Australian Government
Department of Health and Ageing
National Health and Medical Research Council

MINISTRY OF HEALTH
MANATŪ HAUORA

Nutrient Reference Values for Australia and New Zealand

Executive Summary

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HEALTH
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NUTRIENT REFERENCE VALUES FOR AUSTRALIA AND NEW ZEALAND

EXECUTIVE SUMMARY

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Publication Approval

Australian Government

National Health and Medical Research Council

2006 Nutrient Reference Values
These guidelines were endorsed by the Chief Executive Officer (CEO) of the National Health and Medical Research Council (NHMRC) on 9 September 2005, under Section 7(1)(a) of the National Health and Medical Research Council Act 1992. In endorsing these guidelines the NHMRC considers that they meet the NHMRC standard for clinical practice guidelines.

2017 Update: Fluoride and Sodium
Updates to the guideline recommendations for fluoride for 0-8 year olds and sodium for adults were approved by the CEO of the NHMRC on 21 November 2016 and 13 July 2017 respectively, under Section 14A of the National Health and Medical Research Council Act 1992. In approving these guidelines the NHMRC considers that they meet the NHMRC standard for clinical practice guidelines. Approval of the guideline recommendations will be reviewed for currency after five years.

NHMRC is satisfied that the guideline recommendations are systematically derived, based on the identification and synthesis of the best available scientific evidence, and developed for health professionals and practitioners practising in an Australian and New Zealand health care setting.

Disclaimer

This document is a general guide. The recommendations are for healthy people and may not meet the specific nutritional requirements of all individuals. They are designed to assist nutrition and health professionals assess the dietary requirements of individuals and groups and are based on the best information available at the date of compilation.

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Food and Nutrition Board: Institute of Medicine. *Dietary Reference Intakes for calcium, phosphorus, magnesium, vitamin D and fluoride*. Washington DC: National Academy Press, 1997.

Food and Nutrition Board: Institute of Medicine. *Dietary Reference Intakes for thiamin, riboflavin, niacin, vitamin B6, folate, vitamin B12, pantothenic acid, biotin, and choline*. Washington DC, National Academy Press, 1998.

Food and Nutrition Board: Institute of Medicine. *Dietary Reference Intakes. A risk assessment model for establishing upper intake level for nutrients*. Washington, DC: National Academy Press, 1998.

Food and Nutrition Board: Institute of Medicine. *Dietary Reference Intakes for vitamin C, vitamin E, selenium and carotenoids*. Washington, DC: National Academy Press, 2000.

Food and Nutrition Board: Institute of Medicine. *Dietary Reference Intakes. Applications in dietary assessment.* Washington, DC: National Academy Press, 2000.

Food and Nutrition Board: Institute of Medicine. *Dietary Reference Intakes for vitamin A, vitamin K, arsenic, boron, chromium, copper, iodine, iron, manganese, molybdenum, nickel, silicon, vanadium and zinc*. Washington, DC: National Academy Press, 2001.

Food and Nutrition Board: Institute of Medicine. *Dietary Reference Intakes for energy, carbohydrate, fiber, fat, fatty acids, cholesterol, protein and amino acids (macronutrients).* Washington, DC: National Academy Press, 2002.

Food and Nutrition Board: Institute of Medicine. *Dietary Reference Intakes for water, potassium, sodium, chloride and sulfate.* Panel on the dietary reference intakes for electrolytes and water. Washington, D.C: National Academy Press, 2004.

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TABLE OF UPDATES AND AMENDMENTS

Amendment Type	Amendment Detail	Date Updated	Version Number
Revision of fluoride NRVs as follows: • AI for children 0-8 years • UL for children 0-8 years Amendments to the resources across the NRV suite have been made to reflect the latest scientific evidence and recommendations.	NHMRC approved the revised NRV recommendations for fluoride on 21 November 2016 under Section 14A of the NHMRC Act 1992. The supporting material including the Methodological Framework, any literature reviews and evidence summaries are authored by the Australian Government Department of Health (formerly the Department of Health and Ageing) and the New Zealand Ministry of Health. The executive summary and full report are available in PDF from the NHMRC Guidelines and Publications Page.	March 2017	1.1
Revision of sodium NRVs as follows: • SDT for adults • UL for adults Amendments to the resources across the NRV suite have been made to reflect the latest scientific evidence and recommendations.	NHMRC approved the revised NRV recommendations for sodium on 13 July 2017 under Section 14A of the NHMRC Act 1992. The supporting material including the Methodological Framework, any literature reviews and evidence summaries are authored by the Australian Government Department of Health (formerly the Department of Health and Ageing) and the New Zealand Ministry of Health. The executive summary and full report are available in PDF from the NHMRC Guidelines and Publications Page.	September 2017	1.2

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PREFACE

The Australian and New Zealand Governments have been providing nutrition advice to the public for more than 75 years. This advice has included information on 'Recommended Dietary Intakes' (RDIs) or 'Allowances', which are the amounts of specific nutrients required on average on a daily basis for sustenance or avoidance of deficiency states. Advice has also been provided in the form of 'Dietary Guidelines', and culturally-relevant food and dietary patterns that will not only achieve sustenance, but also reduce the risk of chronic disease. The last revision of *Recommended Dietary Intakes for use in Australia* began in 1980 and was published in 1991 (NHMRC 1991). The reviews used as the source of information were published collectively in a book (Truswell et al 1990). The Australian recommendations were also later formally adopted by the New Zealand Ministry of Health for use in New Zealand.

In July 1997, a workshop of invited experts, including representatives from New Zealand, was held in Sydney to discuss the need for a revision of the 1991 NHMRC *Recommended Dietary Intakes for use in Australia*. Under the auspices of the Strategic Inter-governmental Nutrition Alliance (SIGNAL), a second workshop was held in July 1999 to scope the July 1997 recommendations and define the project parameters for the review. Amongst other considerations, it was agreed that:

- a joint Australia New Zealand RDI review should proceed as soon as possible;
- a set of reference values for each nutrient was required and the term 'Nutrient Reference Values' (NRVs) would be used to describe the set; and
- the review should build primarily upon concurrent work being undertaken in the United States and Canada, while also taking into consideration recommendations from the United Kingdom, Germany and the European Union, recent dietary survey data collected in Australia and New Zealand, scientific data and unique Australasian conditions.

At the time of the 1999 workshop, the joint US and Canadian revision had begun to release its recommendations as a series of Dietary Reference Intakes. The revision of most of the major minerals and vitamins was completed by 2001 and this round of revisions was completed by 2004.

Bearing in mind the progress with the joint US:Canada revisions and the high cost and time lines associated with de novo revisions of this kind, in 2001, the Commonwealth Department of Health and Ageing asked the National Health and Medical Research Council (NHMRC) to undertake a scoping study in relation to a potential revision of the Australian/New Zealand RDIs. The New Zealand Ministry of Health funded some initial work for the review process that provided expert input into the revision of the two key nutrients, iodine and selenium. The NHMRC was then commissioned in 2002 to manage the joint Australian/New Zealand revision process. An expert Working Party was appointed to oversee the process with representation from both Australia and New Zealand, including end users from the clinical and public health nutrition research sector, the food industry, the dietetics profession, the food legislative sector and the Australian and New Zealand governments. The current publication, its recommendations and its associated Appendix, are the result of that review process. The understanding of many aspects of good nutrition is by no means complete. Where expert judgement had to be applied, public health and safety were the priorities.

Consumption of food not only provides for the physiological needs of human life, but also contributes to our social and emotional needs. Consequently, it is possible to prescribe a diet that would meet the physiological needs of a group yet fail to meet the social or emotional needs of a significant percentage of that group. Whilst physiological needs are the primary determinant of NRVs, they are developed with consideration given to the other aspects of food intake.

Research has shown that a healthy diet containing adequate amounts of the various nutrients need not be a costly diet. This is discussed in more detail in the NHMRC's *Dietary Guidelines for Australian Adults* which, together with the *Dietary Guidelines for Children and Adolescents in Australia*, the *Dietary Guidelines for Older Australians* and the *New Zealand Food and Nutrition Guidelines for the ages and stages of the lifecycle*, are companion documents to this publication on NRVs. Together with the Australian Guides to Healthy Eating, the Dietary Guidelines translate the nutrient recommendations addressed in the current document into food and lifestyle patterns for the community. Revision of all of these documents is an ongoing process as the various sets of recommendations are closely interrelated.

These recommendations are for healthy people and may not meet the specific nutritional requirements of individuals with various diseases or conditions, pre-term infants, or people with specific genetic profiles. They are designed to assist nutrition and health professionals assess the dietary requirements of individuals and groups. They may also be used by public health nutritionists, food legislators and the food industry for dietary modelling and/or food labelling and food formulation.

Katrine Baghurst, June 2005
Chair of the Working Party
Editor

INTRODUCTION

WHAT ARE NUTRIENT REFERENCE VALUES?

In the 1991 *Recommended Dietary Intakes (RDI) for use in Australia* (NHMRC 1991) an RDI value, sometimes presented as a range, was developed for each nutrient. The RDI was defined as: "*the levels of intake of essential nutrients considered, in the judgement of the NHMRC, on the basis of available scientific knowledge, to be adequate to meet the known nutritional needs of practically all healthy people…they incorporate generous factors to accommodate variations in absorption and metabolism. They therefore apply to group needs. RDIs exceed the actual nutrient requirements of practically all healthy persons and are not synonymous with requirements.*"

Despite the emphasis on the population basis of the RDI, the RDIs were often misused in assessing dietary adequacy of individuals, or even foods, not only in Australia and New Zealand but also in many other countries. To overcome this misuse, many countries have moved to a system of reference values that retains the concept of the RDI while attempting to identify the average requirements needed by individuals. In 1991, the UK (Dept Health 1991) became the first country to develop a set of values for each nutrient. More recently, the Food and Nutrition Board: Institute of Medicine (FNB:IOM 1997, 1998a, 2000a, 2001, 2002, 2004) adopted a similar approach on behalf of the US and Canadian Governments.

After due consideration, the Working Party decided to adopt the approach of the US:Canadian Dietary Reference Intakes (DRIs) but vary some of the terminology, notably to retain the term 'Recommended Dietary Intake'.

Definitions adapted from the FNB:IOM DRI process

EAR **Estimated Average Requirement**

A daily nutrient level estimated to meet the requirements of half the healthy individuals in a particular life stage and gender group.

RDI **Recommended Dietary Intake**

The average daily dietary intake level that is sufficient to meet the nutrient requirements of nearly all (97–98 per cent) healthy individuals in a particular life stage and gender group.

AI **Adequate Intake (used when an RDI cannot be determined)**

The average daily nutrient intake level based on observed or experimentally-determined approximations or estimates of nutrient intake by a group (or groups) of apparently healthy people that are assumed to be adequate.

EER **Estimated Energy Requirement**

The average dietary energy intake that is predicted to maintain energy balance in a healthy adult of defined age, gender, weight, height and level of physical activity, consistent with good health. In children and pregnant and lactating women, the EER is taken to include the needs associated with the deposition of tissues or the secretion of milk at rates consistent with good health.

UL **Upper Level of Intake**

The highest average daily nutrient intake level likely to pose no adverse health effects to almost all individuals in the general population. As intake increases above the UL, the potential risk of adverse effects increases.

For each nutrient, an Estimated Average Requirement (EAR) was set from which an RDI could be derived. (Note that the US: Canadian terminology is 'Recommended Dietary Allowance', or 'RDA'). Whilst the various NRVs are expressed on a per day basis, they should apply to intakes assessed over a period of about 3 to 4 days. If the standard deviation (SD) of the EAR is available and the requirement for the nutrient is symmetrically distributed, the RDI is set at 2SD above the EAR. Such that

$RDI = EAR + 2SD_{EAR}$.

If data about variability in requirements are insufficient to calculate an SD (which is usually the case), a coefficient of variation (CV) is used. A CV of 10% for the EAR is assumed for nutrients unless available data indicate that greater variation is probable. The 10% is based on extensive data on variation in basal metabolic rate and protein requirements (FAO:WHO:UNA 1985, Garby & Lammert 1984, Elia 1992).

If 10% is assumed to be the CV, then twice that amount added to the EAR is defined as equal to the RDI. Thus for a CV of 10%, the RDI would be 1.2 x EAR; for a CV of 15% it would be 1.3 x EAR and for a CV of 20% it would be 1.4 x EAR.

Where evidence was insufficient or too conflicting to establish an EAR (and thus an RDI) an Adequate Intake (AI) was set, either on experimental evidence or by adopting the most recently available population median intake and assuming that the Australian/New Zealand populations were not deficient for that particular nutrient. Both the RDI and AI can be used as a goal for individual intake, but there is less certainty about the AI value as it depends to a greater degree on judgement. An AI might deviate significantly from and be numerically higher than an RDI if the RDI could be determined. Thus AIs should be interpreted with greater caution.

Where AIs were based on median population intakes, these were derived from a re-analysis of the complete databases of the National Nutrition Surveys of Australia, 1995 (Australian Bureau of Statistics 1998) and New Zealand 1991, 1997, 2002 (LINZ Activity and Health Research Unit 1992, Ministry of Health 1999, 2003) using the appropriate age bands. The two-day adjusted data were used for the estimates.

For infants of 0 to 6 months, all recommendations are in the form of Adequate Intakes based on the composition of breast milk from healthy mothers, using a standard milk volume. The bioavailability of nutrients in formulas may vary from that in breast milk, so formula-fed babies may need higher nutrient intakes. As formulas can vary in the chemical form and source of the nutrients, it is not possible to develop a single reference value for all formula-fed infants.

For energy, an Estimated Energy Requirement (EER) was set for a range of activity levels for individuals of a specified age, gender and body size.

For each nutrient, an Upper Level of Intake (UL) was set, which, unless otherwise stated, includes intake from all sources including foods, nutrients added to foods, pills, capsules or medicines. The UL is the highest average daily nutrient intake level likely to pose no adverse health effects to almost all individuals in the general population. In setting the UL, any adverse health effects were considered, including those on chronic disease status. The UL is not a recommended level of intake. It is based on a risk assessment of nutrients that involves establishment of a No Observed Adverse Effect Level (NOAEL) and/or a Lowest Observed Adverse Effect Level (LOAEL) and application of an Uncertainty Factor (UF) related to the evidence base and severity of potential adverse effects. Members of the general population should be advised not to routinely exceed the UL. Intakes above the UL may be appropriate for some nutrients for investigation in well-controlled clinical trials as long as signed informed consent is given and as long as the trials employ appropriate safety monitoring of trial subjects. Readers are referred to the relevant FNB:IOM documents and the report of the UK Expert Group on Vitamins and Minerals (2003) for more details about the potential toxicological effects of high intakes of nutrients. In Australia, vitamin and mineral supplements are regulated under the Therapeutic Goods Act (1989) that also sets some standards for these products. In New Zealand, dietary supplements are generally regulated under the New Zealand Dietary Supplements Regulations (New Zealand Government 1985), but supplements with nutrients at higher/pharmacological doses than the specified maximum daily doses need to meet the requirements of the Medicines Regulations (1984).

Further details of the approach used in setting ULs are given in the FNB:IOM publication *Dietary Reference Intakes. A risk assessment model for establishing upper intake levels for nutrients* (1998b) and in the relevant nutrient chapters of the DRI publications.

The uses of the various NRVs are summarised in the table below that was adapted from the FNB:IOM (2000b) publication, *Dietary Reference Intakes. Applications in Dietary Assessment*. This document also provides further details of potential applications.

Nutrient Reference Value	For individuals:	For groups:
Estimated Average Requirement (EAR)	Use to examine the probability that usual intake is inadequate	Use to estimate the prevalence of inadequate intakes within a group
Recommended Dietary Intake (RDI)	Usual intake at or above this level has a low probability of inadequacy	Do not use to assess intakes of groups
Adequate Intake (AI)	Usual intake at or above this level has a low probability of inadequacy. When the AI is based on median intakes of healthy populations, this assessment is made with less confidence	Mean usual intake at or above this level implies a low prevalence of inadequate intakes. When the AI is based on median intakes of healthy populations, this assessment is made with less confidence
Upper Level of Intake (UL)	Usual intake above this level may place an individual at risk of adverse effects from excessive nutrient intake	Use to estimate the percentage of the population at potential risk of adverse effects from excessive nutrient intake

In contrast to the US:Canadian approach, the Working Party agreed to retain the traditional concept of adequate physiological or metabolic function and/or avoidance of deficiency states as the prime reference point for establishing the EAR and RDIs and to deal separately with the issue of chronic disease prevention. It was felt that assessing nutrient needs for chronic disease prevention in a quantitative manner was still problematical. Research findings related to chronic disease prevention often relate to nutrient mixes or food intake patterns, rather than the intake of individual nutrients.

To address the issue of chronic disease prevention, two additional sets of reference values were developed for selected nutrients for which sufficient evidence existed. The set dealing with the macronutrients was adapted from the work of the FNB:IOM DRI review of macronutrients (2002) and is called the Acceptable Macronutrient Distribution Range (AMDR). The second set of reference values was termed Suggested Dietary Targets (SDTs). These related to nutrients for which there was a reasonable body of evidence of a potential chronic disease preventive effect at levels substantially higher than the EAR and RDI or AI. As the evidence base for chronic disease prevention is mainly derived from studies and health outcomes in adults, these AMDRs and SDTs apply only to adults and adolescents of 14 years and over.

AMDR: Acceptable Macronutrient Distribution Range
The AMDR is an estimate of the range of intake for each macronutrient for individuals (expressed as per cent contribution to energy), which would allow for an adequate intake of all the other nutrients whilst maximising general health outcome.

SDT: Suggested Dietary Target
A daily average intake from food and beverages for certain nutrients that that may help in prevention of chronic disease. Average intake may be based on the mean or median depending on the nutrient and available data.

THE NUTRIENTS REVIEWED

Having considered emerging evidence on the connections between diet and health and the recent recommendations from other countries, the preliminary workshops identified more than 40 nutrients for the Working Party to consider. The document *Recommended Dietary Intakes for use in Australia* (NHMRC 1991), which had also been adopted for use in New Zealand, contained recommendations for 19 nutrients and dietary energy. During this review, dietary energy requirements and requirements for the nutrients were considered. Those for which values were set are listed below:

Macronutrients	Vitamins	Minerals & trace elements
Energy	Vitamin A	Calcium
Protein	Thiamin	Chromium
Fat (for infants only)	Riboflavin	Copper
n-6 fatty acids (linoleic)	Niacin	Fluoride *(revised 2017)*
n-3 fatty acids (α-linolenic)	Vitamin B_6	Iodine
LC n-3 fatty acids (omega-3	Vitamin B_{12}	Iron
fats, DHA, DPA, EPA)	Folate	Magnesium
Carbohydrate (for infants only)	Pantothenic acid	Manganese
Dietary fibre	Biotin	Molybdenum
Water	Choline	Phosphorus
	Vitamin C	Potassium
	Vitamin D	Selenium
	Vitamin E	Sodium *(revised 2017)*
	Vitamin K	Zinc

In addition to the nutrients listed above, the Working Party also reviewed the literature on total fat (for ages and life stages other than infancy), carbohydrate (for ages and life stages other than infancy), cholesterol, arsenic, boron, nickel, silicon and vanadium. For these nutrients or age bands and life stages, it was agreed that there was little or no evidence for their essentiality in humans. This was generally in line with the findings of the US:Canadian DRI review recommendations. However, the DRI reviews set upper limits for some of these nutrients (FNB:IOM 1998, 2001) and the reader is referred to these for information.

The reviews were based on assessment of the applicability of the recently developed US:Canadian Dietary Reference Intakes (FNB:IOM 1997, 1998a,b, 2000a,b, 2001, 2002, 2004) to Australia and New Zealand, with reference to recommendations from other countries such as the UK (1991, 2003), Germany:Austria:Switzerland (DACH recommendations 2002) and from key organisations such as the FAO:WHO (2001).

UPDATE 1.1 AND 1.2: REVISION OF FLUORIDE (2017) AND SODIUM (2017)

In 2011, the Department of Health, in consultation with the New Zealand Ministry of Health commissioned a scoping study for undertaking a review of the 2006 NRVs. This resulted in the development of the 2015 Methodological Framework to guide nutrient reviews. In order to test the Framework, three priority nutrients; fluoride, sodium and iodine, were chosen for review. The scope of the fluoride review was limited to the AI and UL for infants and young children while sodium was limited to the SDT and UL for adults.

The reviews were managed by the Australian Department of Health and the New Zealand Ministry of Health. NHMRC's guideline standards were followed to ensure the 2017 recommendations were developed to rigorous standards. Where the review recommendations have been completed and approved by the NHMRC, this document has been updated to include the revised values.

