Mature preterm milk contained on average 77.7 (22.3) kcal/100 mL energy; 4.2 (1.9) g/100 mL fat; 1.4 (0.4) g/100 mL true protein; and 8.3 (1.8) g/100 mL total carbohydrate. Mature term milk contained 73.2 (27.1) kcal/100 mL energy; 3.9 (2.5) g/100 mL fat; 1.0 (0.5) g/100 mL true protein; and 8.1 (0.9) g/100 mL total carbohydrate. Macronutrient and energy content of preterm and term colostrum were also reported descriptively. Wide variability was observed in the nutrients across samples. Term milk energy ranged from 39.3 – 254.0 kcal/100 mL, fat ranged from 0.5 – 18.8 g/100 mL, true protein from 0.3 – 9.8 g/100 mL, and total carbohydrate from 0.8 – 9.4 g/100 mL. Similarly, preterm milk showed energy ranging from 47.7 – 153.7 kcal/100 mL, fat from 1.2 – 12.7 g/100 mL, true protein from 0.4 - 4.6 g/100 mL, and total carbohydrate from 1.8 - 35.0 g/100 mL. The wide variability observed aligns with existing literature on DHM and likely reflects donor biology, processing and handling, and milk expression practices. This research contributes to the evidence base on the composition of DHM in New Zealand. Further analysis using this dataset will explore the relationship between macronutrient composition and donor variables (postpartum period, age and ethnicity) to better understand their implications for DHM composition and clinical use.

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Keywords

donor human milk; milk composition; breastmilk; preterm

Funding

Missed opportunities: Infant feeding practices and caregiver knowledge in Papua New Guinea

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Infant malnutrition and sub-optimal feeding practices remain critical public health challenges in Papua New Guinea (PNG), which has the world's fourth-highest rate of stunting, affecting nearly half of all children (1). Despite this burden, data on mothers' knowledge, attitudes, and practices (KAP) around infant feeding in PNG remain limited. Addressing these issues in PNG urgently requires context-specific, tailored behaviour change interventions at key stages of infant growth, to promote optimal infant and young child feeding (IYCF) practices (2). This study assessed caregivers' nutritional KAP to inform the design of context-specific, evidence-based interventions in PNG.A mixed-methods design was used, combining an interview-assisted questionnaire with 66 mother-parent dyads and a Yumi Tok Stori approach with 44 mothers. The target population was mothers of infants aged 7-9 months, recruited from Simbu Province and Eastern Highlands. Both methods explored nutritional knowledge, attitudes, and infant feeding practices. Infant and young child feeding (IYCF). Dietary adequacy indicators, including Minimum Acceptable Diet (MAD), Minimum Dietary Diversity (MDD), and Minimum Meal Frequency (MMF), were determined based on the World Health Organisations' guidelines (3). The mean infant age was 7.8 months (SD 1.3). Breastfeeding initiation was nearly universal (97%), yet 64% of mothers did not practice exclusive breastfeeding. While 61% knew that exclusive breastfeeding facilitates infant growth and survival for the first six months, and 67% correctly identified 6 months as the appropriate age to start complementary feeding, knowledge of animal-source foods was low. Only 42% identified eggs as suitable for infants at 6 months, and fewer than 20% recognised that fish or chicken was appropriate at this age. In terms of feeding practices, only 35% of infants met the MAD. MDD was achieved by 47% (mean [SD] of 4.5 [1.6] food groups), while MMF was achieved by 70% (mean of 2.4 [SD 1.2] meals per day). Most mothers (84.9%) knew that sugar should not be added to infants' food and drink, yet 46% reported their infant had consumed a sugar-sweetened drink the previous day. Awareness of multiple micronutrient powders (MNPs) was very low, with only 4 (6%) mothers having heard of them, and just 1 reported their use. Although awareness of some feeding recommendations was high, exclusive breastfeeding practices were not widely practised, knowledge of animal-source foods was limited, and fewer than 4 in 10 infants met the MAD. Very low MNP awareness highlights missed opportunities to address micronutrient deficiencies through proven interventions. This study provides critical evidence on caregivers' KAPs, which can now inform the design of context-specific targeted education and community-based support to strengthen complementary feeding and improve infant nutrition in PNG.

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Keywords

exclusive breastfeeding; complementary feeding; caregivers' nutritional knowledge, attitudes and practices

Funding

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An appreciative inquiry into positive healthcare provider appointments by parents help-seeking for their child's picky eating in Aotearoa New Zealand



