Australian Academy of Science | NATIONAL COMMITTEE FOR **NUTRITION**

NOURISHING AUSTRALIA POLICY BRIEF

PILLAR 2 NUTRITION MECHANISMS

From epidemiology to cause-and-effect relationships

Executive summary

Dietary patterns influence human health via complex interactions between nutrients, other food components and multiple biological systems. Understanding how and why requires an integrated whole-of-system approach.

As a public health apparatus, dietary patterns have the potential to inform food production and manufacturing to improve equity, economic and environmental sustainability as well as combat major non-communicable diseases.

Context, challenges and opportunities

Identifying how dietary patterns influence wellness or accentuate the development of chronic disease requires a shift towards an integrated whole-of-system understanding, rather than focusing on single nutrient components.

- All aspects of food and its effects can potentially regulate biological processes and directly impact human health by influencing hormonal, immune, neural and other physiologies.
- Consumer understanding, food industries and existing approaches to public health policy are operating in the superseded single-nutrient paradigm of nutrition knowledge.

Measuring what people actually eat at population scale is a crucial challenge in nutrition science that can be overcome with modern technology and citizen science.

- The abundance and improved accessibility of rich datasets, enabled by smartphone and web technology, opens up new opportunities for population (i.e. epidemiological) studies that provide detailed insight into dietary patterns and cause-and-effect mechanisms, across populations.
- These new methods provide an agile complement to traditional randomised control trials which are expensive, lengthy and labour intensive.

Leveraging recent advances in measurement, modelling and complex data analysis to derive mechanisms enables new approaches to enhancing human health, productivity and wellbeing.

- Understanding the influence of nutrition on brain activity may lead to nutrition-based therapies and preventive treatments for chronic neurodegeneration in the ageing population.

The science of nutrition informs high-quality diets and sustainable agriculture and is central to achieving the Sustainable Development Goals (SDGs), a fixture of the United Nations 2030 Agenda for Sustainable Development.

- In addition to SDG 2 (Zero Hunger), outcomes enabled by nutrition science (including food security and improved nutrition and promote sustainable agriculture) are inextricably linked to another ten goals.

Sustainable diets that maximise nutritional outcomes require that we rethink current production and commercial practices, manage resources and the food system responsibly and facilitate and support changes in dietary behaviours.

Recommendations and actions needed

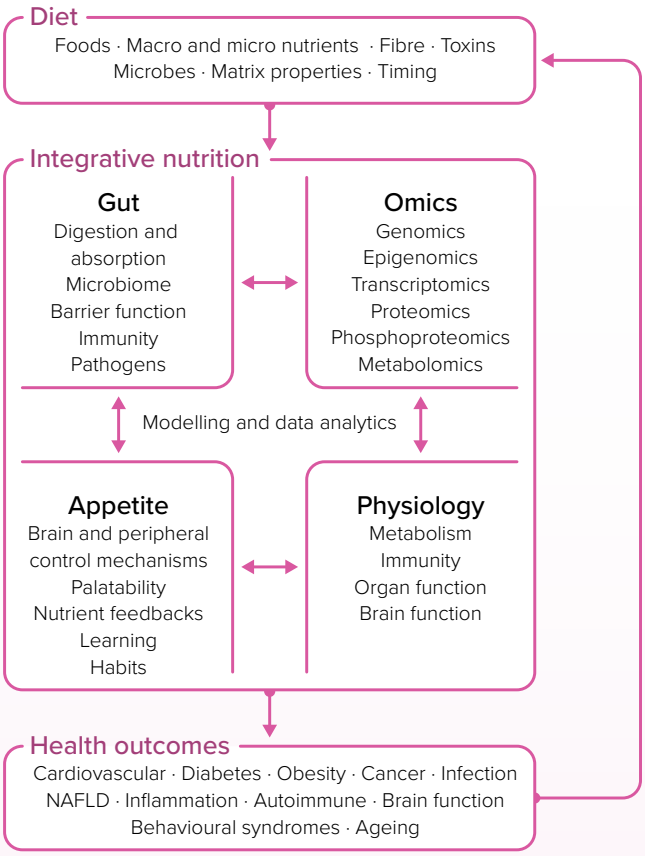
Recommendation 1: Identify the science of nutrition as a national research priority

Integrating expertise in biological, medical and other sciences would position Australia as a global leader in the nutrition mechanisms underpinning healthy diets and dietary routes to combating all the major non-communicable diseases. Moving away from a focus on single nutrients and commodities to consider the system interactions requires:

i. enhancing the profile of nutrition through increased National Health and Medical Research Council (NHMRC) and Australian Research Council (ARC) research funding success rates

ii. positioning the science of nutrition as a priority for the Medical Research Future Fund (MRFF)

iii. ensuring that fit-for-purpose conceptual and experimental frameworks, facilities, measurement tools and modelling capabilities are available.



The components and interrelationships that need to be integrated for a systems understanding of diet and health, which could be used to inform the design of food production and manufacturing systems to take account of health outcomes, equity, economic and environmental sustainability.

Recommendation 2: (a) Identify data collection approaches that can be connected to and analysed by a national capability for nutrition data; and (b) harness methods to analyse complex and diverse data using shared national facilities

Enhancing the efficiency of nutrition data collection, analysis and linkage across scales would enable new advances in the understanding of systems-level cause-and-effect mechanisms between diet, health and wellness. This requires integrating knowledge from a national nutrition data capability which includes datasets on food intake and health, wellness and biomarker outcomes with laboratory and controlled clinical trials.

Recommendation 3: Articulate the challenge of integrating across diverse physiologies to define program and project opportunities

Understanding the interaction of diet with human physiology and biochemistry would enable the role of nutrition in enhancing wellness and productivity to be clearly articulated, leading to advances in precision and personalised medicine as well as enhancing food production and manufacturing processes. This requires:

i. providing training to higher degree research students and early- and mid-career researchers in the science of nutrition to build human capacity

The Australian Blood lime is one in a range of hybrid limes developed by CSIRO Plant Industry for commercial cultivation. It is a hybrid produced by open pollination, from a cross between an Ellendale mandarin (a mandarin and orange hybrid) and a seedling form of the Australian finger lime (*Citrus australasica* var. *sanguinea*). CREDIT: CARL DAVIES / CSIRO / CC-BY-3.0

ii. ensuring that fit-for-purpose facilities, measurement tools and modelling capabilities are widely available.

Recommendation 4: (a) Plan and obtain support for measurement and communication of nutritional attributes of premium Australian foods; and (b) identify and realise opportunities for premium products (foods, meals, diets) of Australian origin

Establishing Australia as a leader in the science of nutrition would create a market advantage in the high-value foods export sector. Nutrition credentials ensure nutritional quality that can be tracked through the supply chain and clean/green production practices that can be leveraged to boost the agrifood sector.