Further NRVs will be reviewed in an ongoing manner as resources allow. The Methodological Framework for the review of NRVs states criteria for triggering reviews of the NRVs, allowing for a responsive updating of targeted priority nutrients. Supporting materials including any literature reviews and evidence summaries will accompany each revision and detail the processes for preparing NRVs.

REFERENCE BODY WEIGHTS

In developing the recommendations it was necessary to standardise body weights for the various age/gender groups. Assessment of the data on measured body weights and heights for relevant age/gender categories from the most recent National Nutrition Survey of Australia, 1995 (ABS 1998) and New Zealand, 1997 and 2002 (MOH 1999, 2003) showed that the body weights were similar to those used in the earlier US:Canadian DRI publications. From the 2002 publication onwards, the US:Canadian DRI review panels changed their standard body weights in response to availability of new data showing markedly lighter body weights than previously used. As the most recent Australian/New Zealand data more closely resembled those in the earlier US:Canadian reports, these were adopted for use throughout these recommendations.

The standard body weights for all adults were based on that for 19–30 year olds, although body weight in most western populations tends to increase throughout adulthood because of increasing body fat.

Gender	Age	Reference body weight (kg)
Both	2–6 months	7*
Both	7–11 months	9*
Both	1–3 years	13*
Both	4–8 years	22*
Males	9–13 years	40
	14–18 years	64
	19+ years	76
Females	9–13 years	40
	14–18 years	57
	19+ years	61

* Update 1.1: Revision of Fluoride (2017)
The fluoride AI and UL for 0-8 year olds were updated in 2017. The following updated reference bodyweights were used when the NRVs were expressed in mg fluoride/day; 0-6 months 6 kg, 7-12 months 9 kg, 1-3 years 12 kg, 4-8 years 22 kg.

The most recent United States reference bodyweight data (IOM 2005) was used for infants and young children aged 1-3 years (mean bodyweight of 12 kg), as no suitable Australian and New Zealand data were available.

New reference bodyweight data was derived from the 2011-2012 Australian Health Survey (AHS) and the 2011-12 New Zealand Health Survey for Australian and New Zealand children aged 4-8 years (ABS 2014) and rounded up to the nearest whole number, resulting in a mean bodyweight of 22 kg for children aged 4-8 years.

EXTRAPOLATION PROCESSES

Experimental data are often only available for a limited age/gender group. The setting of recommendations for other groups may require extrapolation of the data. This is sometimes based on energy requirements, but more commonly on a metabolic body weight. In extrapolating data from one group to another, the processes and formulae used were those developed by the US:Canadian DRI panels unless otherwise indicated in the text.

Extrapolations from adult Estimated Average Requirements (EAR) to children's requirements were mostly done using the formula:

$$EAR_{child} = EAR_{adult} \times F$$

$$\text{where } F = (Weight_{child}/Weight_{adult})^{0.75} \times (1 + \text{growth factor}).$$

The growth factors used were 0.3 from 7 months to 3 years of age and 0.15 for 4–13 years of age for both genders. For boys aged 14–18 years, the growth factor used was 0.15 but for girls of this age, the growth factor was set at zero.

When extrapolating from the Adequate Intake (AI) for younger infants aged 0-6 months, to older infants aged 7-12 months, the formula used was:

$$AI_{7\text{–}12\ months} = AI_{0\text{–}6\ months} \times F$$

$$\text{where } F = (Weight_{7\text{–}12\ months}/Weight_{0\text{–}6\ months})^{0.75}$$

When estimating the Upper Level of Intake for children, the UL was extrapolated down from the adults UL using the formula:

$$UL_{child} = UL_{adult} \times (Weight_{child}/Weight_{adult})^{0.75}$$

This allows both body mass and metabolic differences between adults and children to be incorporated as necessary. More details can be found in the methodology sections of the US:Canadian FNB:IOM reports.

IMPLICATIONS

The implications for adoption of the 2006 revised NRVs include:

- The need to address ongoing education of both health and food industry professionals in the end use of the various reference values and related tools for their use.
- The need to update a number of documents and educational tools based on the previous RDIs, including:
  - The NHMRC Core Food Groups analysis (NHMRC 1994)
  - *The Australian Guide to Healthy Eating* and the *Dietary Guidelines for Australian Adults*, the *Australian Guidelines for Children and Adolescents in Australia* and the *Dietary Guidelines for Older Australians*
  - *The New Zealand Food and Nutrition Guidelines for the ages and stages of the lifecycle.*

In Australia, the Core Food Groups analysis addressed the translation of the nutrient recommendations into amounts of core foods (eg cereals, fruits and vegetables, meats, fish, poultry, dairy, fats and oils) required to meet these nutrient recommendations in Australia. These in turn were used as the basis for the development of the *Australian Guide to Healthy Eating* and the *Australian Dietary Guidelines for Adults*, the *Dietary Guidelines for Children and Adolescents in Australia* and the *Dietary Guidelines for Older Australians*.

New Zealand has Food and Nutrition Guidelines covering the ages and stages of the lifecycle. There are currently seven in the series including infants and toddlers (0–2 years), children (2–12 years), adolescents, pregnant women, breastfeeding women, adults and older people. These publications include a background paper for health professionals and an accompanying health education pamphlet for the public.

The interrelationships between these various recommendations and the underpinning evidence are shown in Figure 1.

- The need for regular monitoring of dietary intake and nutrient status in the population, including the use of fortified foods and supplements, to underpin the ongoing revisions of the NRVs, notably the Adequate Intake values which, by definition, are often based on population median dietary intakes.
- The need for research funds to enable more accurate assessment of requirements for both sustenance and prevention of chronic disease, including studies on issues such as biomarkers for nutritional status and nutrient bioavailability, and adverse effects of high intakes.
- The need to update and expand existing food databases for the analysis of national nutrition survey data, including information on the levels of fortification in foods.
- The need to change computerised dietary analysis programs that use the existing RDI values as reference values.
- The need for the redevelopment of relevant standards for the use of NRVs for food legislative purposes, including issues such as food labelling and food fortification.
- The need to consider the implications of changes in the NRVs for the food and dietary supplementation industry.

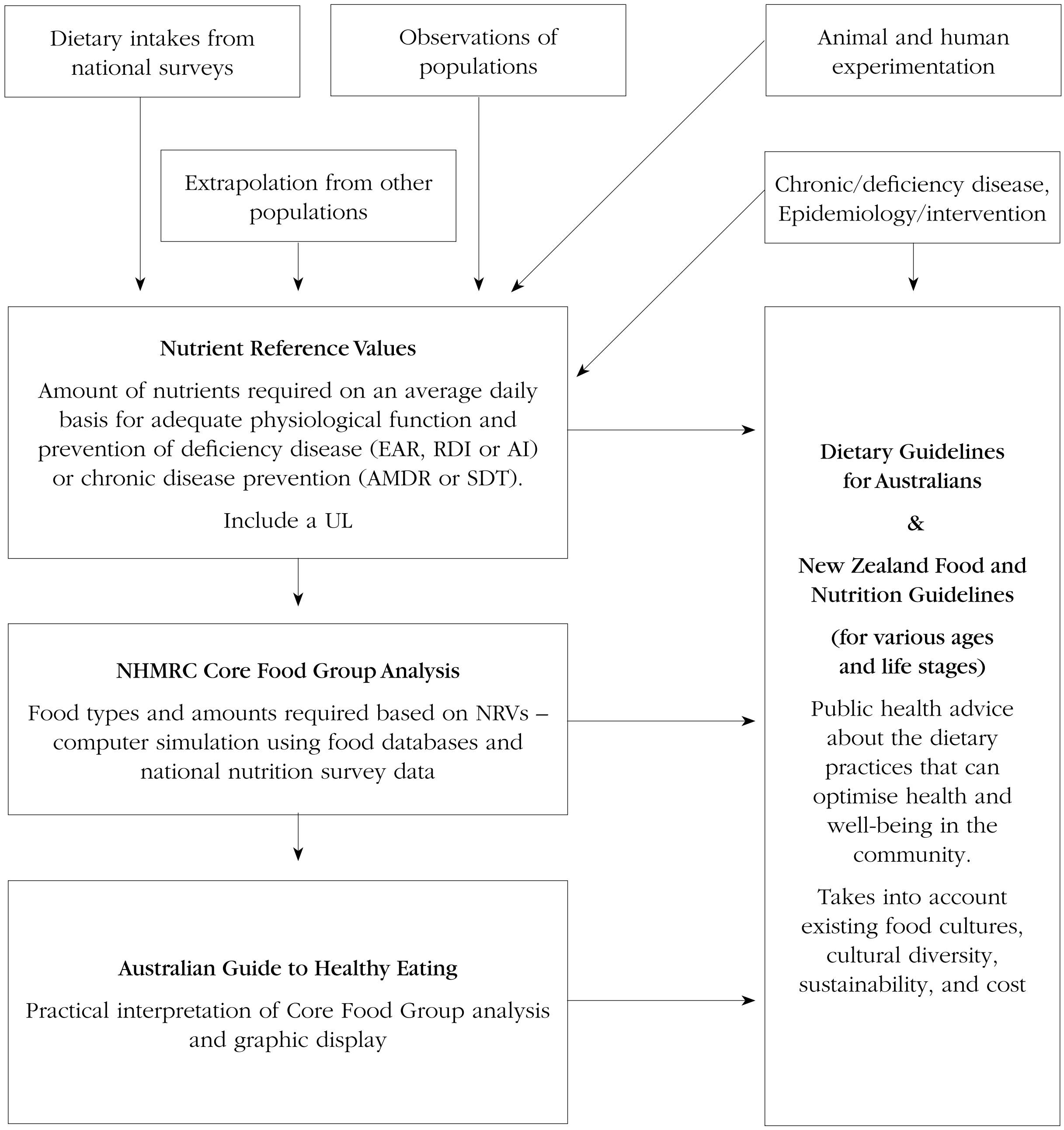

FIGURE 1. INTERRELATIONSHIPS BETWEEN THE EVIDENCE BASE, NRVS, CORE FOOD GROUP ANALYSIS, DIETARY AND FOOD GUIDELINES AND HEALTHY EATING GUIDES

WHAT ARE THE IMPLICATIONS OF CHANGES IN RECOMMENDATIONS FOR CERTAIN NUTRIENTS?

Consumption of a diet conforming to the NRVs need not, in itself, be more expensive for the individual (Baghurst 2003), however addressing the needs for implementation outlined above will involve ongoing costs that are difficult to quantify. The financial expense associated with inadequate nutrition in the community is likely to far outweigh that of implementing the necessary changes. Crowley et al (1992) have estimated the economic cost of diet-related disease in Australia in terms of both direct health care (hospitals, medical expenses, allied health professional services, pharmaceutical expenses and nursing homes) attributable to diet and indirect costs (due to sick leave and the net present value of forgone earnings due to premature death). The estimate of direct costs, excluding consideration of alcohol, was $1,432 million and that for indirect, $605 million, giving a total of $2,037 million for 1989–1990.

The RDI for some nutrients has substantially increased from that in the previous edition due to the availability of new data or changes in the way needs are assessed. In the past, needs at the individual level were often assessed in the practical situation by reference to 70% RDI in the absence of a specific EAR value. The NHMRC Core Food Group assessment, which is the basis for the *Australian Guide to Healthy Eating*, was also modelled on 70% RDI. In the background papers to the previous RDIs (Truswell et al 1990), figures called Lower Diagnostic Levels were given for some nutrients, but these were not officially adopted. They were used to derive the previous RDIs with 'generous factors' to accommodate variation in absorption and metabolism. They were therefore not used in practice. The existence of a specific EAR in the current NRVs overcomes the need to extrapolate from the RDI when attempting to assess adequacy of individual diets.

The new RDI for iron in young women of 18 mg/day appears to have increased from the previous RDI (12–16 mg/day), however the EAR for this group (of 8 mg/day) is actually less than 70% of the old RDI of 8.4–11.2 mg/day. This reflects the very high variability in iron requirements in this group because of variability in menstrual loss. Thus if 70% RDI had been used in the past as a benchmark for assessing the needs of individuals, the apparent requirement would likely have decreased somewhat. For pregnant women, 70% of the old RDI was 15.4–29.0 mg/day whilst the new EAR is 22.0 mg/day. For lactation, 70% of the old RDI was 8.4–11.2 mg/day but the new EAR is 6.5 mg/day.

In the case of zinc, another nutrient known to be borderline for adequacy in the community, the estimate of average needs for men has risen from 8.4 mg/day (70% old RDI) to 12 mg/day (EAR) but that for women has fallen from 8.4 mg/day (70% old RDI) to 6.5 mg/day, partly due to recognition that absorptive capacity for zinc varies across the genders and that men have significant losses in semen.

The EAR is well above 70% of the previous RDI for other nutrients, including the B vitamins thiamin, niacin, riboflavin, vitamin B_6 and B_{12}, calcium and magnesium, which are all about 50% higher, and folate, which is about 100% higher, than 70% of the respective old RDIs. The increase in the B vitamin reference values reflects the ways they were set in the earlier version. In the 1981–1989 RDIs, the values for B vitamins were generally set in relation to energy needs for thiamin, riboflavin and niacin or protein needs for vitamin B_6. Energy and protein needs were, in turn, set on figures recommended at that time by the FAO:WHO. The EARs for B vitamins in the current reference values were set using the results of metabolic studies with specific biochemical endpoints in blood, tissues or urine related to potential deficiency states, or depletion-repletion studies.

For folate, the higher RDI marks a return to the RDI that was in place in Australia before the 1981–1989 revision, when it was lowered from 400 µg to 200 µg/day on the basis that the amount of absorbed folate required to treat or fully prevent deficiency disease was 100 µg/day, that the average absorption from food was 50% and that average total folate consumption in Britain and North America at that time was about 200 µg/day. Other countries such as the US and Germany had an RDI of 400 µg at that time (although they later reduced it) as they felt that the availability of folate was between 25% and 50% and that 100–200 µg absorbed folate/day were needed.

The new Australian/NZ RDI for folate is based on the current recommendations from the US and Canada and new data on dietary intake in relation to maintenance of plasma folate, erythrocyte folate and homocysteine levels that suggest a need for about 300 µg/day. The folate RDI is expressed in terms of dietary folate equivalents in recognition of the difference in bioavailability between food folate and folic acid. The latter, which is the form used for supplements and fortification of foods, is twice as well absorbed as food folate.

In relation to calcium, the difference between the old and new RDIs relates almost entirely to the recognition that losses through sweat of some 60 mg/day were not accounted for in previous estimates. The additional intake required to account for the decrease in absorption of calcium with increased intake is 320 mg.

In the case of magnesium, the new EARs and RDIs were based on maintenance of whole body magnesium over time from balance studies mostly published since the last Australian/New Zealand RDIs were set. Recent studies of people on total parenteral nutrition that indicated lower needs than earlier balance studies were also considered. In the background paper for the earlier magnesium RDI for Australia, Dreosti stated "more, conventional magnesium balance studies are necessary at this stage in order to resolve the question of requirements" (Truswell et al 1990).

Thus, the increased requirements for some nutrients since the previous revision are based on data not available at the time or on a different approach to assessing needs. This outcome may appear to imply that people need to consume more food at a time when obesity is a major public health problem in the community. However, achievement of the new RDIs requires the consumption of different types of foods, not the consumption of more food. If energy-dense, nutrient-poor foods and drinks are replaced with plenty of vegetables, fruits and wholegrain cereals, moderate amounts of lean meats, fish, poultry and reduced fat dairy foods and small amounts of polyunsaturated or monounsaturated fats and oils as well as plain water, then all the nutrients required can be obtained within energy requirements. It should be remembered also that increased levels of activity make dietary choices more flexible and have the benefits of assisting in the maintenance of acceptable body weight and reducing a range of chronic diseases.

REFERENCES

Australian Bureau of Statistics: Commonwealth Department of Health and Aged Care. *National Nutrition Survey. Nutrient intakes and physical measurements*. Australia, 1995. Canberra: Australian Bureau of Statistics, 1998.

Australia New Zealand Food Authority. *Review of health and related claims. Full assessment report. Proposal P153 and pilot for management framework for health claims. Draft enquiry report proposal 170*. Canberra: ANZFA, 2000.

Baghurst KI. Social status, nutrition and the cost of healthy eating. In eds Baghurst KI, Binns C. *Dietary Guidelines for Australian Adults*. Canberra: National Health & Medical Research Council, 2003. Pp 265–70.

Codex Alimentarius Commission. Joint FAO:WHO Food Standards Program. Codex Committee on Nutrition and Foods for Special Dietary Uses. 22nd Session. *Discussion paper on the scientific criteria for health related claims*. Berlin, Germany: Codex Alimentarius Commission, 2000.

Crowley SJ, Antioch K, Carter R, Waters AM, Conway L, Mathers C. *The cost of diet-related disease in Australia*. Canberra: AIHW, 1992.

Department of Health. *Dietary reference values for food energy and nutrients in the United Kingdom*. Report of the panel on Dietary Reference Values of the Committee on Medical Aspects of Food Policy. London: HMSO, 1991.

Elia M. Energy expenditure and the whole body. In Kinney JM, Tucker HM, eds. *Energy metabolism: tissue determinants and cellular corollaries*. New York; Raven Press,1992. Pp19–59.

Expert Group on Vitamins and Minerals. *Safe upper levels for vitamins and minerals.* London: Food Standards Agency, 2003.

FAO:WHO. *Human vitamin and mineral requirements. Report of a joint FAO:WHO expert consultation. Bangkok, Thailand*. Rome: FAO, 2001.

Flight I, Baghurst KI. *Systematic review of the evidence for calcium nutrient reference values. A report prepared for the Australian Nutrition Trust.* Adelaide: CSIRO Health Sciences & Nutrition, 2003a.

Flight I, Baghurst KI. *Systematic review of the evidence for selenium nutrient reference values. A report prepared for the Australian Nutrition Trust.* Adelaide: CSIRO Health Sciences & Nutrition, 2003b.

Flight I, Baghurst KI. *Systematic review of the evidence for vitamin D nutrient reference values. A report prepared for the Australian Nutrition Trust.* Adelaide: CSIRO Health Sciences & Nutrition, 2003c.

Food and Agricultural Organization: World Health Organization: United Nations. *Energy and protein requirements. Report of a joint FAO/WHO/UMA Expert Consultation*. Technical Report Series No. 724. Geneva:World Health Organization, 1985.

Food and Nutrition Board: Institute of Medicine. *Dietary Reference Intakes for calcium, phosphorus, magnesium, vitamin D and fluoride*. Washington DC: National Academy Press, 1997.

Food and Nutrition Board: Institute of Medicine. *Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B6, Folate, Vitamin B12, Pantothenic Acid, Biotin, and Choline*. Washington DC, National Academy Press, 1998a.

Food and Nutrition Board: Institute of Medicine. *Dietary Reference Intakes. A risk assessment model for establishing upper intake level for nutrients*. Washington, DC: National Academy Press, 1998b.

Food and Nutrition Board: Institute of Medicine. *Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium and Carotenoids*. Washington, DC: National Academy Press, 2000a.

Food and Nutrition Board: Institute of Medicine. *Dietary Reference Intakes. Applications in dietary assessment*. Washington, DC: National Academy Press, 2000b.

Food and Nutrition Board: Institute of Medicine. *Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, manganese, Molybdenum, Nickel, Silicon, Vanadium and Zinc*. Washington, DC: National Academy Press, 2001.

Food and Nutrition Board: Institute of Medicine. *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein and Amino Acids (Macronutrients).* Washington, DC: National Academy Press, 2002.

Food and Nutrition Board: Institute of Medicine. *Dietary Reference Intakes for water, potassium, sodium, chloride and sulfate.* Panel on the dietary reference intakes for electrolytes and water. Washington, D.C: National Academy Press, 2004.

Garby L, Lammert O. Within-subjects and between-days-and-weeks variation in energy expenditure at rest. *Hum Nutr Clin Nutr* 1984;38:395–7.

German Nutrition Society: Austrian Nutrition Society; Swiss Society for Nutrition Research: Swiss Nutrition Association. *Reference values for nutrient intake.* Frankfurt/Main:Umschau/Braus: German Nutrition Society, 2001.

LINZ Activity and Health Research Unit. *Twenty four hour diet recall: nutrient analysis based on 1992 DSIR database*. Dunedin, New Zealand: University of Otago, 1992.

Ministry of Health. *NZ food: NZ People. Key results of the 1997 National Nutrition Survey.* Wellington: Ministry of Health, 1999.

Ministry of Health. *NZ Food NZ Children. Key results of the 2002 National Children's Nutrition Survey.* Wellington: Ministry of Health, 2003.