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Estimates of clinically diagnosed picky eating (Pediatric feeding disorder) (1) prevalence (2) is greater annually than that of autism spectrum disorder in the paediatric population. Therefore, it is unsurprising research in the area is increasing, particularly given negative outcomes for those children experiencing feeding issues. However, globally absent is qualitative exploration of parents' experiences in primary care when help-seeking for their child's picky eating. Prior research, when touching on the subject, primarily documents lack of support. This study therefore sought to establish via an appreciative inquiry what positive medical experiences look like, and whether affirmative appointments lead to good outcomes. Eleven parents were recruited through well-child centres, education providers and social media advertising. Semistructured interviews were conducted via videoconference. Wong and Breheny's (2018) (3) three levels of narrative analysis was employed to explore the data. The key finding was evidence of a clear, three-part structure across the narratives. The three structures were, parental management of picky eating, the positive appointment with the doctor, and the outcomes from that interaction. Within these, four key themes were explored. First, the challenge of defining picky eating. Currently, no one unifying definition for subclinical presentations exists, which impacted on decision making for participants. Second, the effect on participant behaviour of wider social discourses of motherhood and its interaction with public health messages. The participants, all female, felt both censure and/or failure and the need to feed according to guidelines. Discomfort was compounded by being unable to conform to norms. Third, the importance of the relationships between doctor-parent and doctor-child. Finally, that doctors were limited by a range of factors in the care they could provide including lack of in-depth knowledge of picky eating and limited referral paths. The study concluded that positive experiences are characterised by personable, caring doctors but that picky eating was neither well-understood nor resolving it prioritised. In fact, much of the support focused either on supplementation to cover nutritional and/or calorific gaps or reassurance that picky eating was normal and/or transitive and therefore not cause for concern.

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- 3. Wong, G, & Breheny, M (2018) Health Psych & Beh Med 6, 245-261

Keywords

picky eating; fussy eating

Funding

Exploring ultra-processed food consumption and associations with nutrient intake in New Zealand adolescents



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Despite concerns about high consumption of ultra-processed foods (UPFs) among New Zealand adolescents, there has been no formal quantification of their intake. This study is the first to assess UPF consumption in this population and examine its contribution to daily nutrient intake. A cross-sectional study was conducted involving students in Years 7–13 (approximately 10 years and older) from schools in Auckland, Bay of Plenty, and Waikato. Data collection took place in classroom settings during school terms two and three of 2024. Dietary intake was recorded using Intake24, an electronic 24-hour dietary recall tool adapted for the New Zealand context. All foods consumed—including ingredients in mixed meals—were classified into four categories using the NOVA system: Unprocessed or Minimally Processed, Processed Culinary Ingredients, Processed, and Ultra-Processed (1). The proportion of daily energy derived from UPFs was calculated. Participants were divided into tertiles based on UPF consumption, and nutrient intake across these groups was compared using one-way ANOVA. Dietary data were collected from 631 adolescents across 16 schools, encompassing 1,385 unique food items. UPFs accounted for $62.5 \pm 25.5\%$ (mean \pm SD) of total daily energy intake. While overall energy intake did not differ significantly across UPF consumption tertiles, notable differences in nutrient intake were observed. After adjustment for energy intake and sex, adolescents in the highest UPF tertile had significantly lower intakes of protein (P<0.001), fibre (P=0.04), beta-carotene (P<0.001), magnesium (P<0.001), potassium (P<0.001), zinc (P<0.001), phosphorus (P<0.001), iron (P=0.03) and Vitamin E (p<0.001). Ultra-processed food intake was associated with significantly higher intakes of carbohydrates (P=0.005), saturated fat (P<0.001), sugar (P<0.001) and sodium (P<0.01). These findings provide foundational insight into the extent of UPF consumption among New Zealand adolescents and its impact on diet quality. The proportion of energy derived from UPFs aligns closely with international data from the United States (67%) and the United Kingdom (66%). Further analysis will explore the specific types of UPFs consumed, their sources, and the social contexts in which they are eaten.

References

1. Monteiro CA, Cannon G, Levy RB et al (2019). Public Health Nutr 22, 936-941.

Keywords

adolescent nutrition; school meal programme; food insecurity; public health policy

Funding

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Ultra-processed food consumption in New Zealand adolescents: the role of eating context



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Adolescence represents a critical window in development, marked by rapid growth and the formation of eating habits and preferences. Understanding how adolescent food choices are shaped is fundamental to encouraging healthy diets. This study is the first to explore associations between eating contexts and ultra-processed food (UPF) consumption and its contribution to energy intake by meal occasion among New Zealand (NZ) adolescents. A secondary objective examined associations between where foods were sourced and UPF intake. Dietary intake was assessed via a 24-hour food recall, using the web-based technology Intake24 from a convenience sample of adolescents (n=631), aged 12-17, from schools within the Auckland, Bay of Plenty and Waikato regions in NZ. Foods were categorised into their level of processing using the NOVA classification system¹. Eating context was assessed by location consumed, with whom and whether an electronic device was present, across six mealtimes. Frequent eating patterns, classed as social dyads (where and with whom), were identified. Linear regression models were used to analyse the association between contextual factors and UPF intake in SPSS v.29.0.UPF contributed 62.5% (SD 25.3) of total daily energy intake overall. Intake was significantly higher at snack times, particularly evening snacks, where UPF accounted for 79.6% (SD 34.5) of energy intake at that occasion (P < 0.05). Meals consumed on the go (81.4%, SD 31.7), in bedrooms (73.7%, SD 36.5), and eaten at fast-food outlets (74.0%, SD 38.7) had the highest UPF contributions by location. Parental presence, especially at the family table, was protective (51.3%, SD 39.5), whereas UPF intake was significantly higher when eating meals alone (65.6%, SD 38.6), with friends (66.2%, SD 37.8), or with others (80.0%, SD 30.1) (P < 0.05). Food sourced from convenience stores and fast-food outlets contributed more than 80% UPF, whereas school lunch programmes contributed only 31.4% (SD 37.7). Strategies to reduce UPF consumption in New Zealand adolescents could include encouraging family meals, reduced or healthier snacking, and increased eligibility and uptake of the government-funded school lunch programme.