National Health and Medical Research Council. *A Guide to the Development, Implementation and Evaluation of Clinical Practice Guidelines*. Canberra: NHMRC, 1999.

National Health and Medical Research Council. *The Core Food Groups. The scientific basis for developing nutrition education tools*. Canberra: NHMRC, 1994. Rescinded 22/9/2000

National Health and Medical Research Council. *Recommended Dietary Intakes for use in Australia*. Canberra: NHMRC, 1991.

New Zealand Government. *New Zealand Dietary Supplements Regulations, 198*5. Wellington: Government Print, 1985.

Therapeutic Goods Administration, Commonwealth Department of Health and Ageing. *Therapeutics Goods Act*. Canberra: Commonwealth Government Department of Health and Ageing, 1989.

Thomson CD, Patterson E. *Australian and New Zealand Nutrient reference values for selenium. A report prepared for the Ministry of Health*. Dunedin: University of Otago, 2001.

Thomson CD. *Australian and New Zealand Nutrient Reference Values for iodine. A report prepared for the Ministry of Health*. Dunedin: University of Otago, 2002.

Truswell A. Levels and kinds of evidence for public-health nutrition. *Lancet* 2001;357:1061–2.

Truswell AS, Dreosti IE, English RM, Rutishauser IHE, Palmer N, eds. *Recommended Nutrient Intakes. Australian papers*. Sydney: Australian Professional Publications, 1990.

United States Food and Drug Administration. Food Advisory Committee Working Group. *Interpretation of significant scientific agreement in the review of health claims*. Washington, DC: US FDA, 1999.

Note: All the FNB:IOM Dietary Reference Intake publications can be accessed on line through the website of the National Academy Press at http://www.nap.edu

SUMMARY TABLES FOR ENERGY REQUIREMENTS ACROSS AGES AND GENDERS

TABLE 1. ESTIMATED ENERGY REQUIREMENTS (EERs) OF INFANTS AND YOUNG CHILDREN

Age (months)	Reference weight (kg)		EER (kJ/day)	
	Boys	Girls	Boys	Girls
1	4.4	4.2	2,000	1,800
2	5.3	4.9	2,400	2,100
3	6.0	5.5	2,400	2,200
4	6.7	6.1	2,400	2,200
5	7.3	6.7	2,500	2,300
6	7.9	7.2	2,700	2,500
7	8.4	7.7	2,800	2,500
8	8.9	8.1	3,000	2,700
9	9.3	8.5	3,100	2,800
10	9.7	8.9	3,300	3,000
11	10.0	9.2	3,400	3,100
12	10.3	9.5	3,500	3,200
15	11.1	10.3	3,800	3,500
18	11.7	11.0	4,000	3,800
21	12.2	11.6	4,200	4,000
24	12.7	12.1	4,400	4,200

Adapted from FNB:IOM (2002). Reference weights from Kuczmarski et al (2000)

TABLE 2. ESTIMATED ENERGY REQUIREMENTS (EERs) FOR CHILDREN AND ADOLESCENTS USING BMR PREDICTED FROM WEIGHT, HEIGHT AND AGE

Age Guide[a] Years	Reference weight[b] kg	Reference height m	BMR[c] MJ/day	PAL 1.2[d] Bed rest	PAL 1.4[d] Very sedentary	PAL 1.6[d] Light	PAL 1.8[d] Moderate	PAL 2.0[d] Heavy	PAL 2.2[d] Vigorous
Boys									
3	14.3	0.95	3.4	4.2	4.9	5.6	6.3	6.9	7.6
4	16.2	1.02	3.6	4.4	5.2	5.9	6.6	7.3	8.1
5	18.4	1.09	3.8	4.7	5.5	6.2	7.0	7.8	8.5
6	20.7	1.15	4.1	5.0	5.8	6.6	7.4	8.2	9.0
7	23.1	1.22	4.3	5.2	6.1	7.0	7.8	8.7	9.5
8	25.6	1.28	4.5	5.5	6.4	7.3	8.2	9.2	10.1
9	28.6	1.34	4.8	5.9	6.8	7.8	8.8	9.7	10.7
10	31.9	1.39	5.1	6.3	7.3	8.3	9.3	10.4	11.4
11	35.9	1.44	5.4	6.6	7.7	8.8	9.9	11.0	12.0
12	40.5	1.49	5.8	7.0	8.2	9.3	10.5	11.6	12.8
13	45.6	1.56	6.2	7.5	8.7	10.0	11.2	12.4	13.6
14	51.0	1.64	6.6	8.0	9.3	10.6	11.9	13.2	14.6
15	56.3	1.70	7.0	8.5	9.9	11.2	12.6	14.0	15.4
16	60.9	1.74	7.3	8.9	10.3	11.8	13.2	14.7	16.2
17	64.6	1.75	7.6	9.2	10.7	12.2	13.7	15.2	16.7
18	67.2	1.76	7.7	9.4	10.9	12.5	14.0	15.6	17.1

(Continued)

a The height and/or weight to age ratio may differ markedly in some ethnic groups. In this case, if BMI is in the acceptable range, it would be more relevant to use body weight as the main guide to current energy needs

b Reference weights from Kuczmarski et al (2000). See also FNB:IOM (2002)

c Estimated using Schofield (1985) equations for weight, height and age group 3–10, 10–18.

d PALs (Physical Activity Levels) incorporate relevant growth factor for age

TABLE 2. (CONT'D) ESTIMATED ENERGY REQUIREMENTS (EERs) FOR CHILDREN AND ADOLESCENTS USING BMR PREDICTED FROM WEIGHT, HEIGHT AND AGE

Age Guide[a] Years	Reference weight[b] kg	Reference height m	BMR[c] MJ/day	PAL 1.2[d] Bed rest	PAL 1.4[d] Very sedentary	PAL 1.6[d] Light	PAL 1.8[d] Moderate	PAL 2.0[d] Heavy	PAL 2.2[d] Vigorous
Girls									
3	13.9	0.94	3.2	3.9	4.5	5.3	5.8	6.4	7.1
4	15.8	1.01	3.4	4.1	4.8	5.5	6.1	6.8	7.5
5	17.9	1.08	3.6	4.4	5.1	5.7	6.5	7.2	7.9
6	20.2	1.15	3.8	4.6	5.4	6.1	6.9	7.6	8.4
7	22.8	1.21	4.0	4.9	5.7	6.5	7.3	8.1	8.9
8	25.6	1.28	4.2	5.2	6.0	6.9	7.7	8.6	9.4
9	29.0	1.33	4.5	5.5	6.4	7.3	8.2	9.1	10.0
10	32.9	1.38	4.7	5.7	6.7	7.6	8.5	9.5	10.4
11	37.2	1.44	4.9	6.0	7.0	8.0	9.0	10.0	11.0
12	41.6	1.51	5.2	6.4	7.4	8.5	9.5	10.6	11.6
13	45.8	1.57	5.5	6.7	7.8	8.9	10.0	11.1	12.2
14	49.4	1.60	5.7	6.9	8.1	9.2	10.3	11.5	12.6
15	52.0	1.62	5.8	7.1	8.2	9.4	10.6	11.7	12.9
16	53.9	1.63	5.9	7.2	8.4	9.5	10.7	11.9	13.1
17	55.1	1.63	5.9	7.2	8.4	9.6	10.8	12.0	13.2
18	56.2	1.63	6.0	7.3	8.5	9.7	10.9	12.1	13.3

a The height and/or weight to age ratio may differ markedly in some ethnic groups. In this case, if BMI is in the acceptable range, it would be more relevant to use body weight as the main guide to current energy needs

b Reference weights from Kuczmarski et al (2000). See also FNB:IOM (2002)

c Estimated using Schofield (1985) equations for weight, height and age group 3–10, 10–18.

d PALs (Physical Activity Levels) incorporate relevant growth factor for age

TABLE 3. ESTIMATED ENERGY REQUIREMENTS OF ADULTS USING PREDICTED BMR X PAL

Age yr	BMI = 22.0[a]		BMR MJ/d	Physical activity level (PAL)[b] Males MJ/day						BMR MJ/d	Physical activity level (PAL)[b] Females MJ/day					
	Ht (m)	Wt (kg)	Male	1.2	1.4	1.6	1.8	2.0	2.2	Female	1.2	1.4	1.6	1.8	2.0	2.2
19-30	1.5	49.5	–	–	–	–	–	–	–	5.2	6.1	7.1	8.2	9.2	10.2	11.2
	1.6	56.3	6.4	7.7	9.0	10.3	11.6	12.9	14.2	5.6	6.6	7.7	8.8	9.9	11.1	12.2
	1.7	63.6	6.9	8.3	9.7	11.0	12.4	13.8	15.2	6.0	7.2	8.4	9.6	10.8	12.0	13.2
	1.8	71.3	7.4	8.9	10.3	11.8	13.3	14.8	16.3	6.5	7.7	9.0	10.3	11.6	12.9	14.2
	1.9	79.4	7.9	9.5	11.1	12.6	14.2	15.8	17.4	7.0	8.4	9.7	11.1	12.5	13.9	15.3
	2.0	88.0	8.4	10.1	11.8	13.5	15.2	16.9	18.6	–	–	–	–	–	–	–
31-50	1.5	49.5	–	–	–	–	–	–	–	5.2	6.3	7.3	8.4	9.4	10.4	11.5
	1.6	56.3	6.4	7.6	8.9	10.2	11.4	12.7	14.0	5.5	6.5	7.6	8.7	9.8	10.9	12.0
	1.7	63.6	6.7	8.0	9.4	10.7	12.1	13.4	14.8	5.7	6.8	8.0	9.1	10.3	11.4	12.5
	1.8	71.3	7.1	8.5	9.9	11.3	12.7	14.2	15.6	6.0	7.2	8.3	9.5	10.7	11.9	13.1
	1.9	79.4	7.5	9.0	10.4	11.9	13.4	14.9	16.4	6.2	7.5	8.7	10.0	11.2	12.5	13.7
	2.0	88.0	7.9	9.5	11.0	12.6	14.2	15.8	17.3	–	–	–	–	–	–	–
51-70	1.5	49.5	–	–	–	–	–	–	–	4.9	6.0	6.9	7.9	8.9	9.8	10.9
	1.6	56.3	5.8	7.0	8.2	9.3	10.4	11.5	12.7	5.2	6.2	7.3	8.3	9.3	10.4	11.4
	1.7	63.6	6.1	7.3	8.6	9.8	11.1	12.3	13.6	5.4	6.5	7.6	8.7	9.8	10.7	12.0
	1.8	71.3	6.5	7.8	9.1	10.4	11.7	13.1	14.4	5.7	6.9	8.0	9.1	10.3	11.4	12.6
	1.9	79.4	6.9	8.3	9.6	11.1	12.4	13.8	15.2	6.0	7.2	8.4	9.6	10.8	12.0	13.2
	2.0	88.0	7.3	8.8	10.2	11.7	13.2	14.7	16.1	–	–	–	–	–	–	–
>70	1.5	49.5	–	–	–	–	–	–	–	4.6	5.6	6.5	7.4	8.3	9.3	10.2
	1.6	56.3	5.2	6.3	7.3	8.3	9.4	10.4	11.5	4.9	5.9	6.9	7.8	8.8	9.8	10.8
	1.7	63.6	5.6	6.7	7.8	8.9	10.0	11.2	12.3	5.2	6.2	7.2	8.3	9.3	10.3	11.4
	1.8	71.3	6.0	7.1	8.3	9.5	10.7	11.9	13.1	5.5	6.6	7.7	8.7	9.8	10.9	12.0
	1.9	79.4	6.4	7.6	8.9	10.2	11.4	12.7	14.0	5.8	6.9	8.1	9.2	10.4	11.5	12.7
	2.0	88.0	6.8	8.1	9.5	10.8	12.2	13.5	14.9	–	–	–	–	–	–	–

a A BMI of 22.0 is approximately the mid point of the WHO (1998) healthy weight range (BMI 18.5–24.9)

b Physical activity level (PAL) of 1.2 (bed rest) to 2.2 (very active or heavy occupational work).

PALs of 1.75 and above are consistent with good health. PALs below 1.4 are not compatible with moving around freely or earning a living. PALs above 2.5 are difficult to maintain for long periods.

Note: the original Schofield equations from which these tables were derived (Schofield 1985) used 60+ years as the upper age category. For people aged 51–70 years, the estimates were derived by averaging those for the adults (31–50 years) and older (>70 years) adults.

SUMMARY OF NUTRIENT REQUIREMENTS ACROSS AGES AND GENDERS

TABLE 4. NUTRIENT REFERENCE VALUES FOR AUSTRALIA AND NEW ZEALAND: MACRONUTRIENTS AND WATER

Age group & gender		Protein g/day			Dietary fats[a] Linoleic (n-6) g/day		Dietary fats[a] α-linolenic (n-3) g/day		Dietary fats[a] LC n-3 (DHA/EPA/DPA) mg/day		Carbohydrate g/day		Dietary fibre g/day		Total water[b] (figure in brackets is fluid component only) L/day	
		AI		*UL*	*AI*	*UL*	*AI*	*UL*	*AI*	*UL*	*AI*	*UL*	*AI*	*UL*	*AI*	*UL*
Infants[c]	**0–6 mo**	10		BM	4.4	BM	0.5[a]	BM	–	NP	60	BM	NP	NP	0.7 (0.7)	NP
	7–12 mo	14		BF	4.6	BF	0.5[a]	BF	–	NP	95	BF	NP	NP	0.8 (0.6)	NP
		EAR	*RDI*	*UL*												
Children	**1–3 yr**	12	14	NP	5	NP	0.5	NP	40	3,000	NO AI OR UL SET FOR OTHER AGES AS DATA ON ESSENTIALITY ARE INSUFFICIENT		14	NP	1.4 (1.0)	NP
	4–8 yr	16	20	NP	8	NP	0.8	NP	55	3,000			18	NP	1.6 (1.2)	NP
Boys	**9–13 yr**	31	40	NP	10	NP	1.0	NP	70	3,000			24	NP	2.2 (1.6)	NP
	14–18 yr	49	65	NP	12	NP	1.2	NP	125	3,000			28	NP	2.7 (1.9)	NP
Girls	**9–13 yr**	24	35	NP	8	NP	0.8	NP	70	3,000			20	NP	1.9 (1.4)	NP
	14–18 yr	35	45	NP	8	NP	0.8	NP	85	3,000			22	NP	2.2 (1.6)	NP

(Continued)

Abbreviations: AI adequate intake; BM, amount normally received from breast milk; B/F, amount in breast milk and food; EAR, estimated average requirement; RDI, recommended dietary intake; NP, not possible to set – may be insufficient evidence or no clear level for adverse effects; UL, Upper Level of Intake

a Recommendation for total n-6 and total n-3; total fat AI also set at 30–31 g/day for infants

b Total water includes water from foods and fluids

c AI recommendations for infants are based on amounts in breast milk

d In 2nd and 3rd trimesters only

TABLE 4. (CONT'D) NUTRIENT REFERENCE VALUES FOR AUSTRALIA AND NEW ZEALAND: MACRONUTRIENTS AND WATER

Age group & gender		Protein g/day			Dietary fats[a] Linoleic (n-6) g/day		Dietary fats[a] α-linolenic (n-3) g/day		Dietary fats[a] LC n-3 (DHA/EPA/DPA) mg/day		Carbohydrate g/day	Dietary fibre g/day		Total water[b] (figure in brackets is fluid component only) L/day	
		EAR	*RDI*	*UL*	*AI*	*UL*	*AI*	*UL*	*AI*	*UL*	*AI UL*	*AI*	*UL*	*AI*	*UL*
Men	**19–30 yr**	52	64	NP	13	NP	1.3	NP	160	3,000	NO AI OR UL SET FOR OTHER AGES AS DATA ON ESSENTIALITY ARE INSUFFICIENT	30	NP	3.4 (2.6)	NP
	31–50 yr	52	64	NP	13	NP	1.3	NP	160	3,000		30	NP	3.4 (2.6)	NP
	51–70 yr	52	64	NP	13	NP	1.3	NP	160	3,000		30	NP	3.4 (2.6)	NP
	>70 yr	65	81	NP	13	NP	1.3	NP	160	3,000		30	NP	3.4 (2.6)	NP
Women	**19–30 yr**	37	46	NP	8	NP	0.8	NP	90	3,000		25	NP	2.8 (2.1)	NP
	31–50 yr	37	46	NP	8	NP	0.8	NP	90	3,000		25	NP	2.8 (2.1)	NP
	51–70 yr	37	46	NP	8	NP	0.8	NP	90	3,000		25	NP	2.8 (2.1)	NP
	>70 yr	46	57	NP	8	NP	0.8	NP	90	3,000		25	NP	2.8 (2.1)	NP
Pregnancy	**14–18 yr**	47[d]	58[d]	NP	10	NP	1.0	NP	110	3,000		25	NP	2.4 (1.8)	NP
	19–30 yr	49[d]	60[d]	NP	10	NP	1.0	NP	115	3,000		28	NP	3.1 (2.3)	NP
	31–50 yr	49[d]	60[d]	NP	10	NP	1.0	NP	115	3,000		28	NP	3.1 (2.3)	NP
Lactation	**14–18 yr**	51	63	NP	12	NP	1.2	NP	140	3,000		27	NP	2.9 (2.3)	NP
	19–30 yr	54	67	NP	12	NP	1.2	NP	145	3,000		30	NP	3.5 (2.6)	NP
	31–50 yr	54	67	NP	12	NP	1.2	NP	145	3,000		30	NP	3.5 (2.6)	NP

Abbreviations: AI adequate intake; BM, amount normally received from breast milk; B/F, amount in breast milk and food; EAR, estimated average requirement; RDI, recommended dietary intake; NP, not possible to set – may be insufficient evidence or no clear level for adverse effects; UL, Upper Level of Intake

a Recommendation for total n-6 and total n-3; total fat AI also set at 30–31 g/day for infants

b Total water includes water from foods as well as fluids

c AI recommendations for infants are based on amounts in breast milk

d In 2nd and 3rd trimesters only

TABLE 5. NUTRIENT REFERENCE VALUES FOR AUSTRALIA AND NEW ZEALAND: B VITAMINS

Age group & gender		Thiamin mg/day			Riboflavin mg/day			Niacin[a] mg/day niacin equivalents			Vitamin B6 mg/day			Vitamin B12 µg/day			Folate[b] as dietary folate equivs µg/day			Pantothenic acid mg/day		Biotin µg/day	
		AI		*UL*	*AI*		*UL*	*AI*		*UL*	*AI*		*UL*[c]	*AI*		*UL*	*AI*		*UL*	*AI*	*UL*	*AI*	*UL*
Infants[d]	**0–6 mo.**	0.2		NP	0.3		BM	2		BM	0.1		BM	0.4		BM	65		BM	1.7	BM	5	BM
	7–12 mo.	0.3		NP	0.4		B/F	4		B/F	0.3		B/F	0.5		B/F	80		B/F	2.2	B/F	6	B/F
		EAR	*RDI*	*UL*	*EAR*	*RDI*	*UL*	*EAR*	*RDI*	*UL*	*EAR*	*RDI*	*UL*	*EAR*	*RDI*	*UL*	*EAR*	*RDI*	*UL*	*AI*	*UL*	*AI*	*UL*
Children	**1–3 yr**	0.4	0.5	NP	0.4	0.5	NP	5	6	10	0.4	0.5	15	0.7	0.9	NP	120	150	300	3.5	NP	8	NP
	4–8 yr	0.5	0.6	NP	0.5	0.6	NP	6	8	15	0.5	0.6	20	1.0	1.2	NP	160	200	400	4.0	NP	12	NP
Boys	**9–13 yr**	0.7	0.9	NP	0.8	0.9	NP	9	12	20	0.8	1.0	30	1.5	1.8	NP	250	300	600	5.0	NP	20	NP
	14–18 yr	1.0	1.2	NP	1.1	1.3	NP	12	16	30	1.1	1.3	40	2.0	2.4	NP	330	400	800	6.0	NP	30	NP
Girls	**9–13 yr**	0.7	0.9	NP	0.8	0.9	NP	9	12	20	0.8	1.0	30	1.5	1.8	NP	250	300	600	4.0	NP	20	NP
	14–18 yr	0.9	1.1	NP	0.9	1.1	NP	11	14	30	1.0	1.2	40	2.0	2.4	NP	330	400	800	4.0	NP	25	NP

(Continued)