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1. Monteiro CA, Cannon G, Levy RB et al (2019). Public Health Nutr 22, 936-941.

Keywords

ultra-processed; eating context; adolescents; energy intake

Funding

New Zealand Heart Foundation (Project Grant #1961).

Understanding student food insecurity in Aotearoa: revealing the tip of the iceberg

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Worldwide, food insecurity among university students is a growing concern as students face unique challenges that exacerbate their risk (1). Despite this, no data exists for New Zealand students. We aimed to assess the prevalence and determinants of food insecurity among New Zealand university students, while also exploring students' reported barriers to accessing food, how they navigate these, and how this differs by food security status. An online cross-sectional survey was conducted among students at the University of Auckland. Food insecurity was assessed using the 10-item US Department of Agriculture Food Security Survey Module. Additional data were collected on student socio-demographic and course of study characteristics, barriers and coping strategies, and awareness, need, and use of university support. Chi-square tests and multivariable logistic regression models were used to assess differences in variables of interest by food security status. The survey was completed by 347 students. Their mean age was 22.1 ± SD 4.7 years, 78% were female, and just under half (45%) experienced food insecurity. After adjusting for age, number of people living in the dwelling, and type of degree, we found that students who lived in off-campus rental accommodation (OR = 3.46, 95% CI 1.81, 6.61, p < 0.001) or lived on campus (OR = 3.14, 95% CI 1.57, 6.28, p = 0.001) were 3 times more likely to be food insecure compared to peers who lived with their parents or family. In comparison to students who reported feeling financially secure, those who reported being financially insecure had high odds of being food insecure (OR = 21.38, 95% CI 5.53, 82.71, p < 0.001). High cost of food and limited time to shop or cook were the most commonly reported barriers to food security. Strategies frequently used to address these were purchasing cheap food and saving food for later, particularly for food-insecure students. A large proportion of students said they would like information on how to cook simple or cheap healthy meals (52%) and how to budget (48%). Overall, there was low awareness (23%) and use (12%) of food relief or support initiatives available through the University (e.g., student food pantries). Our results show a high prevalence of food insecurity among New Zealand university students. Understanding the predictors of food insecurity may help to identify students at greater risk and who might benefit from additional support. Furthermore, findings shed light on the complexity of student food insecurity and warrant the need for future research that focuses on addressing the challenges students navigate.

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Keywords

food security, higher education, predictors, barriers, coping mechanisms

Funding

Plenary 4: Pacific health and nutrition



The multi-sectoral nutritional approach to address NCDs in the Pacific region (inclusive of the monitoring with the MANA dashboard)

Elisiva Na'ati

Plenary 5: GLP-1 medications



GLP-1 Medications: Mechanisms to Measured Action

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Glucagon-like peptide-1 (GLP-1) receptor agonists (GLP-1 RAs) were originally developed for treatment of type 2 diabetes but are now widely used as pharmacotherapy for people with higher body weights, with or without diabetes. Gut-derived GLP-1 acts via widely distributed GLP-1 receptors to reduce postprandial glycaemia, slow gastric emptying and modulate appetite and energy intake (1). Current GLP-1 medications incorporate biochemical modifications such as DPP-4 resistance, albumin binding and fatty acid acylation that prolong half-life and allow once-daily or once-weekly dosing (1). GLP-1 medications reduce energy intake via multiple pathways, reliably inducing weight loss during, but not after, treatment. They also directly and indirectly improve metabolic risk markers, although most trial data come from people with diabetes or high diabetes risk (1).

Experimental and clinical studies suggest potential neuroprotective, cardioprotective and antiinflammatory effects, yet estimates of effect size and duration remain uncertain and evidence for novel indications such as Alzheimer's disease, inflammatory bowel disease, and endometriosis is preliminary (2). It is also important to consider possible interactions with attention-deficit/hyperactivity disorder given the recent increase in interest and diagnoses, especially in adults and women.

Adverse effects and risks include gastrointestinal symptoms (nausea, vomiting, diarrhoea, constipation), gallbladder and biliary disease, possible pancreatitis and acute kidney injury, and loss of lean mass with weight loss (3). Simple, nutrition-related strategies such as slower eating, smaller meals, adequate fluid and fibre intake, and attention to dietary fat may help mitigate gastrointestinal symptoms and support tolerability (3).

Weight regain and relapse in cardiometabolic risk markers are common after discontinuation, with a 2025 systematic review and meta-analysis of 44 studies showing consistent weight, HbA1c and systolic blood pressure rebound after stopping GLP-1 medications (4).

In Aotearoa New Zealand, GLP-1 medications must be considered in the context of the high burden of non-communicable disease, marked inequities and lack of public funding. High out-of-pocket costs risk widening existing inequities, particularly for Māori and Pacific communities who already bear the burden of disproportionate health inequities. However, true equity will not come from simply ensuring "everyone gets the medication", but from Māori and Pacific people having power, options, and protection. Use of GLP-1 medications also intersects with disordered eating, eating disorders, and weight-inclusive care. Clinicians must support shared decision-making that centres bodily autonomy, psychological safety and cultural responsiveness.

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Keywords

GLP-1 medication, weight, equity

Conflict of interest

The author declares no conflicts of interest.

Physiological pathways of weight stigma: a scoping review of biomarker evidence and methodological challenges



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The social devaluation of individuals based on body weight, commonly known as 'weight stigma' is a pervasive psychosocial stressor linked to detrimental mental and physical health outcomes (1). In Aotearoa New Zealand, where 1 in 3 adults live with obesity (2), weight-based discrimination may affect up to 40% of this population (3). Beyond psychosocial consequences, emerging evidence indicates that weight stigma can activate biological stress pathways, contributing to chronic disease risk independently of body weight. This review aimed to critically synthesise studies linking 'weight stigma' and 'physiological biomarkers' (cardiovascular, HPA axis, inflammation, metabolic) to map evidence, evaluate methodological strengths/limitations, and identify mechanistic priorities for future research. Systematic searches of PubMed, PsycINFO (Ovid), and Scopus (up to May 2025) identified 23 eligible studies (11 cross-sectional, six longitudinal, six experimental) among 288 in the initial search. Most acute stress studies reported elevated cortisol and cardiovascular reactivity (e.g., increased blood pressure, heart rate) following stigma exposure. Limited longitudinal evidence suggested associations with chronic low-grade inflammation (e.g., elevated C-reactive protein). However, findings were constrained by heterogeneous measures and the overrepresentation of U.S.-based, Caucasian women with a BMI \geq 25, limiting generalisability. Theoretical approaches have largely drawn from the allostatic load and biopsychosocial models, with growing application of the Cyclic Obesity/Weight-Based Stigma (COBWEBS) model ⁽⁴⁾, which conceptualises weight stigma as a chronic stressor that initiates behavioural, emotional, and physiological feedback loops leading to further weight gain and stigma. While these models provide valuable insight into mechanisms of stress and dysregulation, few studies have examined how such cycles manifest within culturally diverse or non-Western contexts. Pacific peoples in Aotearoa experience disproportionate burdens of both obesity and discrimination, yet remain virtually absent from biomarker-based stigma research. To address this gap, the next phase of research will employ a feasibility mixed-methods study integrating quantitative biomarker assessments (cortisol, hs-CRP, blood pressure, heart rate) with qualitative talanoa sessions among New Zealand European and Pacific males. This culturally grounded approach will contextualise how lived experiences of stigma may translate into physiological dysregulation, aligning with the COBWEBS framework and extending it to underrepresented populations. Ultimately, this work will lay the groundwork for more equitable health research and practice in Aotearoa New Zealand.

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Keywords

weight stigma; biomarkers; COBWEBS model; physiological

Funding

Plenary 6: Sports nutrition



Misfed or misled, a critical examination of popular nutrition narratives targeted to active women on social media

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The rise of social media as a primary source for seeking and sharing health information has fundamentally transformed how individuals' access and engage with nutrition information (1). This shift has facilitated the rapid dissemination of unverified nutrition advice, which may promote poor dietary habits, disordered eating, and adverse health outcomes. Notably, over 85% of female Instagram users report following nutrition-related content (2); however, a review of the site's nutritional information found 45% to be inaccurate and 90% of low quality, with some content considered potentially harmful (3). This presentation, "Misfed or Misled," examines the pervasive nutrition messages directed at active women, many of which are amplified by high-profile influencers on their social media platforms. It will critically evaluate popular narratives targeted at women, particularly those related to macronutrients, and the concept of synchronising dietary patterns with menstrual or menopausal phases. Drawing on current evidence, the presentation will discuss how these messages may distort or oversimplify scientific concepts and the implications for women's health, performance, and relationship with food. Finally, it will offer practical, evidence-based strategies to support optimal fuelling across the lifespan, including during menopause.

Keywords

diet; social media; nutrition misinformation; nutrition communication

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Conflict of Interest

The authors have no relevant conflicts of interests to declare.

Abstracts for Posters



Improving sports nutrition knowledge and dietary intake in adolescent female athletes: a scoping review of nutrition education targeting low energy availability

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Low energy availability (LEA), an inadequate energy intake relative to exercise energy expenditure and fat-free mass, has been increasingly documented among female adolescent athletes. Problematic LEA underpins Relative Energy Deficiency in Sport (REDs) and poses a serious threat to an athlete's health, growth, and performance (1). Improving dietary intake through enhanced nutrition knowledge has been proposed as the key strategy to prevent problematic LEA⁽²⁾. While various nutrition education approaches have attempted to address this issue, their effectiveness remains unclear. This scoping review synthesised the current evidence on nutrition education related to LEA in improving knowledge and dietary intake among female adolescent athletes. A systematic search of PubMed, Web of Science, Scopus, and EBSCOhost initially identified 1,517 records. Eligible studies involved female-only or female and male adolescent athletes (mean age: 10-19 years old), investigated at least one intervention group receiving nutrition education covering LEA, REDs, or Female Athlete Triad (Triad), and measured knowledge and/or dietary intakes. After screening, seven studies were eligible for inclusion. Of these studies (n= 695, 94.2% female), three were randomised controlled trials, three were singlearm intervention studies, and one was a two-arm study comparing two different interventions. Topics included the Triad (n=5) and energy availability (n=2). Nutritionists/dietitians were frequently involved in delivering or developing educational materials (n=5). Programme duration ranged from one session to three months (mean=67 days), with sessions delivered mostly weekly or more often (n=4). Delivery methods included face-to-face (n=3), independent learning (n=3), and remote education (n=1). Videos (n=4), printed materials such as booklets and workbooks (n=4), or a combination of both (n=2) were used to facilitate learning. Knowledge was assessed as Triad knowledge (n=4) and sports nutrition knowledge (SNK) across multiple subdomains (n=3) using self-developed (n=3), modified (n=3), or previously validated questionnaires (n=1). Post-intervention improvements in both Triad knowledge and SNK were reported in 6 studies. Dietary intake was assessed in two studies using food records or food diaries. Increases in energy and all macronutrient intakes were observed only in the face-toface intervention that incorporated practical activities, whereas the remote approach showed no such changes. In conclusion, nutrition education involving nutrition professionals appears effective in improving knowledge among adolescent female athletes, but improving dietary intake may require face-to-face, activity-based programmes. However, variations in study design and outcome measurements are important limitations, highlighting the need for more rigorous research to inform effective strategies for LEA prevention.