Abbreviations: AI adequate intake; BM, amount normally received from breast milk; B/F, amount in breast milk and food; EAR, estimated average requirement; RDI, recommended dietary intake; NP, not possible to set – may be insufficient evidence or no clear level for adverse effects; UL, upper level of intake

a The UL for niacin refers to nicotinic acid. For supplemental nicotinamide, the UL is 900 mg/day for men and non-pregnant women, 150 mg/day for 1–3 yr-olds, 250 mg/day for 4–8 yr-olds; 500 mg/day for 9–13 yr-olds and 750 mg/day for 14–18 yr-olds. It is not possible to set a UL for nicotinamide for infancy (intake should be only breast milk, formula or foods) or pregnancy and lactation (source should be food only)

b For folate, the UL is for intake from fortified foods and supplements as folic acid

c For vitamin B_6, the UL is set for pyridoxine

d All infant AIs are based on milk concentrations in healthy women and average volumes

e This is for dietary intake. For pregnant women, it does not include the additional supplemental folic acid required to prevent neural tube defects

TABLE 5. (CONT'D) NUTRIENT REFERENCE VALUES FOR AUSTRALIA AND NEW ZEALAND: B VITAMINS

Age group & gender		Thiamin mg/day			Riboflavin mg/day			Niacin[a] mg/day niacin equivalents			Vitamin B6 mg/day			Vitamin B12 µg/day			Folate[b] as dietary folate equivs µg/day			Pantothenic acid mg/day		Biotin µg/day	
		EAR	*RDI*	*UL*	*EAR*	*RDI*	*UL*	*EAR*	*RDI*	*UL*	*EAR*	*RDI*	*UL*	*EAR*	*RDI*	*UL*	*EAR*[e]	*RDI*[e]	*UL*	*AI*	*UL*	*AI*	*UL*
Men	**19–30 yr**	1.0	1.2	NP	1.1	1.3	NP	12	16	35	1.1	1.3	50	2.0	2.4	NP	320	400	1,000	6.0	NP	30	NP
	31–50 yr	1.0	1.2	NP	1.1	1.3	NP	12	16	35	1.1	1.3	50	2.0	2.4	NP	320	400	1,000	6.0	NP	30	NP
	51–70 yr	1.0	1.2	NP	1.1	1.3	NP	12	16	35	1.4	1.7	50	2.0	2.4	NP	320	400	1,000	6.0	NP	30	NP
	>70 yr	1.0	1.2	NP	1.3	1.6	NP	12	16	35	1.4	1.7	50	2.0	2.4	NP	320	400	1,000	6.0	NP	30	NP
Women	**19–30 yr**	0.9	1.1	NP	0.9	1.1	NP	11	14	35	1.1	1.3	50	2.0	2.4	NP	320	400	1,000	4.0	NP	25	NP
	31–50 yr	0.9	1.1	NP	0.9	1.1	NP	11	14	35	1.1	1.3	50	2.0	2.4	NP	320	400	1,000	4.0	NP	25	NP
	51–70 yr	0.9	1.1	NP	0.9	1.1	NP	11	14	35	1.3	1.5	50	2.0	2.4	NP	320	400	1,000	4.0	NP	25	NP
	>70 yr	0.9	1.1	NP	1.1	1.3	NP	11	14	35	1.3	1.5	50	2.0	2.4	NP	320	400	1,000	4.0	NP	25	NP
Pregnancy	**14–18 yr**	1.2	1.4	NP	1.2	1.4	NP	14	18	30	1.6	1.9	40	2.2	2.6	NP	520	600	800	5.0	NP	30	NP
	19–30 yr	1.2	1.4	NP	1.2	1.4	NP	14	18	35	1.6	1.9	50	2.2	2.6	NP	520	600	1,000	5.0	NP	30	NP
	31–50 yr	1.2	1.4	NP	1.2	1.4	NP	14	18	35	1.6	1.9	50	2.2	2.6	NP	520	600	1,000	5.0	NP	30	NP
Lactation	**14-18 yr**	1.2	1.4	NP	1.3	1.6	NP	13	17	30	1.7	2.0	40	2.4	2.8	NP	450	500	800	6.0	NP	35	NP
	19-30 yr	1.2	1.4	NP	1.3	1.6	NP	13	17	35	1.7	2.0	50	2.4	2.8	NP	450	500	1,000	6.0	NP	35	NP
	31-50 yr	1.2	1.4	NP	1.3	1.6	NP	13	17	35	1.7	2.0	50	2.4	2.8	NP	450	500	1,000	6.0	NP	35	NP

Abbreviations: AI adequate intake; BM, amount normally received from breast milk; B/F, amount in breast milk and food; EAR, estimated average requirement; RDI, recommended dietary intake; NP, not possible to set – may be insufficient evidence or no clear level for adverse effects; UL, upper level of intake

a The UL for niacin refers to nicotinic acid. For supplemental nicotinamide, the UL is 900 mg/day for men and non-pregnant women, 150 mg/day for 1–3 yr-olds, 250 mg/day for 4–8 yr-olds; 500 mg/day for 9–13 yr-olds and 750 mg/day for 14–18 yr-olds. It is not possible to set a UL for nicotinamide for infancy (intake should be only breast milk, formula or foods) or pregnancy and lactation (source should be food only)

b For folate, the UL is for intake from fortified foods and supplements as folic acid

c For vitamin B_6, the UL is set for pyridoxine

d All infant AIs are based on milk concentrations in healthy women and average volumes

e This is for dietary intake. For pregnant women, it does not include the additional supplemental folic acid required to prevent neural tube defects

TABLE 6. NUTRIENT REFERENCE VALUES FOR AUSTRALIA AND NEW ZEALAND: VITAMINS A, C, D, E AND K AND CHOLINE

Age group & gender		Vitamin A (retinol equivalents) µg/day			Vitamin C mg/day			Vitamin D µg/day		Vitamin E (α-tocopherol equivalents[a]) mg/day		Vitamin K µg/day		Choline mg/day	
		AI		*UL*[b]	*AI*		*UL*[c]	*AI*	*UL*	*AI*	*UL*	*AI*	*UL*	*AI*	*UL*
Infants[d]	**0–6 mo.**	250 (as retinol)		600	25		BM	5	25	4	BM	2.0	BM	125	BM
	7–12 mo.	430		600	30		B/F	5	25	5	B/F	2.5	B/F	150	B/F
		EAR	*RDI*	*UL*	*EAR*	*RDI*	*UL*	*AI*	*UL*	*AI*	*UL*	*AI*	*UL*	*AI*	*UL*
Children	**1–3 yr**	210	300	600	25	35	NP	5	80	5	70	25	NP	200	1,000
	4–8 yr	275	400	900	25	35	NP	5	80	6	100	35	NP	250	1,000
Boys	**9–13 yr**	445	600	1,700	28	40	NP	5	80	9	180	45	NP	375	1,000
	14–18 yr	630	900	2,800	28	40	NP	5	80	10	250	55	NP	550	3,000
Girls	**9–13 yr**	420	600	1,700	28	40	NP	5	80	8	180	45	NP	375	1,000
	14–18 yr	485	700	2,800	28	40	NP	5	80	8	250	55	NP	400	3,000

(Continued)

Abbreviations: AI, adequate intake; BM, amount normally received from breast milk; B/F, amount in breast milk and food; EAR, estimated average requirement; RDI, recommended dietary intake; NP, not possible to set – may be insufficient evidence or no clear level for adverse effects; UL, upper level of intake

a One α-tocopherol equivalent is equal to 1 mg RRR α-(or *d*-α-) tocopherol, 2mg β-tocopherol, 10mg γ tocopherol or 3 mg α-tocotrienol. The relevant figure for synthetic all-rac-α-tocopherols (*dl*-α-tocopherol) is 14 mg

b A UL cannot be established for supplemental β-carotene use and is not required for food use

c Not possible to establish a UL for vitamin C from available data, but 1,000 mg/day would be a prudent limit

d All infant AIs are based on milk concentrations in healthy women and average volumes

TABLE 6. (CONT'D) NUTRIENT REFERENCE VALUES FOR AUSTRALIA AND NEW ZEALAND: VITAMINS A, C, D, E AND K AND CHOLINE

Age group & gender		Vitamin A (retinol equivalents) µg/day			Vitamin C mg/day			Vitamin D µg/day		Vitamin E (α-tocopherol equivalents[a]) mg/day		Vitamin K µg/day		Choline mg/day	
		EAR	*RDI*	*UL*	*EAR*	*RDI*	*UL*	*AI*	*UL*	*AI*	*UL*	*AI*	*UL*	*AI*	*UL*
Men	19–30 yr	625	900	3,000	30	45	NP	5	80	10	300	70	NP	550	3,500
	31–50 yr	625	900	3,000	30	45	NP	5	80	10	300	70	NP	550	3,500
	51–70 yr	625	900	3,000	30	45	NP	10	80	10	300	70	NP	550	3,500
	>70 yr	625	900	3,000	30	45	NP	15	80	10	300	70	NP	550	3,500
Women	19–30 yr	500	700	3,000	30	45	NP	5	80	7	300	60	NP	425	3,500
	31–50 yr	500	700	3,000	30	45	NP	5	80	7	300	60	NP	425	3,500
	51–70 yr	500	700	3,000	30	45	NP	10	80	7	300	60	NP	425	3,500
	>70 yr	500	700	3,000	30	45	NP	15	80	7	300	60	NP	425	3,500
Pregnancy	14–18 yr	530	700	2,800	38	55	NP	5	80	8	300	60	NP	415	3,000
	19–30 yr	550	800	3,000	40	60	NP	5	80	7	300	60	NP	440	3,500
	31–50 yr	550	800	3,000	40	60	NP	5	80	7	300	60	NP	440	3,500
Lactation	14–18 yr	780	1,100	2,800	58	80	NP	5	80	12	300	60	NP	525	3,000
	19–30 yr	800	1,100	3,000	60	85	NP	5	80	11	300	60	NP	550	3,500
	31–50 yr	800	1,100	3,000	60	85	NP	5	80	11	300	60	NP	550	3,500

Abbreviations: AI, adequate intake; BM, amount normally received from breast milk; B/F, amount in breast milk and food; EAR, estimated average requirement; RDI, recommended dietary intake; NP, not possible to set – may be insufficient evidence or no clear level for adverse effects; UL, upper level of intake

a One α-tocopherol equivalent is equal to 1 mg RRR α- (or d-α-) tocopherol, 2mg β-tocopherol, 10mg γ tocopherol or 3 mg α-tocotrienol. The relevant figure for synthetic all-rac- α-tocopherols (dl-α-tocopherol) is 14 mg

b A UL cannot be established for supplemental beta-carotene use and is not required for food use

c Not possible to establish a UL for vitamin C from available data, but 1,000 mg/day would be a prudent limit

d All infant AIs are based on milk concentrations in healthy women and average volumes

TABLE 7. NUTRIENT REFERENCE VALUES FOR AUSTRALIA AND NEW ZEALAND: MINERALS – CALCIUM, PHOSPHORUS, ZINC AND IRON

Age group & gender		Calcium[a] mg/day			Phosphorus mg/day			Zinc mg/day			Iron mg/day		
			AI	*UL*		*AI*	*UL*		*AI*	*UL*		*AI*	*UL*
Infants	**0–6 mo.**		210	BM		100	BM	2.0		4	0.2		20
	7–12 mo.		270	B/F		275	B/F	*EAR*	*RDI*	*UL*	*EAR*	*RDI*	*UL*
								2.5	3.0	5	7	11.0	20
		EAR	*RDI*	*UL*	*EAR*	*RDI*	*UL*	*EAR*	*RDI*	*UL*	*EAR*	*RDI*	*UL*
Children	**1–3 yr**	360	500	2,500	380	460	3,000	2.5	3	7	4	9	20
	4–8 yr	520	700	2,500	405	500	3,000	3.0	4	12	4	10	40
Boys	**9–13 yr**	800–1,050	1,000–1,300	2,500	1,055	1,250	4,000	5.0	6	25	6	8	40
	14–18 yr	1,050	1,300	2,500	1,055	1,250	4,000	11.0	13	35	8	11	45
Girls	**9–13 yr**	800–1,050	1,000–1,300	2,500	1,055	1,250	4,000	5.0	6	25	6	8	40
	14–18 yr	1,050	1,300	2,500	1,055	1,250	4,000	6.0	7	35	8	15	45

(Continued)

Abbreviations: AI, adequate intake; BM, amount normally received from breast milk; B/F, amount in breast milk and food; EAR, estimated average requirement; RDI, recommended dietary intake; NP, not possible to set – may be insufficient evidence or no clear level for adverse effects; UL, upper level of intake

a For calcium, there are separate recommendations for children aged 9–11 years and 12–13 years because of growth needs. 9–11 year-olds who are growing and maturing at much greater rates than average may need the intakes recommended for 12–13 year-olds

TABLE 7. (CONT'D) NUTRIENT REFERENCE VALUES FOR AUSTRALIA AND NEW ZEALAND: MINERALS – CALCIUM, PHOSPHORUS, ZINC AND IRON

Age group & gender		Calcium[a] mg/day			Phosphorus mg/day			Zinc mg/day			Iron mg/day		
		EAR	*RDI*	*UL*	*EAR*	*RDI*	*UL*	*EAR*	*RDI*	*UL*	*EAR*	*RDI*	*UL*
Men	**19–30 yr**	840	1,000	2,500	580	1,000	4,000	12.0	14	40	6	8	45
	31–50 yr	840	1,000	2,500	580	1,000	4,000	12.0	14	40	6	8	45
	51–70 yr	840	1,000	2,500	580	1,000	4,000	12.0	14	40	6	8	45
	>70 yr	1,100	1,300	2,500	580	1,000	3,000	12.0	14	40	6	8	45
Women	**19–30 yr**	840	1,000	2,500	580	1,000	4,000	6.5	8	40	8	18	45
	31–50 yr	840	1,000	2,500	580	1,000	4,000	6.5	8	40	8	18	45
	51–70 yr	1,100	1,300	2,500	580	1,000	4,000	6.5	8	40	5	8	45
	>70 yr	1,100	1,300	2,500	580	1,000	3,000	6.5	8	40	5	8	45
Pregnancy	**14–18 yr**	1,050	1,300	2,500	1,055	1,250	3,500	8.5	10	35	23	27	45
	19–30 yr	840	1,000	2,500	580	1,000	3,500	9.0	11	40	22	27	45
	31–50 yr	840	1,000	2,500	580	1,000	3,500	9.0	11	40	22	27	45
Lactation	**14–18 yr**	1,050	1,300	2,500	1,055	1,250	4,000	9.0	11	35	7	10	45
	19–30 yr	840	1,000	2,500	580	1,000	4,000	10.0	12	40	6.5	9	45
	31–50 yr	840	1,000	2,500	580	1,000	4,000	10.0	12	40	6.5	9	45

Abbreviations: AI, adequate intake; BM, amount normally received from breast milk; B/F, amount in breast milk and food; EAR, estimated average requirement; RDI, recommended dietary intake; NP, not possible to set – may be insufficient evidence or no clear level for adverse effects; UL, upper level of intake

a For calcium, there are separate recommendations for children aged 9–11 years and 12–13 years because of growth needs. 9–11year-olds who are growing and maturing at much greater rates than average may need the intakes recommended for 12–13 year-olds

TABLE 8. NUTRIENT REFERENCE VALUES FOR AUSTRALIA AND NEW ZEALAND: MINERALS – MAGNESIUM, IODINE, SELENIUM AND MOLYBDENUM

Age group & gender		Magnesium mg/day			Iodine µg/day			Selenium µg/day			Molybdenum µg/day		
		AI		UL[a]	AI		UL	AI		UL	AI		UL
Infants	0–6 mo.	30		BM	90		BM	12		45	2		BM
	7–12 mo.	75		B/F	110		B/F	15		60	3		B/F
		EAR	***RDI***	***UL***	***EAR***	***RDI***	***UL***	***EAR***	***RDI***	***UL***	***EAR***	***RDI***	***UL***
Children	**1–3 yr**	65	80	65	65	90	200	20	25	90	13	17	300
	4–8 yr	110	130	110	65	90	300	25	30	150	17	22	600
Boys	**9–13 yr**	200	240	350	75	120	600	40	50	280	26	34	1,100
	14–18 yr	340	410	350	95	150	900	60	70	400	33	43	1,700
Girls	**9–13 yr**	200	240	350	75	120	600	40	50	280	26	34	1,100
	14–18 yr	300	360	350	95	150	900	50	60	400	33	43	1,700

(Continued)

Abbreviations: AI, adequate intake; BM, amount normally received from breast milk; B/F, amount in breast milk and food; EAR, estimated average requirement; RDI, recommended dietary intake; NP, not possible to set – may be insufficient evidence or no clear level for adverse effects; UL, upper level of intake

a Note that all of the ULs listed for magnesium refer to supplements

TABLE 8. (CONT'D) NUTRIENT REFERENCE VALUES FOR AUSTRALIA AND NEW ZEALAND: MINERALS – MAGNESIUM, IODINE, SELENIUM AND MOLYBDENUM

Age group & gender		Magnesium mg/day			Iodine µg/day			Selenium µg/day			Molybdenum µg/day		
		EAR	*RDI*	*UL*[a]	*EAR*	*RDI*	*UL*	*EAR*	*RDI*	*UL*	*EAR*	*RDI*	*UL*
Men	**19–30 yr**	330	400	350	100	150	1,100	60	70	400	34	45	2,000
	31–50 yr	350	420	350	100	150	1,100	60	70	400	34	45	2,000
	51–70 yr	350	420	350	100	150	1,100	60	70	400	34	45	2,000
	>70 yr	350	420	350	100	150	1,100	60	70	400	34	45	2,000
Women	**19–30 yr**	255	310	350	100	150	1,100	50	60	400	34	45	2,000
	31–50 yr	265	320	350	100	150	1,100	50	60	400	34	45	2,000
	51–70 yr	265	320	350	100	150	1,100	50	60	400	34	45	2,000
	>70 yr	265	320	350	100	150	1,100	50	60	400	34	45	2,000
Pregnancy	**14–18 yr**	335	400	350	160	220	900	55	65	400	40	50	1,700
	19–30 yr	290	350	350	160	220	1,100	55	65	400	40	50	2,000
	31–50 yr	300	360	350	160	220	1,100	55	65	400	40	50	2,000
Lactation	**14–18 yr**	300	360	350	190	270	900	65	75	400	35	50	1,700
	19–30 yr	255	310	350	190	270	1,100	65	75	400	36	50	2,000
	31–50 yr	265	320	350	190	270	1,100	65	75	400	36	50	2,000

Abbreviations: AI, adequate intake; BM, amount normally received from breast milk; B/F, amount in breast milk and food; EAR, estimated average requirement; RDI, recommended dietary intake; NP, not possible to set – may be insufficient evidence or no clear level for adverse effects; UL, upper level of intake

a Note that all of the ULs listed for magnesium refer to supplements

TABLE 9. NUTRIENT REFERENCE VALUES FOR AUSTRALIA AND NEW ZEALAND: MINERALS – COPPER, CHROMIUM, MANGANESE, FLUORIDE, SODIUM AND POTASSIUM

Age/gender group		Copper mg/day		Chromium µg/day		Manganese mg/day		Fluoride mg/day		Sodium mg/day[a]		Potassium mg/day	
		AI	*UL*	*AI*	*UL*	*AI*	*UL*[b]	*AI*	*UL*	*AI*	*UL*[c^]	*AI*	*UL*[d]
Infants	**0–6 mo.**	0.20	BM	0.2	NP	0.003	BM	-*	1.2*	120	NP	400	NP
	7–12 mo.	0.22	B/F	5.5	NP	0.600	B/F	0.5*#	1.8*	170	NP	700	NP
Children	**1–3 yr**	0.7	1	11	NP	2.0	NP	0.6*	2.4*	200–400	1,000	2,000	NP
	4–8 yr	1.0	3	15	NP	2.5	NP	1.1*	4.4*	300–600	1,400	2,300	NP
Boys	**9–13 yr**	1.3	5	25	NP	3.0	NP	2.0	10	400–800	2,000	3,000	NP
	14–18 yr	1.5	8	35	NP	3.5	NP	3.0	10	460–920	2,300	3,600	NP
Girls	**9–13 yr**	1.1	5	21	NP	2.5	NP	2.0	10	400–800	2,000	2,500	NP
	14–18 yr	1.1	8	24	NP	3.0	NP	3.0	10	460–920	2,300	2,600	NP

(Continued)

Abbreviations: AI, adequate intake; BM, amount normally received from breast milk; B/F, amount in breast milk and food; EAR, estimated average requirement; RDI, recommended dietary intake; NP, not possible to set – may be insufficient evidence or no clear level for adverse effects; UL, upper level of intake; ND, not determined - reflecting the inability to identify a single point below which there is low risk

a 920 mg sodium/day is equivalent to 40 mmol/day; 2,300 mg sodium/day is equivalent to 100 mmol/day

b Intake of manganese beyond that normally found in food and beverages could represent a health risk, but there are insufficient data to set a UL

c A target of no more than 2,000 mg sodium/day (87 mmol) is recommended to help in the prevention of chronic disease. The sodium SDT was updated in 2017

d For potassium, supplements should be taken only under medical supervision

* The fluoride AI and UL for 0-8 year olds were updated in 2017. The following reference body weights were used when the 2017 NRVs for infants and young children aged 0-8 years were expressed in mg fluoride/day; 0-6 months 6 kg, 7-12 months 9 kg, 1-3 years 12 kg, 4-8 years 22 kg

Rounded to the first decimal place

^ The sodium ULs for adults were updated in 2017. The 2006 UL for 14 - 18 years, including for pregnancy and lactation, remains until the ULs for infants, children and adolescents are reviewed. The 2017 ULs for adults of 'not determined' are for adults 18+ years. It is recognised that currently there is overlap in the UL recommendations for 18 year olds. The UL for 18 year olds should be taken as the 2017 UL for adults as this is more up-to-date

TABLE 9. (CONT'D) NUTRIENT REFERENCE VALUES FOR AUSTRALIA AND NEW ZEALAND: MINERALS – COPPER, CHROMIUM, MANGANESE, FLUORIDE, SODIUM AND POTASSIUM

Age/gender group		Copper mg/day		Chromium µg/day		Manganese mg/day		Fluoride mg/day		Sodium mg/day[a]		Potassium mg/day	
		AI	*UL*	*AI*	*UL*	*AI*	*UL*[b]	*AI*	*UL*	*AI*	*UL*[c^]	*AI*	*UL*[d]
Men	**19–30 yr**	1.7	10	35	NP	5.5	NP	4.0	10	460–920	ND	3,800	NP
	31–50 yr	1.7	10	35	NP	5.5	NP	4.0	10	460–920	ND	3,800	NP
	51–70 yr	1.7	10	35	NP	5.5	NP	4.0	10	460–920	ND	3,800	NP
	>70 yr	1.7	10	35	NP	5.5	NP	4.0	10	460–920	ND	3,800	NP
Women	**19–30 yr**	1.2	10	25	NP	5.0	NP	3.0	10	460–920	ND	2,800	NP
	31–50 yr	1.2	10	25	NP	5.0	NP	3.0	10	460–920	ND	2,800	NP
	51–70 yr	1.2	10	25	NP	5.0	NP	3.0	10	460–920	ND	2,800	NP
	>70 yr	1.2	10	25	NP	5.0	NP	3.0	10	460–920	ND	2,800	NP
Pregnancy	**14–18 yr**	1.2	8	30	NP	5.0	NP	3.0	10	460–920	2,300	2,800	NP
	19–30 yr	1.3	10	30	NP	5.0	NP	3.0	10	460–920	ND	2,800	NP
	31–50 yr	1.3	10	30	NP	5.0	NP	3.0	10	460–920	ND	2,800	NP
Lactation	**14–18 yr**	1.4	8	45	NP	5.0	NP	3.0	10	460–920	2,300	3,200	NP
	19–30 yr	1.5	10	45	NP	5.0	NP	3.0	10	460–920	ND	3,200	NP
	31–50 yr	1.5	10	45	NP	5.0	NP	3.0	10	460–920	ND	3,200	NP

Abbreviations: AI, adequate intake; BM, amount normally received from breast milk; B/F, amount in breast milk and food; EAR, estimated average requirement; RDI, recommended dietary intake; NP, not possible to set – may be insufficient evidence or no clear level for adverse effects; UL, upper level of intake; ND, not determined - reflecting the inability to identify a single point below which there is low risk

a 920 mg sodium/day is equivalent to 40 mmol/day; 2,300 mg/day sodium is equivalent to 100 mmol/day

b Intake of manganese beyond that normally found in food and beverages could represent a health risk, but there are insufficient data to set a UL

c A target of no more than 2,000 mg sodium/day (87 mmol) is recommended to help in the prevention of chronic disease. The sodium SDT was updated in 2017

d For potassium, supplements should be taken only under medical supervision

^ The sodium ULs for adults were updated in 2017. The 2006 UL for 14 - 18 years, including for pregnancy and lactation, remains until the ULs for infants, children and adolescents are reviewed. The 2017 ULs for adults of 'not determined' are for adults 18+ years. It is recognised that currently there is overlap in the UL recommendations for 18 year olds. The UL for 18 year olds should be taken as the 2017 UL for adults as this is more up-to-date

TABLES OF RECOMMENDATIONS BY AGE GROUP WITH SUMMARY OF METHODS USED

TABLE 10. INFANTS 0-6 MONTHS

AIs only are set for infants aged 0-6 months based on the content of breast milk in healthy mothers assuming a breast milk volume of 780 mL/day and rounding where appropriate (reference body weight 7 kg).

Nutrient	Adequate Intake (per day)	Average breast milk concentration used in estimations of AI
Protein	10 g (1.43g/kg body weight)	*12.7 g/L*
Total fat	31g	*40 g/L*
n-6 fats	4.4 g	*5.6 g/L*
n-3 fats	0.5 g	*0.63 g/L*
LC n-3 (omega)	None set	
Carbohydrate	60g	*74 g/L*
Dietary fibre	None set	
Water	0.7 L	*Breast milk is 87% water*
Vitamin A as retinyl esters	250µg	*310 µg/L*
Thiamin	0.2 mg	*0.21 mg/L*
Riboflavin	0.3 mg	*0.35 mg/L*
Niacin	2 mg preformed niacin	*1.8 mg/L preformed niacin*
Vitamin B_6	0.1 mg	*0.13 mg/L*
Vitamin B_{12}	0.4 µg	*0.42 µg/L*
Folate (Dietary Folate Equivalents	65 µg	*85 µg/L*
Pantothenate	1.7 mg	*2.2 mg/L*
Biotin	5 µg	*6 µg/L*
Choline	125 mg	*160 mg/L*
Vitamin C	25 mg	*30 mg/L*
Vitamin D	5 µg	*Based on lowest dietary intake associated with mean serum 25(OH)D greater than 11mg/L assuming little exposure to sunlight*
Vitamin E (α tocopherol eq uivs)	4 mg	*4.9 mg/L*
Vitamin K	2 µg	*2.5 µg/L*
Calcium	210 mg	*264 mg*
Chromium	0.2 µg	*0.25 µg/L*
Copper	0.2 mg/day	*0.25 mg/L*
Fluoride*	None set	
Iodine	90 µg	*115 µg/L*

* The fluoride AI and UL for 0-8 year olds were updated in 2017. The following reference body weights were used when the 2017 NRVs for infants and young children aged 0-8 years were expressed in mg fluoride/day; 0-6 months 6 kg, 7-12 months 9 kg, 1-3 years 12 kg, 4-8 years 22 kg.

(Continued)

TABLE 10. (CONT'D) INFANTS 0-6 MONTHS

Nutrient	Adequate Intake (per day)	Average breast milk concentration used in estimations of AI
Iron	0.2 mg	*0.26 mg/L. Iron in formula is much less bioavailable (only 10-20% that of breast milk) so intake will need to be significantly higher*
Magnesium	30 mg	*34 mg/mL*
Manganese	0.003 mg (3 µg)	*3.5µg/L*
Molybdenum	2 µg	*2 µg/L*
Phosphorus	100 mg	*124 mg/L*
Potassium	400 mg	*500 mg/L*
Selenium	12 µg	*15 µg/L*
Sodium	120 mg	*160 mg*
Zinc	2 mg	*2.5 mg/L (in early months). Absorption of zinc is higher from breast milk than cow's milk or soy-based based formula but these formulas generally have a much higher content of zinc which compensates for this.*

TABLE 11. INFANTS 7-12 MONTHS

AIs only are set for most nutrients based on estimates of intake from breast milk (600mL/d assumed) and complementary food (based on usual daily amounts consumed as detailed in FNB:IOM DRI publications) or, where intake data are not available or are unreliable, by extrapolation from younger infants or adults on a metabolic body weight basis or by factorial calculation.

Nutrient	Adequate Intake (per day)	Basis of estimate
Protein	14 g (1.6 mg/kg body weight)	*Breast milk 11 g/L; 7.1 g from food*
Total fat	30 g	*Breast milk 40 g/L ; 5.7 g from foods*
n-6 fats	4.6 g	*Breast milk 5.6 g/L; 1.2 g from food*
n-3 fats	0.5 g	*Breast milk 0.63 g/L; 0.11 g from food*
LC n-3 (omega)	None set	
Carbohydrate	95 g	*Breast milk 74 g/L; 51 g from foods*
Dietary fibre	None set	
Water (total)	800 mL	*From breast milk, formula, food, plain water and other beverages including 0.6 L as fluids*
Vitamin A as retinol equivalents	430 µg	*Breast milk 310 µg/L; 244 µg from foods*
Thiamin	0.3 mg	*Estimated by extrapolation from younger infants and adults as intake data estimates were unreasonably high*
Riboflavin	0.4 mg	*As above estimated by extrapolation*
Niacin Equivs.	4 mg	*Limited data so derived from adult data on metabolic body weight basis*
Vitamin B_6	0.3 mg	*Extrapolated from younger infants*
Vitamin B_{12}	0.5 µg	*Extrapolated from younger infants. Vegan mothers need B12 supplementation throughout pregnancy and lactation; if they do not take supplements, their infants will require supplements from birth*
Folate (Dietary Folate Equivs)	80 µg	*Extrapolated from younger infants and adults*
Pantothenate	2.2 mg	*Extrapolated from younger infants*
Biotin	6 µg	*Extrapolated from younger infants*
Choline	150 mg	*Extrapolated from younger infants and adults*
Vitamin C	30 mg	*Extrapolated from younger infants*
Vitamin D	5 µg	*Based on younger infant needs*
Vitamin E (α TE)	5 mg	*Extrapolated from younger infants*
Vitamin K	2.5 µg	*Derived from younger infants*
Calcium	270 mg	*Breast milk 210 mg/L; 140 mg from foods*
Chromium	5.5 µg	*Breast milk 0.25 ug/L; additional amount added based on energy needs as food intake data insufficient*
Copper	0.22 mg	*Breast milk > 200 µg/L; 100 µg from foods*

(Continued)

TABLE 11. (CONT'D) INFANTS 7-12 MONTHS

Nutrient	Adequate Intake (per day)	Basis of estimate
Fluoride*	0.5 mg#	*AI of 0.05 mg/kg bw/day based on fluoride intakes under conditions that result in near maximal dental caries prevention (fluoridation in drinking water approx. 1 mg F/litre).*
Iodine	110 µg	*Extrapolated from younger infants*
Iron	7 mg	*Set by modelling components of iron requirements. Absorption higher from mixed Western diet (18%) than vegetarian (10%) thus vegetarian infants will need higher intakes.*
Magnesium	75 mg	*Breast milk 34 mg/L; 55 mg/day foods*
Manganese	0.6 mg	*Based on total consumption estimates and extrapolation from adults*
Molybdenum	3 µg	*Extrapolated from younger infants*
Phosphorus	275 mg	*Breast milk 124 mg/L; food 200 mg/day*
Potassium	700 mg	*Breast milk 500 mg/L; food 440 mg/day*
Selenium	15 µg	*Extrapolated from younger infants*
Sodium	170 mg	*Extrapolated from younger infants*
Zinc	EAR 2.5 mg RDI 3.0 mg	*Set by factorial calculation including estimates of endogenous zinc loss; growth needs; absorption estimates. Absorption is higher on mixed Western diets than on vegetarian diets so vegetarians will need diets approximately 50% higher in zinc*

* The fluoride AI and UL for 0-8 year olds were updated in 2017. The following reference body weights were used when the 2017 NRVs for infants and young children aged 0-8 years were expressed in mg fluoride/day; 0-6 months 6 kg, 7-12 months 9 kg, 1-3 years 12 kg, 4-8 years 22 kg.

\# Rounded to the first decimal place

TABLE 12. CHILDREN 1-3 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Protein	12 g (0.92 g/kg) CV of 12%	14g (1.08 g/kg)	-	*Factorial method including amounts needed for growth and maintenance.*
Total fat	-	-	-	*Essentiality relates to type of fat only*
Linoleic acid	-	-	5.0 g	*Median population intakes*
α-linolenic	-	-	0.5 g	*Median population intakes*
LC n-3 (omega)	-	-	40 mg	*Median population intakes*
Carbohydrate	-	-	-	*Limited data re essentiality on which to set EAR/RDI or AI*
Dietary fibre	-	-	14 g	*Median population intakes including an allowance for resistant starch*
Water	-	-	Total 1.4 L Fluids 1.0 L	*Median population intakes (total includes water in foods)*
Vitamin A as retinol equivalents	210 µg CV 20%	300 µg	-	*Computational method of FNB:IOM, 2001: based on amount of dietary vitamin A required to maintain a given body pool size in well-nourished subjects*
Thiamin	0.4 mg CV 10%	0.5 mg	-	*Extrapolated from adult data on a metabolic body weight basis*
Riboflavin	0.4 mg CV 1-0%	0.5 mg	-	*Extrapolated from adult data on a metabolic body weight basis*
Niacin Equivs.	5 mg CV 15%	6 mg		*Extrapolated from adult data on a metabolic body weight basis*
Vitamin B_6	0.4 mg CV 10%	0.5 mg	-	*Extrapolated from adult data on a metabolic body weight basis*
Vitamin B_{12}	0.7 µg CV 10%	0.9 µg	-	*Extrapolated from adult data on a metabolic body weight basis. Vegan children will need supplementation*
Folate (Dietary Folate Equivs)	120 µg CV 10%	150 µg		*Extrapolated from adult data on a metabolic body weight basis*
Pantothenate	-	-	3.5 mg	*Median population intakes*
Biotin	-	-	8 µg	*Extrapolated from infant AI using relative body weights with an allowance for growth*
Choline	-	-	200 mg	*Extrapolated from adult data on a body weight basis allowing for growth needs*
Vitamin C	25 mg CV 20%	35 mg	-	*Interpolated from adult and infant data following the approach of FAO:WHO 2002.*
Vitamin D*	-	-	5 µg	*Extrapolated from data in older children with limited sunlight exposure*
Vitamin E (α TE)	-	-	5 mg	Median population intakes
Vitamin K	-	-	25 µg	Median population intakes

(Continued)

TABLE 12. (CONT'D) CHILDREN 1-3 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Calcium	360 mg CV 15%	500 mg	-	Modelling based on components such as accumulation of total body calcium, urinary losses, dermal losses and daily skeletal increments
Chromium	-	-	11 μg	Extrapolated from adult data on a body weight basis; adult data derived using chromium content/1000 kj from experimental diets applied to median population energy intake for this age group
Copper	-	-	0.7 mg	Median population intakes
Fluoride#	-	-	0.6 mg	AI of 0.05 mg/kg bw/day based on fluoride intakes under conditions that result in near maximal dental caries prevention (fluoridation in drinking water approx. 1 mg F/litre).
Iodine	65 μg CV 20%	90 μg	-	Based on balance studies
Iron **	4 mg	9 mg	-	Based on modelling requirements assuming 14% absorption; EAR set on 50th percentile of requirement; RDI set on 97.5 percentile
Magnesium	65 mg CV 10%	80 mg	-	Extrapolated from balance studies for older age groups on a body weight and growth basis
Manganese	-	-	2 mg	Median population intakes
Molybdenum	13 μg CV 15%	17 μg	-	Extrapolated on a body weight basis from balance studies in adults
Phosphorus	380 mg CV 10%	460 mg	-	Based on estimates of body accretion using tissue composition data and growth rates
Potassium	-	-	2000 mg	Median population intakes
Selenium	20 μg CV 10%	25 μg	-	Extrapolated from adult data assessing intakes required to maintain adequate plasma glutathione peroxidase
Sodium	-	-	200-400 mg	Extrapolated from intakes required in adults to maintain sodium balance with a generous margin for acclimatisation to hot climates; adjusted for median energy intake at this age
Zinc ***	2.5 mg CV 10%	3.0 mg	-	Factorial method based on intestinal, urinary, skin and semen losses and estimated absorption rates of 24% for boys and 31% girls

* With regular sun exposure there would not be a need for dietary vitamin D
** Absorption of iron is lower from vegetarian diets so intakes will need to be up to 80% higher
*** Absorption of zinc is lower from vegetarian diets so intakes will need to be up to 50% higher
\# The fluoride AI and UL for 0-8 year olds were updated in 2017. The following reference body weights were used when the 2017 NRVs for infants and young children aged 0-8 years were expressed in mg fluoride/day; 0-6 months 6 kg, 7-12 months 9 kg, 1-3 years 12 kg, 4-8 years 22 kg

TABLE 13. CHILDREN 4-8 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Protein	16 g (0.73 g/kg) CV 12%	20 g (0.91 g/kg)	-	*Factorial method including amounts needed for growth and maintenance*
Total fat	-	-	-	*Essentiality relates to type of fat only*
Linoleic acid	-	-	8.0 g	*Median population intakes*
α-linolenic	-	-	0.8 g	*Median population intakes*
LC n-3 (omega)	-	-	55 mg	*Median population intakes*
Carbohydrate	-	-	-	*Limited data re essentiality on which to set EAR/RDI or AI*
Dietary fibre	-	-	18 g	*Median population intakes including an allowance for resistant starch*
Water			Total 1.6 L Fluids 1.2 L	*Median population intakes (total includes water in foods)*
Vitamin A as retinol equivalents	275 µg CV 20%	400 µg		*Computational method of FNB:IOM, 2001: based on amount of dietary vitamin A required to maintain a given body pool size in well-nourished subjects*
Thiamin	0.5 mg CV 10%	0.6 mg		*Extrapolated from adult data on a metabolic body weight basis*
Riboflavin	0.5 mg CV 10%	0.6 mg		*Extrapolated from adult data on a metabolic body weight basis*
Niacin Equivs.	6 mg CV 15%	8 mg		*Extrapolated from adult data on a metabolic body weight basis*
Vitamin B_6	0.5 mg CV 10%	0.6 mg	-	*Extrapolated from adult data on a metabolic body weight basis*
Vitamin B_{12}	1.0 µg CV 10%	1.2 µg	-	*Extrapolated from adult data on a metabolic body weight basis.* *Vegan children will need supplementation*
Folate (Dietary Folate Equivs)	160 µg CV 10%	200 µg	-	*Extrapolated from adult data on a metabolic body weight basis*
Pantothenate	-	-	4 mg	*Median population intakes*
Biotin	-	-	12 µg	*Extrapolated from infant AI using relative body weights with an allowance for growth*
Choline	-	-	250 mg	*Extrapolated from adult data on a body weight basis allowing for growth needs*
Vitamin C	25 mg CV 20%	35 mg	-	*Interpolated from adult and infant data following the approach of FAO:WHO 2002*
Vitamin D*	-	-	5 µg	*Extrapolated from data in older children with limited sunlight exposure*
Vitamin E (α TE)	-	-	6 mg	*Median population intakes*
Vitamin K	-	-	35 µg	*Median population intakes*

(Continued)

TABLE 13. (CONT'D) CHILDREN 4-8 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Calcium	520 mg CV 15%	700 mg	-	*Modelling based on components such as accumulation of total body calcium, urinary losses, dermal losses and daily skeletal increments*
Chromium	-	-	15 µg	*Extrapolated from adult data on a body weight basis; adult data derived using chromium content/1000 kj from experimental diets applied to median population energy intake for this age group*
Copper	-	-	1.0 mg	*Median population intakes*
Fluoride#	-	-	1.1 mg	*AI of 0.05 mg/kg bw/day based on fluoride intakes under conditions that result in near maximal dental caries prevention (fluoridation in drinking water approx. 1 mg F/litre).*
Iodine	65 µg CV 20%	90 µg	-	*Based on balance studies*
Iron**	4 mg	10 mg		*Based on modelling requirements assuming 18% absorption; EAR set on 50th percentile of requirement; RDI set on 97.5 percentile*
Magnesium	110 mg CV 10%	130 mg		*Extrapolated from balance studies for older age groups on a body weight and growth basis*
Manganese	-	-	2.5 mg	*Median population intakes*
Molybdenum	17 µg CV 15%	22 µg	-	*Extrapolated on a body weight basis from balance studies in adults*
Phosphorus	405 mg CV 10%	500 mg	-	*Based on estimates of body accretion using tissue composition data and growth rates*
Potassium	-	-	2300 mg	*Median population intakes*
Selenium	25 µg CV 10%	30 µg	-	*Extrapolated from adult data assessing intakes required to maintain adequate plasma glutathione peroxidase*
Sodium	-	-	300-600 mg	*Extrapolated from intakes required in adults to maintain sodium balance with a generous margin for acclimatisation to hot climates; adjusted for median energy intake at this age*
Zinc***	3 mg CV 10%	4 mg	-	*Factorial method based on intestinal, urinary, skin and semen losses and estimated absorption rates of 24% for boys and 31% girls*