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Keywords

low energy availability; sports nutrition knowledge; dietary intake; female adolescent athletes

Funding

Quality assessment of white bread with potassium-enriched, reduced-sodium salt



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High dietary sodium (Na) intake is strongly linked to hypertension, cardiovascular disease, and premature mortality. As part of global efforts to reduce salt consumption, potassium chloride (KCI) has emerged as a promising salt substitute due to its salty taste at low concentrations (1). Bread, a major dietary sodium source in New Zealand, contributes approximately 18% of total sodium intake in the national diet (2). Therefore, reformulation strategies that effectively reduce sodium while maintaining bread quality attributes are essential for consumer acceptance and real-world implementation. This study aimed to investigate the effect of potassium-enriched, reduced-sodium salt on white bread quality, specifically in terms of volume, moisture, colour, texture and mineral content. White bread was prepared using a standardised base formulation, in which table salt (NaCl) was replaced with 0%, 25%, 50%, 75%, and 100% KCl, respectively. All samples were processed under identical conditions, and key quality parameters were assessed using standardised testing methods. Inductively Coupled Plasma (ICP) was used to confirm the content of sodium and potassium in bread samples at different substitution levels. One-way analysis of variance (ANOVA) was used to assess differences in bread quality across formulations, followed by post-hoc Tukey Honestly Significant Difference tests ($\alpha = 0.05$). Bread volume and moisture content showed no significant differences across substitution levels. Based on Texture Profile Analysis, instrumental hardness measurements slightly increased with higher KCI substitution, while gumminess rose mildly and other texture parameters remained stable. Instrumental colour measurements indicated that both crust and crumb colour remained consistent across all formulations. Overall, these findings support the practical application of using potassium-enriched, reduced-sodium salt in bread formulation without compromising bread quality and its potential to contribute meaningfully to population-level sodium reduction and improved public health outcomes.

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bread; sodium; potassium

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Nutrient composition of human milk at 7–10 months postpartum and its contribution to infant energy intake

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Human milk (HM) is the optimal source of nutrition for infants, conferring health benefits for both infants and mothers. While exclusive breastfeeding is recommended by the World Health Organization and New Zealand Ministry of Health for the first 6 months (1, 2), complementary foods are typically introduced at around 6 months with breastfeeding often continuing into late infancy. HM composition during the complementary feeding period remains under-researched in New Zealand, with most studies classifying HM expressed beyond two weeks postpartum as "mature milk," potentially overlooking changes in nutrient content, as HM composition is known to change over the course of lactation. Understanding HM composition in relation to maternal and infant characteristics, and how energy is derived from milk sources and complementary foods across feeding practices, is essential to accurately assess nutrient intake and inform evidence-based feeding guidelines during this critical stage. This research aimed to determine the nutrient composition of human milk between 7–10 months postpartum and its contribution to infant energy intake. The cross-sectional study included 625 parent-infant dyads from the multi-centred (Dunedin and Auckland) First Foods New Zealand (FFNZ) study⁽³⁾. Infants were 7– 10 months of age, and participants were recruited in 2020-2022. This secondary analysis examines a subsample of 121 mothers who provided HM samples. Demographic and anthropometric measures, 24-hour dietary recalls, and HM volume (measured using the doseto-mother stable isotope technique), were collected as part of the FFNZ study. Macronutrients (fat, lactose, protein), micronutrients (vitamin A, C, E, folate, sodium, magnesium, phosphorus, potassium, calcium) and trace elements (iron, copper, selenium, zinc, iodine) were analysed using validated methods. Twelve of the eighteen nutrients were within ranges reported in the literature. Average HM vitamin C (2.39 mg/100mL), iron (133.9 µg/L), selenium (10.21 µg/L), and iodine (62.82 µg/L) concentrations were lower than values reported in the literature, whereas vitamin E (0.27 mg/100mL) and magnesium (34.30 mg/L) were higher. No clear differences in HM micronutrient concentrations were observed across maternal (e.g., age, BMI, parity) or infant characteristics (e.g., age, BMI z-score, sex). Significant differences (p<0.001) were observed between breastfed (n=330) and formula-fed (n=217) infants in the energy contribution from milk sources (mean+SD: 2,068+561 kJ/day and 2,251+601 kJ/day, respectively) and total energy (i.e., milk sources and complementary foods), of 3,239+525 kJ/day and 3,534+609 kJ/day, respectively, including after adjusting for infant age and sex. These findings indicate that HM nutrient concentrations in New Zealand mothers between 7–10 months postpartum are broadly consistent with international literature, though lower iodine, iron, and selenium concentrations may place infants at risk of inadequate intake. Future work should integrate HM composition with measured intakes to determine nutrient adequacy. This will clarify HM's contribution in late infancy and ensure feeding guidelines adequately address potential nutrient gaps.