* With regular sun exposure there would not be a need for dietary vitamin D
** Absorption of iron is lower from vegetarian diets so intakes will need to be up to 80% higher
*** Absorption of zinc is lower from vegetarian diets so intakes will need to be up to 50% higher
# The fluoride AI and UL for 0-8 year olds were updated in 2017. The following reference body weights were used when the 2017 NRVs for infants and young children aged 0-8 years were expressed in mg fluoride/day; 0-6 months 6 kg , 7-12 months 9 kg, 1-3 years 12 kg, 4-8 years 22 kg

TABLE 14. CHILDREN AND ADOLESCENTS 9-13 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Protein	Boys 31 g (0.78 g/kg) Girls 24 g (0.61 g/kg) CV 12%	Boys 40 g (0.94 g/kg) Girls 35 g (0.87 g/kg)	-	*Factorial method including amounts needed for growth and maintenance*
Total fat	-	-	-	*Essentiality relates to type of fat only*
Linoleic acid	-	-	Boys 10 g Girls 8 g	*Median population intakes*
α-linolenic	-	-	Boys 1.0 g Girls 0.8 g	*Median population intakes*
LC n-3 (omega)	-	-	Boys 70 mg Girls 70 mg	*Median population intakes*
Carbohydrate	-	-	-	*Limited data re essentiality on which to set EAR/RDI or AI*
Dietary fibre	-	-	Boys 24 g Girls 20 g	*Median population intakes including an allowance for resistant starch*
Water	-	-	Boys Total 2.2 L Fluids 1.6 L Girls Total 1.9 L Fluids 1.4 L	*Median population intakes (total includes water in foods)*
Vitamin A as retinol equivalents	Boys 445 µg Girls 420 µg CV 20%	Boys 600 µg Girls 600 µg	-	*Computational method of FNB:IOM, 2001: based on amount of dietary vitamin A required to maintain a given body pool size in well-nourished subjects*
Thiamin	Boys 0.7 mg Girls 0.7 mg CV 10%	Boys 0.9 mg Girls 0.9 mg	-	*Extrapolated from adult data on a metabolic body weight basis*
Riboflavin	Boys 0.8 mg Girls 0.8 mg CV 10%	Boys 0.9 mg Girls 0.9 mg	-	*Extrapolated from adult data on a metabolic body weight basis*
Niacin Equivs.	Boys 9 mg Girls 9 mg CV 15%	Boys 12 mg Girls 12 mg	-	*Extrapolated from adult data on a metabolic body weight basis*
Vitamin B_6	Boys 0.8 mg Girls 0.8 mg CV 10%	Boys 1.0 mg Girls 1.0 mg	-	*Extrapolated from adult data on a metabolic body weight basis*

(Continued)

TABLE 14. (CONT"D) CHILDREN AND ADOLESCENTS 9-13 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Vitamin B_{12}	Boys 1.5 µg Girls 1.5 µg CV 10%	Boys 1.8 µg Girls 1.8 µg	-	*Extrapolated from adult data on a metabolic body weight basis* *Vegan children will need supplementation*
Folate (Dietary Folate Equivs)	Boys 250 µg Girls 250 µg CV 10%	Boys 300 µg Girls 300 µg	-	*Extrapolated from adult data on a metabolic body weight basis*
Pantothenate	-	-	Boys 5 mg Girls 4 mg	*Median population intakes*
Biotin	-	-	Boys 20 µg Girls 20 µg	*Extrapolated from infant AI using relative body weights with an allowance for growth*
Choline	-	-	Boys 375 mg Girls 375 mg	*Extrapolated from adult data on a body weight basis allowing for growth needs*
Vitamin C	Boys 28 mg Girls 28 mg CV 20%	Boys 40 mg Girls 40 mg	-	*Interpolated from adult and infant data following the approach of FAO:WHO 2002*
Vitamin D*	-	-	Boys 5 µg Girls 5 µg	*Based on dietary intakes required to maintain defined levels of plasma 25(OH)D in children with limited sunlight exposure*
Vitamin E (α TE)	-	-	Boys 9 mg Girls 8 mg	*Median population intakes*
Vitamin K	-	-	Boys 45 µg Girls 45 µg	*Median population intakes*
Calcium	Boys 9-11 yrs 800 mg 12-13 yrs 1050 mg Girls 9-11 yrs 800 mg 12-13 yrs 1050 mg CV 15%	Boys 9-11 yrs 1000 mg 12-13 yrs 1300 mg Girls 9-11 yrs 1000 mg 12-13 yrs 1300 mg	-	*Modelling based on components such as accumulation of total body calcium, urinary losses, dermal losses and daily skeletal increments*
Chromium	-	-	Boys 25 µg Girls 21 µg	*Extrapolated from adult data on a body weight basis; adult data derived using chromium content/1000 kj from experimental diets applied to median population energy intake for this age group*

(Continued)

TABLE 14. (CONT"D) CHILDREN AND ADOLESCENTS 9-13 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Copper	-	-	Boys 1.3 mg Girls 1.1 mg	*Median population intakes*
Fluoride	-	-	Boys 2 mg Girls 2 mg	*Based on data relating fluoride intake to dental caries status*
Iodine	Boys 75 µg Girls 75 µg CV 20%	Boys 120 µg Girls 120 µg	-	*Based on data extrapolated from adults from balance studies*
Iron **	Boys 6 mg Girls 6 mg	Boys 8 mg Girls 8 mg	-	*Based on modelling requirements assuming 18% absorption; EAR set on 50th percentile of requirement; RDI set on 97.5 percentile*
Magnesium	Boys 200 mg Girls 200 mg CV 10%	Boys 240 mg Girls 240 mg	-	*Balance studies*
Manganese	-	-	Boys 3.0 mg Girls 2.5 mg	*Median population intakes*
Molybdenum	Boys 26 µg Girls 26 µg CV 15%	Boys 34 µg Girls 34 µg	-	*Extrapolated on a body weight basis from balance studies in adults*
Phosphorus	Boys 1055 mg Girls 1055 mg CV 10%	Boys 1250 mg Girls 1250 mg	-	*Based on a factorial approach using tissue accretion data from longitudinal and cross-sectional studies*
Potassium	-	-	Boys 3000 mg Girls 2500 mg	*Median population intakes*
Selenium	Boys 40 µg Girls 40 µg CV 10%	Boys 50 µg Girls 50 µg	-	*Extrapolated from adult data assessing intakes required to maintain adequate plasma glutathione peroxidase*
Sodium	-	-	Boys 400-800 mg Girls 400-800 mg	*Extrapolated from intakes required in adults to maintain sodium balance with a generous margin for acclimatisation to hot climates; adjusted for median energy intake at this age*
Zinc***	Boys 5 mg Girls 5 mg CV 10%	Boys 6 mg Girls 6 mg	-	*Factorial method based on intestinal, urinary, skin and semen losses and estimated absorption rates of 24% for boys and 31% girls*

* With regular sun exposure there would not be a need for dietary vitamin D
** Absorption of iron is lower from vegetarian diets so intakes will need to be up to 80% higher
*** Absorption of zinc is lower from vegetarian diets so intakes will need to be up to 50% higher

TABLE 15. ADOLESCENTS 14-18 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Protein	Boys 49 g (0.76 g/kg) Girls 35 g (0.62 g/kg) CV 12%	65g (0.99 g/kg) 45g (0.77 g/kg)	-	*Factorial method including amounts needed for growth and maintenance*
Total fat	-	-	-	*Essentiality relates to type of fat only*
Linoleic acid	-	-	Boys 12 g Girls 8 g	*Median population intakes*
α-linolenic	-	-	Boys 1.2 g Girls 0.8 g	*Median population intakes*
LC n-3 (omega)	-	-	Boys 125 mg Girls 85 mg	*Median population intakes*
Carbohydrate	-	-	-	*Limited data re essentiality on which to set EAR/RDI or AI*
Dietary fibre	-	-	Boys 28 g Girls 22 g	*Median population intakes including an allowance for resistant starch*
Water (total)	-	-	Boys Total 2.7 L Fluids 1.9 L Girls Total 2.2 L Fluids 1.6 L	*Median population intakes (total includes water in foods)*
Vitamin A as retinol equivalents	Boys 630 µg Girls 485 µg CV 20%	Boys 900 µg Girls 700 µg	-	*Computational method of FNB:IOM, 2001: based on amount of dietary vitamin A required to maintain a given body pool size in well-nourished subjects*
Thiamin	Boys 1.0 mg Girls 0.9 mg CV 10%	Boys 1.2 mg Girls 1.1 mg	-	*Extrapolated from adult data on a metabolic body weight basis*
Riboflavin	Boys 1.1 mg Girls 0.9 mg CV 10%	Boys 1.3 mg Girls 1.1 mg	-	*Extrapolated from adult data on a metabolic body weight basis*
Niacin Equivs.	Boys 12 mg Girls 11 mg CV 15%	Boys 16 mg Girls 14 mg	-	*Extrapolated from adult data on a metabolic body weight basis*
Vitamin B_6	Boys 1.1 mg Girls 1.0 mg CV 10%	Boys 1.3 mg Girls 1.2 mg	-	*Extrapolated from adult data on a metabolic body weight basis*
Vitamin B_{12}	Boys 2.0 µg Girls 2.0 µg CV 10%	Boys 2.4 µg Girls 2.4 µg	-	*Extrapolated from adult data on a metabolic body weight basis.* *Vegan children will need supplementation*

(Continued)

TABLE 15. (CONT'D) ADOLESCENTS 14-18 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Folate (Dietary Folate Equivs)	Boys 330 µg Girls 330 µg CV 10%	Boys 400 µg Girls 400 µg	-	*Extrapolated from adult data on a metabolic body weight basis*
Pantothenate	-	-	Boys 6 mg Girls 4 mg	*Median population intakes*
Biotin	-	-	Boys 30 µg Girls 25 µg	*Extrapolated from infant AI using relative body weights with an allowance for growth and some population data available from NZ*
Choline	-	-	Boys 550 mg Girls 400 mg	*Extrapolated from adult data on a body weight basis allowing for growth needs*
Vitamin C	Boys 28 mg Girls 28 mg CV 20%	Boys 40 mg Girls 40 mg	-	*Interpolated from adult and infant data following the approach of FAO:WHO 2002*
Vitamin D*	-	-	Boys 5 µg Girls 5 µg	*Based on dietary intakes required to maintain defined levels of plasma 25(OH)D in children with limited sunlight exposure*
Vitamin E (αTE)	-	-	Boys 10 mg Girls 8 mg	*Median population intakes*
Vitamin K	-	-	Boys 55 µg Girls 55 µg	*Median population intakes*
Calcium	Boys 1050 mg Girls 1050 mg CV 15%	Boys 1300 mg Girls 1300 mg	-	*Modelling based on components such as accumulation of total body calcium, urinary losses, dermal losses and daily skeletal increments*
Chromium	-	-	Boys 35 µg Girls 25 µg	*Extrapolated from adult data on a body weight basis; adult data derived using chromium content/1000 kj from experimental diets applied to median population energy intake for this age group*
Copper	-	-	Boys 1.5 mg Girls 1.1 mg	*Median population intakes*
Fluoride	-	-	Boys 3 mg Girls 3 mg	*Based on data relating fluoride intake to dental caries status*
Iodine	Boys 95 µg Girls 95 µg CV 20%	Boys 150 µg Girls 150 µg	-	*Based on balance studies*

(Continued)

TABLE 15. (CONT'D) ADOLESCENTS 14-18 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Iron**	Boys 8 mg Girls 8 mg	Boys 11 mg Girls 15 mg	-	*Based on modelling requirements assuming 18% absorption; EAR set on 50th percentile of requirement; RDI set on 97.5 percentile*
Magnesium	Boys 340 mg Girls 300 mg CV 10%	Boys 410 mg Girls 360 mg	-	*Balance studies*
Manganese	-	-	Boys 3.5 mg Girls 3.0 mg	*Median population intakes*
Molybdenum	Boys 33 µg Girls 33 µg CV 15%	Boys 43 µg Girls 43 µg	-	*Extrapolated on a body weight basis from balance studies in adults*
Phosphorus	Boys 1055 mg Girls 1055 mg CV 10%	Boys 1250 mg Girls 1250 mg	-	*Based on a factorial approach using tissue accretion data from longitudinal and cross-sectional studies in younger adolescents*
Potassium	-	-	Boys 3600 mg Girls 2600 mg	*Median population intakes*
Selenium	Boys 60 µg Girls 50 µg CV 10%	Boys 70 µg Girls 60 µg	-	*Extrapolated from adult data assessing intakes required to maintain adequate plasma glutathione peroxidase*
Sodium	-	-	Boys 460-920 mg Girls 460-920 mg	*Extrapolated from intakes required in adults to maintain sodium balance with a generous margin for acclimatisation to hot climates; adjusted for median energy intakes at this age*
Zinc***	Boys 11 mg Girls 6 mg CV 10%	Boys 13 mg Girls 7 mg	-	*Factorial method based on intestinal, urinary, skin and semen losses and estimated absorption rates of 24% for boys and 31% girls*

* With regular sun exposure there would not be a need for dietary vitamin D

** Absorption of iron is lower from vegetarian diets so intakes will need to be up to 80% higher

*** Absorption of zinc is lower from vegetarian diets so intakes will need to be up to 50% higher

TABLE 16. ADULTS 19-30 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Protein	Men 52 g (0.68 g/kg) Women 37 g (0.60 g/kg) CV 12%	Men 64 g (0.84 g/kg) Women 46 g (0.75 g/kg)	-	*Factorial method including amounts needed for growth and maintenance*
Total fat	-	-	-	*Essentiality relates to type of fat only*
Linoleic acid	-	-	Men 13 g Women 8 g	*Median population intakes*
α-linolenic	-	-	Men 1.3 g Women 0.8 g	*Median population intakes*
LC n-3 (omega)	-	-	Men 160 mg Women 90 mg	*Median population intakes*
Carbohydrate	-	-	-	*Limited data re essentiality on which to set EAR/RDI or AI*
Dietary fibre	-	-	Men 30 g Women 25 g	*Median population intakes including an allowance for resistant starch*
Water (total)	-	-	Men Total 3.4 L Fluids 2.6 L Women Total 2.8 L Fluids 2.1 L	*Median population intakes (total includes water in foods)*
Vitamin A as retinol equivalents	Men 625 µg Women 500 µg CV 20%	Men 900 µg Women 700 µg	-	*Computational method of FNB:IOM, 2001: based on amount of dietary vitamin A required to maintain a given body pool size in well-nourished subjects*
Thiamin	Men 1.0 mg Women 0.9 mg CV 10%	Men 1.2 mg Women 1.1 mg	-	*Metabolic studies using various endpoints such as transketolase activity and urinary thiamine excretion*
Riboflavin	Men 1.1 mg Women 0.9 mg CV 10%	Men 1.3 mg Women 1.1 mg	-	*Studies addressing clinical deficiency signs and biochemical markers such as EGRAC*
Niacin Equivs.	Men 12 mg Women 11 mg CV 15%	Men 16 mg Women 14 mg	-	*Studies addressing niacin intake in relation to urine N_1 methylnicotinamide with a 10% decrease allowed for women for lower energy intakes*

(Continued)

TABLE 16. (CONT'D) ADULTS 19-30 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Vitamin B_6	Men 1.1 mg Women 1.1 mg CV 10%	Men 1.3 mg Women 1.3 mg	-	*Depletion/repletion studies*
Vitamin B_{12}	Men 2.0 µg Women 2.0 µg CV 10%	Men 2.4 µg Women 2.4 µg	-	*Haematological evidence and serum B_{12} levels. Strict vegetarians will need supplementation with B_{12}*
Folate (Dietary Folate Equivs)	Men 320 µg Women 320 µg CV 10%	Men 400 µg Women 400 µg	-	*Metabolic balance studies using endpoints such as erythrocyte folate, plasma folate and homocysteine levels*
Pantothenate	-	-	Men 6 mg Women 4 mg	*Median population intakes*
Biotin	-	-	Men 30 µg Women 25 µg	*Extrapolated from AI of infants on a body weight basis together with median population intake data from NZ*
Choline	-	-	Men 550 mg Women 425 mg	*Based on experimental studies of prevention of alanine aminotransferase abnormalities and on studies of people on total parenteral nutrition*
Vitamin C	Men 30 mg Women 30 mg CV 20%	Men 45 mg Women 45 mg	-	*EAR set as intake at which body content is halfway between tissue saturation and the point at which scurvy appears*
Vitamin D*	-	-	Men 5 µg Women 5 µg	*Based on dietary intakes required to maintain defined levels of plasma 25(OH)D in adults with limited sunlight exposure*
Vitamin E (α TE)	-	-	Men 10 mg Women 7 mg	*Median population intakes*
Vitamin K	-	-	Men 70 µg Women 60 µg	*Median population intakes*
Calcium	Men 840 mg Women 840 mg CV 10%	Men 1000 mg Women 1000 mg	-	*Modelling based on components such as accumulation of total body calcium, urinary losses, dermal losses and daily skeletal increments*
Chromium	-	-	Men 35 µg Women 25 µg	*Derived using chromium content/1000 kj from experimental diets applied to median population energy intake*

(Continued)

TABLE 16. (CONT'D) ADULTS 19-30 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Copper	-	-	Men 1.7 mg Women 1.2 mg	*Median population intakes*
Fluoride	-	-	Men 4 mg Women 3 mg	*Based on data relating fluoride intake to dental caries status*
Iodine	Men 100 µg Women 100 µg CV 20%	Men 150 µg Women 150 µg	-	*Based on balance studies*
Iron **	Men 6 mg Women 8 mg	Men 8 mg Women 18 mg	-	*Based on modelling requirements assuming 18% absorption; EAR set on 50th percentile of requirement; RDI set on 97.5 percentile*
Magnesium	Men 330 mg Women 255 mg CV 10%	Men 400 mg Women 310 mg	-	*Balance studies*
Manganese	-	-	Men 5.5 mg Women 5.0 mg	*Median population intakes*
Molybdenum	Men 34 µg Women 34 µg CV 15%	Men 45 µg Women 45 µg	-	*Based on balance studies in young men*
Phosphorus	Men 580 mg Women 580 mg CV 35%	Men 1000 mg Women 1000 mg	-	*Based on a graphical transformation technique assessing intake level required to reach lowest point for normal plasma range*
Potassium	-	-	Men 3800 mg Women 2800 mg	*Median population intakes*
Selenium	Men 60 µg Women 50 µg CV 10%	Men 70 µg Women 60 µg	-	*Based on intakes required to maintain adequate plasma glutathione peroxidase.*
Sodium	-	-	Men 460-920 mg Women 460-920 mg	*Extrapolated from intakes required in adults to maintain sodium balance with a generous margin for acclimatisation to hot climate.*
Zinc***	Men 12 mg Women 6.5 mg	Men 14 mg Women 8 mg	-	*Factorial method based on intestinal, urinary, skin and semen losses and estimated absorption rates of 24% for men and 31% women*

* With regular sun exposure there would not be a need for dietary vitamin D. For people with little exposure to sunlight, a supplement of 10 µg/day would not be excessive

** Absorption of iron is lower from vegetarian diets so intakes will need to be up to 80% higher

*** Absorption of zinc is lower from vegetarian diets so intakes will need to be up to 50% higher

TABLE 17. ADULTS 31-50 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Protein	Men 52 g (0.68 g/kg) Women 37 g (0.60 g/kg) CV 12%	64 g (0.84 g/kg) 46 g (0.75 g/kg)	-	*Factorial method including amounts needed for growth and maintenance*
Total fat	-	-	-	*Essentiality relates to type of fat only*
Linoleic acid	-	-	Men 13 g Women 8 g	*Median population intakes*
α-linolenic	-	-	Men 1.3 g Women 0.8 g	*Median population intakes*
LC n-3 (omega)	-	-	Men 160 mg Women 90 mg	*Median population intakes*
Carbohydrate	-	-	-	*Limited data re essentiality on which to set EAR/RDI or AI*
Dietary fibre	-	-	Men 30 g Women 25 g	*Median population intakes including an allowance for resistant starch*
Water	-	-	Men Total 3.4 L Fluids 2.6 L Women Total 2.8 L Fluids 2.1 L	*Median population intakes (total includes water in foods)*
Vitamin A as retinol equivalents	Men 625 µg Women 500 µg CV 20%	Men 900 µg Women 700 µg	-	*Computational method of FNB:IOM, 2001. based on amount of dietary vitamin A required to maintain a given body pool size in well-nourished subjects*
Thiamin	Men 1.0 mg Women 0.9 mg CV 10%	Men 1.2 mg Women 1.1 mg	-	*Metabolic studies using various endpoints such as transketolase activity and urinary thiamine excretion.*
Riboflavin	Men 1.1 mg Women 0.9 mg CV 10%	Men 1.3 mg Women 1.1 mg	-	*Studies addressing clinical deficiency signs and biochemical markers such as EGRAC*
Niacin Equivs.	Men 12 mg Women 11 mg CV 15%	Men 16 mg Women 14 mg	-	*Studies addressing niacin intake in relation to urine N_1 methylnicotinamide with a 10% decrease allowed for women for lower energy intakes.*
Vitamin B_6	Men 1.1 mg Women 1.1 mg CV 10%	Men 1.3 mg Women 1.3 mg	-	*Depletion/repletion studies*

(Continued)

TABLE 17. (CONT'D) ADULTS 31-50 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Vitamin B_{12}	Men 2.0 µg Women 2.0 µg CV 10%	Men 2.4 µg Women 2.4 µg	-	*Haematological evidence and serum B_{12} levels. Strict vegetarians will need supplementation with B_{12}*
Folate (Dietary Folate Equivs)	Men 320 µg Women 320 µg CV 10%	Men 400 µg Women 400 µg	-	*Metabolic balance studies using endpoints such as erythrocyte folate, plasma folate and homocysteine levels*
Pantothenate	-	-	Men 6 mg Women 4 mg	*Median population intakes*
Biotin	-	-	Men 30 µg Women 25 µg	*Extrapolated from AI of infants on a body weight basis together with median population intake data from NZ*
Choline	-	-	Men 550 mg Women 425 mg	*Based on experimental studies of prevention of alanine aminotransferase abnormalities and on studies of people on total parenteral nutrition.*
Vitamin C	Men 30 mg Women 30 mg CV 20%	Men 45 mg Women 45 mg	-	*EAR set as intake at which body content is halfway between tissue saturation and the point at which scurvy appears*
Vitamin D*	-	-	Men 5 µg Women 5 µg	*Based on dietary intakes required to maintain defined levels of plasma 25(OH)D in adults with limited sunlight exposure*
Vitamin E (α TE)	-	-	Men 10 mg Women 7 mg	*Median population intakes*
Vitamin K	-	-	Men 70 µg Women 60 µg	*Median population intakes*
Calcium	Men 840 mg Women 840 mg CV 10%	Men 1000 mg Women 1000 mg	-	*Modelling based on components such as accumulation of total body calcium, urinary losses, dermal losses and daily skeletal increments*
Chromium	-	-	Men 35 µg Women 25 µg	*Derived using chromium content/1000 kj from experimental diets applied to median population energy intake*
Copper	-	-	Men 1.7 mg Women 1.2 mg	*Median population intakes*

(Continued)

TABLE 17. (CONT'D) ADULTS 31-50 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Fluoride	-	-	Men 4 mg Women 3 mg	*Based on data relating fluoride intake to dental caries status*
Iodine	Men 100 µg Women 100 µg CV 20%	Men 150 µg Women 150 µg	-	*Based on balance studies*
Iron **	Men 6 mg Women 8 mg	Men 8 mg Women 18 mg	-	*Based on modelling requirements assuming 18% absorption;* *EAR set on 50th percentile of requirement; RDI set on 97.5 percentile*
Magnesium	Men 350 mg Women 265 mg CV 10%	Men 420 mg Women 320 mg	-	*Balance studies*
Manganese	-	-	Men 5.5 mg Women 5.0 mg	*Median population intakes*
Molybdenum	Men 34 µg Women 34 µg CV 15%	Men 45 µg Women 45 µg	-	*Based on balance studies in young men*
Phosphorus	Men 580 mg Women 580 mg CV 35%	Men 1000 mg Women 1000 mg	-	*Based on a graphical transformation technique assessing intake level required to reach lowest point for normal plasma range*
Potassium	-	-	Men 3800 mg Women 2800 mg	*Median population intakes*
Selenium	Men 60 µg Women 50 µg CV 10%	Men 70 µg Women 60 µg	-	*Based on intakes required to maintain adequate plasma glutathione peroxidase*
Sodium	-	-	Men 460-920 mg Women 460-920 mg	*Extrapolated from intakes required in adults to maintain sodium balance with a generous margin for acclimatisation to hot climate*
Zinc***	Men 12 mg Women 6.5 mg	Men 14 mg Women 8 mg	-	*Factorial method based on intestinal, urinary, skin and semen losses and estimated absorption rates of 24% for men and 31% women*

* With regular sun exposure there would not be a need for dietary vitamin D. For people with little exposure to sunlight, a supplement of 10 µg/day would not be excessive

** Absorption of iron is lower in vegetarian diets so intakes will need to be up to 80% higher

*** Absorption of zinc is lower in vegetarian diets so intakes will need to be up to 50% higher

TABLE 18. ADULTS 51-70 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Protein	Men 52 g (0.68 g/kg) Women 37 g (0.60 g/kg) CV 12%	64 g (0.84 g/kg) 46 g (0.75 g/kg)	-	*Factorial method including amounts needed for growth and maintenance*
Total fat	-	-	-	*Essentiality relates to type of fat only*
Linoleic acid	-	-	Men 13 g Women 8 g	*Median population intakes*
α-linolenic	-	-	Men 1.3 g Women 0.8 g	*Median population intakes*
LC n-3 (omega)	-	-	Men 160 mg Women 90 mg	*Median population intakes*
Carbohydrate	-	-	-	*Limited data re essentiality on which to set EAR/RDI or AI*
Dietary fibre	-	-	Men 30 g Women 25 g	*Median population intakes including an allowance for resistant starch*
Water	-	-	Men Total 3.4 L Fluids 2.6 L Women Total 2.8 L Fluids 2.1 L	*Median population intakes (total includes water in foods)*
Vitamin A as retinol equivalents	Men 625 µg Women 500 µg CV 20%	Men 900 µg Women 700 µg	-	*Computational method of FNB:IOM, 2001: based on amount of dietary vitamin A required to maintain a given body pool size in well-nourished subjects*
Thiamin	Men 1.0 mg Women 0.9 mg CV 10%	Men 1.2 mg Women 1.1 mg	-	*Metabolic studies using various endpoints such as transketolase activity and urinary thiamine excretion*
Riboflavin	Men 1.1 mg Women 0.9 mg CV 10%	Men 1.3 mg Women 1.1 mg	-	*Studies addressing clinical deficiency signs and biochemical markers such as EGRAC*
Niacin Equivs.	Men 12 mg Women 11 mg CV 15%	Men 16 mg Women 14 mg	-	*Studies addressing niacin intake in relation to urine N_1 methylnicotinamide with a 10% decrease allowed for women for lower energy intakes*
Vitamin B_6	Men 1.4 mg Women 1.3 mg CV 10%	Men 1.7 mg Women 1.5 mg	-	*Depletion/repletion studies*

(Continued)

TABLE 18. (CONT'D) ADULTS 51-70 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Vitamin B_{12}	Men 2.0 µg Women 2.0 µg CV 10%	Men 2.4 µg Women 2.4 µg	-	*Haematological evidence and serum B_{12} levels. Strict vegetarians will need supplementation with B_{12}*
Folate (Dietary Folate Equivs)	Men 320 µg Women 320 µg CV 10%	Men 400 µg Women 400 µg	-	*Metabolic balance studies using endpoints such as erythrocyte folate, plasma folate and homocysteine levels*
Pantothenate	-	-	Men 6 mg Women 4 mg	*Median population intakes*
Biotin	-	-	Men 30 µg Women 25 µg	*Extrapolated from AI of infants on a body weight basis together with median population intake data from NZ*
Choline	-	-	Men 550 mg Women 425 mg	*Based on experimental studies of prevention of alanine aminotransferase abnormalities and on studies of people on total parenteral nutrition*
Vitamin C	Men 30 mg Women 30 mg CV 20%	Men 45 mg Women 45 mg	-	*EAR set as intake at which body content is halfway between tissue saturation and the point at which scurvy appears*
Vitamin D*	-	-	Men 10 µg Women 10 µg	*Based on dietary intakes required to maintain defined levels of plasma 25(OH)D in adults of this age with limited sunlight exposure*
Vitamin E (αTE)	-	-	Men 10 mg Women 7 mg	*Median population intakes*
Vitamin K	-	-	Men 70 µg Women 60 µg	*Median population intakes*
Calcium	Men 840 mg Women 1100 mg CV 10%	Men 1000 mg Women 1300 mg	-	*Modelling based on components such as accumulation of total body calcium, urinary losses, dermal losses and daily skeletal increments*
Chromium	-	-	Men 35 µg Women 25 µg	*Derived using chromium content/1000 kj from experimental diets applied to median population energy intake.*
Copper	-	-	Men 1.7 mg Women 1.2 mg	*Median population intakes*

(Continued)

TABLE 18. (CONT'D) ADULTS 51-70 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Fluoride	-	-	Men 4 mg Women 3 mg	*Based on data relating fluoride intake to dental caries status*
Iodine	Men 100 μg Women 100 μg CV 20%	Men 150 μg Women 150 μg	-	*Based on balance studies*
Iron**	Men 6 mg Women 5 mg	Men 8 mg Women 8 mg	-	*Based on modelling requirements assuming 18% absorption; EAR set on 50th percentile of requirement; RDI set on 97.5 percentile*
Magnesium	Men 350 mg Women 265 mg CV 10%	Men 420 mg Women 320 mg	-	*Balance studies*
Manganese	-	-	Men 5.5 mg Women 5.0 mg	*Median population intakes*
Molybdenum	Men 34 μg Women 34 μg CV 15%	Men 45 μg Women 45μg	-	*Based on balance studies in young men*
Phosphorus	Men 580 mg Women 580 mg CV 35%	Men 1000 mg Women 1000 mg	-	*Based on a graphical transformation technique assessing intake level required to reach lowest point for normal plasma range*
Potassium	-	-	Men 3800 mg Women 2800 mg	*Median population intakes*
Selenium	Men 60 μg Women 50 μg CV 10%	Men 70 μg Women 60 μg	-	*Based on intakes required to maintain adequate plasma glutathione peroxidase*
Sodium	-	-	Men 460-920 mg Women 460-920 mg	*Extrapolated from intakes required in adults to maintain sodium balance with a generous margin for acclimatisation to hot climate*
Zinc***	Men 12 mg Women 6.5 mg	Men 14 mg Women 8 mg	-	*Factorial method based on intestinal, urinary, skin and semen losses and estimated absorption rates of 24% for men and 31% women*

* With regular sun exposure there would not be a need for dietary vitamin D. For people with little exposure to sunlight, a supplement of 10 μg/day may not be excessive

** Absorption of iron is lower from vegetarian diets so intakes will need to be up to 80% higher

*** Absorption of zinc is lower from vegetarian diets so intakes will need to be up to 50% higher

TABLE 19. ADULTS OVER 70 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Protein	Men 65 g (0.86 g/kg) Women 46 g (0.75 g/kg) CV 12%	81 g (1.07 g/kg) 57 g (0.94 g/kg)	-	*Factorial method including amounts needed for growth and maintenance*
Total fat	-	-	-	*Essentiality relates to type of fat only*
Linoleic acid	-	-	Men 13 g Women 8 g	*Median population intakes*
α-linolenic	-	-	Men 1.3 g Women 0.8 g	*Median population intakes*
LC n-3 (omega)	-	-	Men 160 mg Women 90 mg	*Median population intakes*
Carbohydrate	-	-	-	*Limited data re essentiality on which to set EAR/RDI or AI*
Dietary fibre	-	-	Men 30 g Women 25 g	*Median population intakes including an allowance for resistant starch*
Water	-	-	Men Total 3.4 L Fluids 2.6 L Women Total 2.8 L Fluids 2.1 L	*Median population intakes (total includes water in foods)*
Vitamin A as retinol equivalents	Men 625 µg Women 500 µg CV 20%	Men 900 µg Women 700 µg	-	*Computational method of FNB:IOM, 2001: based on amount of dietary vitamin A required to maintain a given body pool size in well-nourished subjects*
Thiamin	Men 1.0 mg Women 0.9 mg CV 10%	Men 1.2 mg Women 1.1 mg	-	*Metabolic studies using various endpoints such as transketolase activity and urinary thiamine excretion*
Riboflavin	Men 1.3 mg Women 1.1 mg CV 10%	Men 1.6 mg Women 1.3 mg	-	*Studies addressing clinical deficiency signs and biochemical markers such as EGRAC*
Niacin Equivs.	Men 12 mg Women 11 mg CV 15%	Men 16 mg Women 14 mg	-	*Studies addressing niacin intake in relation to urine N_1 methylnicotinamide with a 10% decrease allowed for women for lower energy intakes*
Vitamin B_6	Men 1.4 mg Women 1.3 mg CV 10%	Men 1.7 mg Women 1.5 mg	-	*Depletion/repletion studies*

(Continued)

TABLE 19. (CONT'D) ADULTS OVER 70 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Vitamin B_{12}	Men 2.0 µg Women 2.0 µg CV 10%	Men 2.4 µg Women 2.4 µg	-	*Haematological evidence and serum B12 levels. Strict vegetarians will need supplementation with B12. Substantial numbers of older people have atrophic gastritis and may require fortified foods or supplements*
Folate (Dietary Folate Equivs)	Men 320 µg Women 320 µg CV 10%	Men 400 µg Women 400 µg	-	*Metabolic balance studies using endpoints such as erythrocyte folate, plasma folate and homocysteine levels*
Pantothenate	-	-	Men 6 mg Women 4 mg	*Median population intakes*
Biotin	-	-	Men 30 µg Women 25 µg	*Extrapolated from AI of infants on a body weight basis together with median population intake data from NZ*
Choline	-	-	Men 550 mg Women 425 mg	*Based on experimental studies of prevention of alanine aminotransferase abnormalities and on studies of people on total parenteral nutrition*
Vitamin C	Men 30 mg Women 30 mg CV 20%	Men 45 mg Women 45 mg	-	*EAR set as intake at which body content is halfway between tissue saturation and the point at which scurvy appears*
Vitamin D*	-	-	Men 15 µg Women 15 µg	*Based on dietary intakes required to maintain defined levels of plasma 25(OH)D in adults of this age with limited sunlight exposure*
Vitamin E (αTE)	-	-	Men 10 mg Women 7 mg	*Median population intakes*
Vitamin K	-	-	Men 70 µg Women 60 µg	*Median population intakes*
Calcium	Men 1100 mg Women 1100 mg CV 10%	Men 1300 mg Women 1300 mg	-	*Modelling based on components such as accumulation of total body calcium, urinary losses, dermal losses and daily skeletal increments*
Chromium	-	-	Men 35 µg Women 25 µg	*Derived using chromium content/1000 kj from experimental diets applied to median population energy intake*
Copper	-	-	Men 1.7 mg Women 1.2 mg	*Median population intakes*

(Continued)

TABLE 19. (CONT'D) ADULTS OVER 70 YEARS

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Fluoride	-	-	Men 4 mg Women 3 mg	*Based on data relating fluoride intake to dental caries status*
Iodine	Men 100 µg Women 100 µg CV 20%	Men 150 µg Women 150 µg	-	*Based on balance studies*
Iron**	Men 6 mg Women 5 mg	Men 8 mg Women 8 mg	-	*Based on modelling requirements assuming 18% absorption; EAR set on 50th percentile of requirement; RDI set on 97.5 percentile*
Magnesium	Men 350 mg Women 265 mg CV 10%	Men 420 mg Women 320 mg	-	*Balance studies*
Manganese	-	-	Men 5.5 mg Women 5.0 mg	*Median population intakes*
Molybdenum	Men 34 µg Women 34 µg CV 15%	Men 45 µg Women 45 µg	-	*Based on balance studies in young men*
Phosphorus	Men 580 mg Women 580 mg CV 35%	Men 1000 mg Women 1000 mg	-	*Based on a graphical transformation technique assessing intake level required to reach lowest point for normal plasma range*
Potassium	-	-	Men 3800 mg Women 2800 mg	*Median population intakes*
Selenium	Men 60 µg Women 50 µg CV 10%	Men 70 µg Women 60 µg	-	*Based on intakes required to maintain adequate plasma glutathione peroxidase*
Sodium	-	-	Men 460-920 mg Women 460-920 mg	*Extrapolated from intakes required in adults to maintain sodium balance with a generous margin for acclimatisation to hot climate*
Zinc***	Men 12 mg Women 6.5 mg	Men 14 mg Women 8 mg	-	*Factorial method based on intestinal, urinary, skin and semen losses and estimated absorption rates of 24% for men and 31% women*

* With regular sun exposure there would not be a need for dietary vitamin D. For people with little exposure to sunlight, a supplement of 10 µg/day (or as high as 25 µg/day for bedbound or institutionalised elderly) may not be excessive

** Absorption of iron is lower from vegetarian diets so intakes will need to be up to 80% higher

*** Absorption of zinc is lower from vegetarian diets so intakes will need to be up to 50% higher

TABLE 20. PREGNANCY

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Protein	14-18 yrs 47 g (0.82 g/kg) 19-50 yrs 49 g (0.80 g/kg) CV 12%	14-18 yrs 58 g (1.02 g/kg) 19-50 yrs 60 g (1.00 g/kg)	-	*Only in 2nd and 3rd trimesters. Extra 0.2 g/kg required on basis of mid-trimester weight gain and efficiency of use*
Total fat	-	-	-	*Essentiality relates to type of fat only*
Linoleic acid	-	-	14-18 yrs 10 g 19-50 yrs 10 g	*Median population intakes with an additional amount related to increased body weight*
α-linolenic	-	-	14-18 yrs 1.0 g 19-50 yrs 1.0 g	*Median population intakes with an additional amount related to increased body weight*
LC n-3 (omega)	-	-	14-18 yrs 110 mg 19-50 yrs 115 mg	*Median population intakes with an additional amount related to increased body weight*
Carbohydrate	-	-	-	*Limited data re essentiality on which to set EAR/RDI or AI*
Dietary fibre	-	-	14-18 yrs 25 g 19-50 yrs 28 g	*Median population intakes including an allowance for resistant starch;12% increase for additional energy needs*
Water	-	-	14-18 yrs Total 2.4 L Fluids 1.8 L 19-50 yrs Total 3.1 L Fluids 2.3 L	*Median population intakes (total includes water in foods). Additional allowance for expanding extracellular space, needs of fetus and amniotic fluid*
Vitamin A (as retinol equivalents)	14-18 yrs 530 µg 19-50 yrs 550 µg CV 20%	14-18 yrs 700 µg 19-50 yrs 800 µg	-	*Computational method of FNB:IOM, 2001 based on maternal needs and accumulation of vitamin A in liver of fetus*
Thiamin	All ages 1.2 mg CV 10%	All ages 1.4 mg	-	*Metabolic studies using various endpoints such as transketolase activity and urinary thiamine excretion plus estimated requirements for maternal and fetal growth and small increase in energy usage*

(Continued)

TABLE 20. (CONT'D) PREGNANCY

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Riboflavin	All ages 1.2 mg CV 10%	All ages 1.4 mg	-	*Studies addressing clinical deficiency signs and biochemical markers such as EGRAC in non-pregnant subjects plus added needs for increased growth of maternal and fetal tissue and increase in energy expenditure*
Niacin Equivs.	All ages 14 mg CV 15%	All ages 18 mg	-	*Studies addressing niacin intake in relation to urine N_1 methylnicotinamide with a 10% decrease allowed for women for lower energy intakes and an additional allowance to cover increased energy use and growth*
Vitamin B_6	All ages 1.6 mg CV 10%	All ages 1.9 mg	-	*Depletion/repletion studies for non-pregnant subjects plus estimates of changes in plasma concentrations in pregnancy, fetal sequestration data and supplementation studies*
Vitamin B_{12}	All ages 2.2 µg CV 10%	All ages 2.6 µg	-	*Haematological evidence and serum B12 levels plus an allowance for fetal and placental needs*
Folate (Dietary Folate Equivs)	All ages 520 µg CV 10% *Note: This does not include additional needs of 400µg/day needed one month before and three months after conception for prevention of neural tube defects*	All ages 600 µg	-	*Controlled metabolic studies and a series of population studies*
Pantothenate	-	-	All ages 5 mg	*Based on median population intakes plus an allowance for additional body weight*
Biotin	-	-	All ages 30 µg	*Extrapolated from AI of infants on a body weight basis taking into account needs for growth of maternal tissues and fetus*