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human milk; breast milk; infant; New Zealand

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Maternal perception vs actual breast milk supply: is there a difference? protocol for an observational study



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It is well known that breastfeeding provides favourable health outcomes for both mother and baby. However, many mothers struggle to meet global breastfeeding recommendations, with Perceived Insufficient Milk Supply (PIMS) being a leading reason for early cessation (1). Currently, little is known about the relationship between PIMS, actual milk insufficiency, and human milk nutrient composition. The primary aims of the Māmā (mother) and Baby Breastfeeding Study are to describe human milk volumes produced by a diverse sample of breastfeeding mothers at 3 months postpartum with differing perceptions of milk supply, and to compare human milk composition in relation to milk volume. In this observational study in Dunedin, Aotearoa New Zealand, a sample of 150 mother-infant dyads will be recruited. A diverse range of participants in terms of ethnicity and socio-economic status will be included, with an aim of recruiting as close to 20% Māori as possible. Targeted recruitment through networks within the maternity and healthcare sector as well as through Māori researchers will be utilised. Human milk volume (milk supply) will be assessed using the 'dose-to-mother' stable isotope (deuterium oxide) technique. Mother participants will consume an accurate dose (30 g) of deuterium oxide after baseline saliva samples are collected from both mother and infant. Subsequent post-dose samples will be collected over 3 time-points to determine deuterium enrichment over a 14 day period using Fourier-Transform Infrared Spectrometry. Human milk macronutrient (energy, fat, carbohydrate, and crude and true protein) and mineral and trace element (sodium, magnesium, phosphorus, potassium, calcium, iron, copper, zinc, selenium, and iodine) composition of one full milk expression from one breast will be analysed using the MIRIS Human Milk Analyzer and ICP-MS, respectively. Potential predictors and maternal perception of milk supply will be assessed via questionnaire. Infant body mass index (BMI) will be calculated from measures of weight and length at three different time points over four weeks, using standard techniques. These, alongside anthropometric measurements collected at the infant's Well Child Tamariki Ora (WCTO) visits, will be used to assess infant growth trajectory over time. Regression models will be used to assess the associations between maternal perception of milk supply, human milk volumes, and composition. Recruitment for this study began in February 2025 and is anticipated to conclude in June 2026 with analysis expected to be completed by February 2027. As of 25 August, 56 participants have been enrolled. Progress with recruitment, and the initial demographic profile of participants, will be presented. This research will provide new knowledge on whether maternal perception of milk supply aligns with actual human milk volume or nutrient composition. Such information will be beneficial to health professionals working with breastfeeding mothers with milk supply concerns and inform the design of breastfeeding support programmes and resources.

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Food, nutrition, and ageing: are older adults in Fiji meeting their dietary needs?

NSNZ

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Older people (\geq 55 years) constitute 14% of the Fiji population (1). Little is known about the dietary intake of older Fijians. This study aimed to assess the dietary intake of communitydwelling adults aged 55 and above in Fiji's Central Division. This retrospective study from a broader investigation (2) and subsequent published papers (3, 4) analysed 24-hour multiple-pass dietary recall data from the Intake24 Fiji app. Energy and nutrients were calculated using the NZ Food Composition Database, including Pacific foods, with food images provided to improve reporting accuracy. Total energy, macronutrients and micronutrient intake were reported in terms of adequacy whether meeting or not meeting EARs as compared to the NH&MRC,2006 reference values. Of 171 participants (mean age 64.1±7.5 years), 59% were women and one-third were iTaukei. The mean (standard deviation) energy intake was 6.56 (3.10) MJ/d, with energy derived from protein 11.0 (6.3) %, from carbohydrate 55.9 (13.9) %, and from fat 28.7 (12.3) %. Those over 70 years consumed a higher % of energy from carbohydrate compared with those younger (62.3 vs. 54.7%, p= 0.006). Fijians of Indian/other descent had higher fat and lower carbohydrate intake compared to iTaukei- fat 31.4 vs. 24.3%, p=0.001; carbohydrate 53.4 vs. 60.6, p=0.014. Protein intake was low for females, 49.6 (50.1) g, those over 70 years, 36.0 (24.8) g, and iTaukei, 50.9 (58.8) g. Fijians of Indian/other descent had higher protein intake per body weight, 0.76 (0.38) g/kg, compared to iTaukei, 0.58 (0.65) g/kg. Over half of Fijians met recommended carbohydrate intake (45-60% of energy), but fewer than 30% met protein recommendations (15–25%). Recommended fat intake (20–35%) was exceeded by 20% of participants. Nutrient reference values were met in 50% of participants for vitamin B6, C, iron, manganese, phosphorus, and potassium, but showed inadequate intakes for Vitamin B12, E, folate, thiamine, retinol, calcium, magnesium, selenium, zinc, and copper. Bread and bakery products were the leading contributors to energy, protein, and carbohydrate intake, accounting for over 30% of total consumption. Mixed cooked dishes contributed the most to fat intake, while sugars, honey, and related products made up 27% of total sugar intake. Findings reveal significant nutritional disparities by age and ethnicity among older Fijians. The main food sources of energy intake were bread and baked products, including those for protein. This highlights the need for culturally tailored public health and dietary interventions.

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Keywords

dietary intake, Fijians, ageing, nutrition

Funding

The role of skeletal muscle in adults with diabetes: A protocol for a systematic review and meta-analysis



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In New Zealand, the number of people with diabetes, including type 2 diabetes, exceeded 348,500 in 2024, and it is expected to reach 510,000 by 2040 ⁽¹⁾, resulting in skyrocketing healthcare costs, underscoring a persistent inertia in the management of type 2 diabetes. Exercise and dietary changes are considered crucial first-line strategies in managing type 2 diabetes. Early personalised treatments are highly recommended, as prolonged high blood glucose can worsen insulin resistance, leading to organ damage and increased healthcare needs. Although modifying exercise and diet plans to individual needs is an ongoing challenge. Skeletal muscle is the largest insulin-sensitive organ and regulates glucose homeostasis in the peripheral body by activating glucose transporter-4 to facilitate cellular glucose uptake for further metabolism. Despite this, glucose transporter-4 can be activated independently of insulin to promote glucose absorption by muscle contraction during structured physical activity, such as exercise. This unique property of skeletal muscle makes it a standard target for planning lifestyle interventions aimed at controlling blood glucose levels, thereby delaying disease progression. However, regular monitoring of skeletal muscle in type 2 diabetes patients is rarely considered in clinical settings. We aim to investigate the role of muscle mass and strength in the type 2 diabetes population. We plan to undertake a systematic review and meta-analysis. A protocol is being prepared for PROSPERO registration and has been drafted using the standard procedures of PRISMA 2020. A comprehensive literature search has been undertaken across major databases, including MEDLINE, Embase, PubMed, SPORTDiscus, and the Cochrane Library. Inclusion was limited to peer-reviewed, observational and randomised controlled trial articles published up to January 14, 2025, in English. Search terms included both medical subject heading terms and text words related to type 2 diabetes and resistance exercise. All extracted studies will be reviewed, with relevant data extracted and risk of bias assessed, by two independent reviewers. Any discrepancies will be resolved by a third independent reviewer. This review will provide insight into the current understanding and gaps of the role of muscle mass and strength in type 2 diabetes management and inform the development of tools to support individualised and responsive care of individuals with type 2 diabetes by healthcare professionals.

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Keywords

skeletal muscle mass, type 2 diabetes mellitus, resistance exercise, HbA1c

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Barley food structure: implications for in vitro digestibility and glycaemic index

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The global rise in metabolic disorders has increased interest in dietary strategies for managing postprandial blood sugar (1). This study investigates how milling and cooking alter barley's microstructure, influencing starch digestion and dietary fibre fermentability, with implications for the glycaemic index and gut health. Using simulated in vitro digestion models and INFOGEST protocols, we constructed digesto-grams of starch digestion over 180 minutes for four formats of processed barley (raw kibbled, raw flour, cooked kibbled, cooked flour) and a white bread reference (glycaemic index = 70) (2,3). Using validated estimates of blood glucose disposal, simulated blood glucose response curves were constructed from the digesto-grams, allowing the calculation of in vitro glycaemic index (GI) from the areas under the simulated blood glucose response curves relative to the area for white bread (4). The main findings from this study were: (1) GI was strongly dependent on processing. The calculated GI values are as follows: Raw kibbled 22 \pm 0.8; cooked kibbled 47 \pm 1.5; raw flour, 39 \pm 1.4; cooked flour, 87 \pm 1.2. (2) The GI value was directly related to digested starch (DS), and inversely related to the amount of resistant starch (RS) remaining in the barley residues after digesting (g/ 100 g barley): Raw kibbled, DS 20 \pm 0.1, RS 9.6 \pm 0.2; raw flour, DS 23.41 \pm 0.15, RS 4.21 \pm 1.32; cooked kibbled, DS 35.22 ± 2.16, RS 1.2 ± 0.48; cooked flour, DS 46.12 ± 1.38, RS 0.20 ± 1.04. Future work will investigate how the microstructure of processed barley affects its GI and RS content. Undigested residues, varying in RS and complex carbohydrates, will be used in faecal fermentation studies to assess microbiome modulation in normal and high BMI groups, followed by investigations into their impact on satiety signalling (GLP-1/PYY).

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in vitro digestion, glycaemic index, resistant starch, gut microbiome

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The impact of preconception parental obesogenic diets on offspring metabolic health in a rat model



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Parental diet has emerged as a critical factor in programming offspring's metabolic health, yet the independent and combined effects of maternal and paternal obesogenic exposures remain largely underexplored (1, 2). In Aotearoa New Zealand, obesity affects around one in three adults and one in eight children, disproportionately burdening Māori and Pacific communities (3). Understanding how both parents contribute to offspring metabolic health is key for preventive strategies. Growing evidence suggests that increasing omega-3 intake can improve metabolic programming, offering a potential means to mitigate early obesogenic effects. Building on earlier findings of altered birth weight, this study examined adult offspring metabolism. The objective was to assess maternal, paternal, and combined obesogenic (OB) diet exposures on offspring energy metabolism and skeletal muscle citrate synthase (CS) activity, and to evaluate whether early-life omega-3 treatment could act as a rescue intervention. Male (pat) and female (mat) Sprague Dawley rats received either a control diet (CON) or OB diet for five weeks premating. Females remained on their diets throughout pregnancy and lactation. Four parental diet groups were established: 1-matCON-patCON, 2-matCON-patOB, 3-matOB-patCON, and 4matOB-patOB. Offspring from each group received either omega-3 or placebo from postnatal day (PN) 21-63. Indirect calorimetry at PN145 measured 24-h energy expenditure (EE) and respiratory exchange ratio (RER), and dark/light phase ratios were calculated to assess patterns of metabolic variation. CS activity was assessed in skeletal muscle at PN180. Statistical analysis was performed using one-way and two-way ANOVA with sex and treatment as factors. In females, offspring from 4-matOB-patOB parents showed reduced EE dark/light ratios compared with 1-matCON-patCON (p = 0.003) and 3-matOB-patCON (p = 0.04), indicating impaired metabolic flexibility. Early-life omega-3 intervention restored this EE variation in 4matOB-patOB females, suggesting a protective effect. In males, EE ratios were reduced in 4matOB-patOB compared with 2-matCON-patOB (p = 0.02) and 3-matOB-patCON (p = 0.04), and RER phase shifts were absent, reflecting disrupted substrate switching. Omega-3 rescued this RER rhythmicity in males but increased RER ratios in 3-matOB-patCON offspring (p = 0.04), highlighting context-dependent responses. CS activity was reduced in omega-3 treated males from 1-matCON-patCON parents (p = 0.04), pointing to potential adverse effects in low-risk backgrounds. Together, these outcomes demonstrate sex-specific programming, with males being more vulnerable to disrupted substrate switching, whereas females showed greater responsiveness to omega-3 rescue. These findings demonstrate that parental OB diets impair offspring EE and RER in a sex- and context-dependent manner, reflecting disrupted dark/light metabolic regulation. This disruption may represent an early pathway by which parental diet programs later metabolic disease risk. Early-life omega-3 provided targeted rescue but carried risks in low-risk settings, underscoring the need for tailored interventions and highlighting the importance of including both parents in strategies to break the cycle of obesity.

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parental diet; metabolic programming; omega-3 fatty acids; obesity

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Seaweed as a sustainable protein source: nutrient bioavailability, safety, gastrointestinal tolerance, and sensory impacts in healthy adults

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Seaweed, a nutrient-dense and sustainable food source, holds promise for helping to meet growing global dietary protein demands. However, its complex cellular structure embeds protein within membranes and walls, making extraction challenging and limiting protein yields (1). Seaweed has traditionally been consumed with minimal processing in relatively small quantities, such as 5-10 g daily in Asian diets (2,3). The volume required for seaweed to serve as a meaningful protein source is relatively high, raising concerns about safety, digestibility, gastrointestinal tolerance, and sensory acceptability. The effects of large servings of minimally processed seaweed have not been examined in human studies. This study evaluated the impact of a minimally processed seaweed meal (SWM, containing ~150 g of seaweed) on postprandial plasma amino acid response, micronutrient bioavailability, safety, tolerance, and sensory acceptability in healthy adults. The hypothesis was that protein in the SWM would increase amino acid concentrations in the peripheral circulation compared to the control (CON) meal. In this single-blinded, randomized cross-over trial, 20 healthy adults (12 females, 8 males; aged 18-60 years, BMI 18-30 kg/ m^2) consumed either the SWM or a CON meal on separate days. Blood samples and questionnaires were collected at fasting and regular intervals for 4 hours, while urine was collected up to 24 hours post-consumption. Both meals were dumplings with identical ingredients, except seaweed was added to the SWM. It contained more protein (+3.75 g), carbohydrate (+10 g), fat (+2.35 g), energy (~318 kJ), and essential amino acids (EAAs) (+1.56 g). There was no difference between SWM and CON for plasma pooled essential amino acids (EAAs) peak concentration (1036.6 \pm 144.0 vs. 1053.0 \pm 160.5 μ mol L⁻¹; p=0.66) or incremental area under the curve (iAUC; p=0.65). However, SWM resulted in lower peak plasma concentrations of asparagine (p=0.02) and glutamine (p=0.03), and reduced iAUC for alanine (p=0.02), proline (p=0.01), and tyrosine (p=0.02). Plasma glucose, insulin, and triglyceride responses were similar between meals. Serum iodine concentration was higher following SWM (p=0.02). Urinary iodine peaked 2-4 hours after the SWM meal, declined by 24 hours, but stayed above baseline and was higher than CON (p<0.001). Urinary arsenic was higher at 24 hours in SWM vs. CON (p=0.05), but remained below safety limits. Gastrointestinal symptoms, including abdominal distension and belching, were more pronounced after SWM (treatment×time interaction: p=0.03 and p<0.001, respectively). Appetite-related responses, including hunger and satiation, were less favourable for SWM (main treatment effect: p<0.001), although no treatment × time interaction was observed. Intake of the SWM did not lead to differences in overall bioavailability of EAAs compared to CON, although some individual amino acid responses varied. The SWM resulted in less favourable gastrointestinal symptoms and satiety outcomes, which therefore suggests that meals containing a high proportion of minimally processed seaweed require further optimisation.

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