(Continued)

TABLE 20. (CONT'D) PREGNANCY

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Choline	-	-	14-18 yrs 415 mg 19-50 yrs 440 mg	*Based on estimates for non-pregnant females plus an allowance for fetal and placental accretion plus turnover in the mother*
Vitamin C	14-18 yrs 38 mg 19-50 yrs 40 mg CV 20%	14-18 yrs 40 mg 19-50 yrs 60 mg	-	*EAR set as intake at which body content is halfway between tissue saturation and the point at which scurvy appears in non pregnant people with an allowance for additional needs of fetus*
Vitamin D*	-	-	All ages 5µg	*Based on dietary intakes required to maintain defined levels of plasma 25(OH)D in women with limited exposure to sunlight; additional needs for fetus very small*
Vitamin E (αTE)	-	-	14-18 yrs 8 mg 19-50 yrs 7 mg	*Median population intakes; no additional needs in pregnancy*
Vitamin K	-	-	All ages 60 µg	*Median population intakes; no increase in pregnancy*
Calcium	14-18 yrs 1050 mg 19-50 yrs 840 mg CV 10%	14-18 yrs 1300 mg Women 1000 mg	-	*Modelling based on components such as accumulation of total body calcium, urinary losses, dermal losses and daily skeletal increments ; no additional needs in pregnancy*
Chromium	-	-	All ages 30 µg	*Derived using chromium content/1000 kj from experimental diets applied to median population energy intake with an allowance for additional body weight*
Copper	-	-	14-18 yrs 1.2 mg 19-50 yrs 1.3 mg	*Median population intakes plus an allowance for fetal needs and for the products of pregnancy*
Fluoride	-	-	All ages 3 mg	*Based on data relating fluoride intake to dental caries status; no additional requirement in lactation*
Iodine	All ages 160 µg CV 20%	All ages 220 µg	-	*Based on balance studies for non-pregnant women and iodine thyroid content of newborns*

(Continued)

TABLE 20. (CONT'D) PREGNANCY

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Iron**	14-18 yrs 23 mg 19-50 yrs 22 mg	14-18 yrs 27 mg 19-50 yrs 27 mg	-	*Based on modelling requirements assuming upper limit of 25% absorption;* *EAR set on 50th percentile of requirement; RDI set on 97.5 percentile*
Magnesium	14-18 yrs 335 mg 19-30 yrs 290 mg 31-50 yrs 300 mg CV 10%	14-18 yrs 400 mg 19-30 yrs 350 mg 31-50 yrs 360 mg		*Based on balance studies and an allowance for additional lean body mass*
Manganese	-	-	All ages 5 mg	*Median population intakes; no addition in pregnancy*
Molybdenum	All ages 40 µg CV 15%	All ages 50 µg	-	*Based on non-pregnant recommendations with an allowance for additional body weight*
Phosphorus	14-18 yrs 1055 mg 19-50 yrs 580 mg CV 35%	14-18 yrs 1250 mg 19-50 yrs 1000 mg	-	*Based on a graphical transformation technique assessing intake level required to reach lowest point for normal plasma range; no additional need in pregnancy*
Potassium	-	-	All ages 2800 mg	*Median population intakes; no additional need in pregnancy*
Selenium	All ages 55 µg CV 10%	All ages 65 µg	-	*Based on intakes required to maintain adequate plasma glutathione peroxidase plus an allowance for fetal needs*
Sodium	-	-	Men 460-920 mg Women 460-920 mg	*Extrapolated from intakes required in adults to maintain sodium balance with a generous margin for acclimatisation to hot climate. No additional requirement in pregnancy*
Zinc***	14-18 yrs 8.5 mg 19-50 yrs 9 mg	14-18 yrs 10 mg 19-50 yrs 11 mg	-	*Factorial method based on intestinal, urinary, skin and semen losses and estimated absorption rates of 24% for men and 31% women with an allowance for additional maternal and fetal needs*

* For women with limited exposure to sunlight a supplemental intake of 10µg/day prenatally would not be excessive

** Absorption of iron is lower from vegetarian diets so intakes will need to be up to 80% higher

*** Absorption of zinc is lower from vegetarian diets so intakes will need to be up to 50% higher

TABLE 21. LACTATION

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Protein	14-18 yrs 51 g (0.90 g/kg) 19-50 yrs 54 g (0.88 g/kg) CV 12%	14-18 yrs 63 g (1.11 g/kg) 19-50 yrs 67 g (1.10g/kg)	-	*Additional requirement of 17g/day assessed using factorial approach*
Total fat	-	-	-	*Essentiality relates to type of fat only*
Linoleic acid	-	-	14-18 yrs 12 g 19-50 yrs 12 g	*Median population intakes of women and infants*
α-linolenic	-	-	14-18 yrs 1.2 g 19-50 yrs 1.2 g	*Median population intakes of women and infants*
LC n-3 (omega)	-	-	14-18 yrs 140 mg 19-50 yrs 145 mg	*Median population intakes of women and infants*
Carbohydrate	-	-	-	*Limited data re essentiality on which to set EAR/RDI or AI*
Dietary fibre	-	-	14-18 yrs 27 g 19-50 yrs 30 g	*Median population intakes including an allowance for resistant starch and 20% increase related to higher energy needs*
Water	-	-	14-18 yrs Total 2.9 L Fluids 2.3 L 19-50 yrs Total 3.5 L Fluids 2.6 L	*Median population intakes (total includes water in foods). Additional allowance for fluid lost in breast milk*
Vitamin A as retinol equivalents	14-18 yrs 780 µg 19-50 yrs 800 µg CV 20%	14-18 yrs 1100 µg 19-50 yrs 1100 µg	-	*Computational method of FNB:IOM, 2001 used for mothers. AI for infants added to EAR*
Thiamin	All ages 1.2 mg CV 10%	All ages 1.4 mg	-	*Metabolic studies using various endpoints such as transketolase activity and urinary thiamine excretion plus estimated needs for breast milk losses and energy cost of milk production*
Riboflavin	All ages 1.3 mg CV 10%	All ages 1.6 mg	-	*Studies addressing clinical deficiency signs and biochemical markers such as EGRAC in non-lactating subjects plus added needs for milk production and loss in breast milk*

(Continued)

TABLE 21. (CONT'D) LACTATION

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Niacin Equivs.	All ages 13 mg CV 15%	All ages 17 mg		*Studies addressing niacin intake in relation to urine N $_1$ methylnicotinamide with an appropriate allowance made for energy usage in pregnant women and for loss of preformed niacin secreted in breast milk*
Vitamin B_6	All ages 1.7 mg CV 10%	All ages 2.0 mg	-	*Depletion/repletion studies for non-pregnant subjects plus estimates of amounts required to produce sufficient levels in breast milk for infant needs*
Vitamin B_{12}	All ages 2.4 µg CV 10%	All ages 2.8 µg	-	*Haematological evidence and serum B12 levels plus an allowance for amount secreted in breast milk*
Folate (Dietary Folate Equivs)	All ages 450 µg CV 10%	All ages 500 µg	-	*Metabolic balance studies using endpoints such as erythrocyte folate, plasma folate and homocysteine levels in non-lactating subjects plus an allowance for losses in breast milk*
Pantothenate	-	-	All ages 6 mg	*Based on median population intakes plus an allowance for breast milk losses*
Biotin	-	-	35 µg	*Extrapolated from AI of infants on a body weight basis plus an allowance for losses in breast milk*
Choline	-	-	14-18 yrs 525 mg 19-50 yrs 550 mg	*Based on estimates for non-lactating females plus an allowance for choline secreted in breast milk*
Vitamin C	14-18 yrs 58 mg 19-50 yrs 60 mg CV 20%	14-18 yrs 80 mg 19-50 yrs 85 mg	-	*EAR set as intake at which body content is halfway between tissue saturation and the point at which scurvy appears in non pregnant people with an allowance for additional needs of breastfed infant*

(Continued)

TABLE 21. (CONT'D) LACTATION

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Vitamin D*	-	-	All ages 5 µg	*Based on dietary intakes required to maintain defined levels of plasma 25(OH)D in women with limited exposure to sunlight; additional needs for lactation very small*
Vitamin E (α TE)	-	-	14-18 yrs 12 mg 19-50 yrs 11 mg	*Median population intakes plus an allowance for vitamin E secreted in breast milk.*
Vitamin K	-	-	All ages 60 µg	*Median population intakes; no addition in lactation*
Calcium	14-18 yrs 1050 mg 19-50 yrs 840 mg CV 10%	14-18 yrs 1300 mg Women 1000 mg	-	*Modelling based on components such as accumulation of total body calcium, urinary losses, dermal losses and daily skeletal increments; no additional needs in lactation*
Chromium	-	-	All ages 45 µg	*Derived using chromium content/1000 kj from experimental diets applied to median population energy intake with an allowance for chromium secreted in breast milk*
Copper	-	-	14-18 yrs 1.4 mg 19-50 yrs 1.5 mg	*Median population intakes plus an allowance for copper secreted in breast milk*
Fluoride	-	-	All ages 3 mg	*Based on data relating fluoride intake to dental caries status; no additional requirement in lactation*
Iodine	All ages 190 µg CV 30%	All ages 270 µg	-	*Based on balance studies for non-lactating women with an allowance for iodine secreted in breast milk*
Iron**	14-18 yrs 7 mg 19-50 yrs 6.5 mg CV 30%	14-18 yrs 10 mg 19-50 yrs 9 mg	-	*For EAR, iron secreted in milk was added to the distribution of requirements for non-lactating women and for younger mothers an allowance was made for growth. Absorption of 18% was assumed*

(Continued)

TABLE 21. (CONT'D) LACTATION

Nutrient	Estimated Average Requirement (per day)	Recommended Dietary Intake (per day)	Adequate Intake (per day)	Basis of estimate
Magnesium	14-18 yrs 300 mg 19-30 yrs 255 mg 31-50 yrs 265 mg CV 10%	14-18 yrs 360 mg 19-30 yrs 310 mg 31-50 yrs 320 mg		*Based on balance studies; no additional needs in lactation*
Manganese	-	-	All ages 5 mg	*Median population intakes; no addition in lactation*
Molybdenum	14-18 yrs 35 µg 19-50 yrs 36 µg CV 15%	All ages 50 µg	-	*Based on non-pregnant recommendations with an allowance for molybdenum secreted in breast milk*
Phosphorus	14-18 yrs 1055 mg 19-50 yrs 580 mg CV 35%	14-18 yrs 1250 mg 19-50 yrs 1000 mg	-	*Based on a graphical transformation technique assessing intake level required to reach lowest point for normal plasma range; no additional need in lactation*
Potassium	-	-	All ages 2800 mg	*Median population intakes; no additional needs for lactation*
Selenium	All ages 65 µg CV 10%	All ages 75 µg	-	*Based on intakes required to maintain adequate plasma glutathione peroxidase plus an allowance for selenium secreted in breast milk*
Sodium	-	-	Men 460-920 mg Women 460-920 mg	*Extrapolated from intakes required in adults to maintain sodium balance with a generous margin for acclimatisation to hot climate. No additional requirement in lactation*
Zinc***	14-18 yrs 9 mg 19-50 yrs 10 mg	14-18 yrs 11 mg 19-50 yrs 12 mg	-	*Factorial method based on intestinal, urinary, skin and semen losses and estimated absorption rates of 24% for men and 31% women with an allowance for zinc secreted in breast milk*

* For mothers and their babies with limited exposure to sunlight a supplemental intake of 10µg/day would not be excessive

** Absorption of iron is lower from vegetarian diets so intakes will need to be up to 80% higher

*** Absorption of zinc is lower from vegetarian diets so intakes will need to be up to 50% higher

SUMMARY OF UPPER LEVELS OF INTAKE

TABLE 22. UPPER LEVELS OF INTAKE

Nutrient	Infants[a]	1-3 years	4-8 years	9-13 years	14-18 years (including pregnancy & lactation)	Adult males	Adult females (including pregnancy & lactation)
Protein[b]	NP	NP	NP	NP	NP	NP	NP
Linoleic acid	NP	NP	NP	NP	NP	NP	NP
α-linolenic	NP	NP	NP	NP	NP	NP	NP
LC n-3 (omega) mg	NP	3000 mg	3000 mg	3000 mg	3000 mg	3000 mg	3000 mg
Dietary fibre g	NP	NP	NP	NP	NP	NP	NP
Water L	NP	NP	NP	NP	NP	NP	NP
Vitamin A[c] as retinol	600 μg	600 μg	900 μg	1700 μg	2800 μg	3000 μg	3000 μg
Thiamin	NP	NP	NP	NP	NP	NP	NP
Riboflavin	NP	NP	NP	NP	NP	NP	NP
Nicotinic acid Nicotinamide	NP NP	10 mg 150 mg	15 mg 250 mg	20 mg 500 mg	30 mg 750 mg	35 mg 900 mg	35 mg 900 mg
Vitamin B_6[d]	NP	15 mg	20 mg	30 mg	40 mg	50 mg	50 mg
Vitamin B_{12}	NP	NP	NP	NP	NP	NP	NP
Folate[e]	NP	300 μg	400 μg	600 μg	800 μg	1000 μg	1000 μg
Pantothenate	NP	NP	NP	NP	NP	NP	NP
Biotin	NP	NP	NP	NP	NP	NP	NP
Choline	NP	1000 mg	1000 mg	1000 mg	3000 mg	3500 mg	3500 mg
Vitamin C[f]	NP	NP	NP	NP	NP	NP	NP
Vitamin D	25 μg	80 μg	80 μg	80 μg	80 μg	80 μg	80 μg
Vitamin E (αTE)	NP	70 mg	100 mg	180 mg	250 mg	300 mg	300 mg
Vitamin K	NP	NP	NP	NP	NP	NP	NP

(Continued)

a For infants it is generally not possible (NP) to establish an Upper Level of Intake. Intake for infants should be from breast milk formula or foods only. For other ages, limited data for certain nutrients may mean it is not possible to set an Upper Level of Intake

b Upper limit of 25% energy from protein recommended in relation to the balance of macronutrients for chronic disease prevention

c Limit cannot be established for supplemental beta-carotene intake and is not required for food sources

d For Vitamin B6 UL is for pyridoxine

e For folate, UL is for dietary folate equivalents from fortified foods and supplements

f For vitamin C, 1000mg/day would be a prudent limit

TABLE 22. (CONT'D) UPPER LEVELS OF INTAKE

Nutrient	Infants[a]	1-3 years	4-8 years	9-13 years	14-18 years (including pregnancy & lactation)	Adult males	Adult females (including pregnancy & lactation)
Calcium	NP	2500 mg	2500 mg	2500 mg	2500 mg	2500 mg	2500 mg
Chromium	NP	NP	NP	NP	NP	NP	NP
Copper	NP	1 mg	3 mg	5 mg	8 mg	10 mg	10 mg
Fluoride*	0-6 mo 1.2 mg 7-12 mo 1.8 mg	2.4 mg	4.4 mg	10 mg	10 mg	10 mg	10 mg
Iodine	NP	200 µg	300 µg	600 µg	900 µg	1100 µg	1100 µg
Iron	20 mg	20 mg	40 mg	40 mg	45 mg	45 mg	45 mg
Magnesium supplements	NP	65 mg	110 mg	350 mg	350 mg	350 mg	350 mg
Manganese[g]	NP	NP	NP	NP	NP	NP	NP
Molybdenum	NP	300 µg	600 µg	1100 µg	1700 µg	2000 µg	2000 µg
Phosphorus	NP	3000 mg	3000 mg	4000 mg	4000 mg	19-70 years 4000 mg >70 years 3000 mg	19-70 years 4000 mg >70 years 3000 mg Pregnancy: 3500 mg Lactation: 4000 mg
Potassium	NP	NP	NP	NP	NP	NP	NP
Selenium	0-6 mo 45 µg 7-12 mo 60 µg	90 µg	150 µg	280 µg	400 µg	400 µg	400 µg
Sodium#	NP	1000 mg	1400 mg	2000 mg	2300 mg	2300 mg	2300 mg
Zinc	0-6 mo 4 mg 7-12 mo 5 mg	7 mg	12 mg	25 mg	35 mg	40 mg	40 mg

a For infants it is generally not possible (NP) to establish an Upper Level of Intake. Intake for infants should be from breast milk formula or foods only. For other ages, limited data for certain nutrients may mean it is not possible to set an Upper Level of Intake

g Intake of manganese beyond that found in food and beverages could represent a health risk but there is insufficient data to seta UL.

* The fluoride AI and UL for 0-8 year olds were updated in 2017. The following reference body weights were used when the 2017 NRVs for infants and young children aged 0-8 years were expressed in mg fluoride/day; 0-6 months 6 kg, 7-12 months 9 kg, 1-3 years 12 kg, 4-8 years 22 kg.

The sodium ULs for adults were updated in 2017. The 2006 UL for 14 - 18 years, including for pregnancy and lacation, remains until the ULs for infants, children and adolescents are reviewed. The 2017 ULs for adults of 'not determined' are for adults 18+ years. It is recognised that currently there is overlap in the UL recommendations for 18 year olds. The UL for 18 year olds should be taken as the 2017 UL for adults as this is more up-to-date. ND, not determined - reflecting the inability to identify a single point below which there is low risk.

SUMMARY OF RECOMMENDATIONS TO REDUCE CHRONIC DISEASE RISK

(APPLICABLE TO ADOLESCENTS OVER 14 YRS AND ADULTS)

TABLE 23. SUGGESTED DIETARY TARGETS (SDT) TO REDUCE CHRONIC DISEASE RISK– MICRONUTRIENTS, DIETARY FIBRE AND LC N-3 FATS

Nutrient	Suggested Dietary Target[a] (intake per day on average)	Comments
Vitamin A	Vitamin A: Men 1,500 µg Women 1,220 µg Carotenes: Men 5,800 µg Women 5,000 µg	The suggested dietary target is equivalent to the 90th centile of intake in the Australian and New Zealand populations, to be attained by replacing nutrient-poor, energy-dense foods and drinks with plenty of red-yellow vegetables and fruits, moderate amounts of reduced-fat dairy foods and small amounts of vegetable oils.
Vitamin C	Men 220 mg Women 190 mg	Equivalent to the 90th centile of intake in the Australian and New Zealand populations, to be attained by replacing nutrient-poor, energy-dense foods and drinks with plenty of vegetables, legumes and fruit.
Vitamin E	Men 19 mg Women 14 mg	Equivalent to the 90th centile of intake in the Australian and New Zealand populations, to be attained by including some poly- or monounsaturated fats and oils and replacing nutrient-poor, energy-dense foods and drinks with plenty of vegetables and moderate amounts of lean meat, poultry, fish, reduced-fat dairy foods and wholegrain cereals.
Selenium	No specific figure can be set. There is some evidence of potential benefit for certain cancers but adverse effects for others.	There are no available population intake data for Australia. New Zealand is a known low selenium area, thus recommendations based on centiles of population intakes are inappropriate. Selenium-rich foods include seafood, poultry and eggs and to a lesser extent, other muscle meats. The content in plant foods depends on the soil in which they were grown.
Folate	An additional 100–400 µg DFE over current intakes (ie a total of about 300–600 µg DFE), may be required to optimise homocysteine levels and reduce overall chronic disease risk and DNA damage.	Current population intakes are well below the new recommended intakes. Increased consumption through replacement of nutrient-poor, energy-dense foods and drinks with folate-rich foods such as vegetables and fruits and wholegrain cereals is recommended as the primary strategy. Dairy foods can also help with folate absorption but reduced fat varieties should be chosen. It should be noted that fortified foods contain folic acid which has almost twice the potency of naturally occurring food folates.

a For most nutrients, unless otherwise noted, this is based on the 90th centile of current population intake. Average intake may be based on the mean or median depending on the nutrient and available data.

(Continued)

TABLE 23 (CONT'D) SUGGESTED DIETARY TARGETS (SDT) TO REDUCE CHRONIC DISEASE RISK – MICRONUTRIENTS, DIETARY FIBRE AND LC N-3 FATS

Nutrient	Suggested Dietary Target[a] (intake per day on average)	Comments
Sodium *(revised 2017)*/ potassium	Sodium *(revised 2017)*: Men 2,000 mg 87 mmol Women 2,000 mg 87 mmol Potassium: Men 4,700 mg 120 mmol Women 4,700mg 120 mmol	The Sodium SDT and UL for adults were reviewed in 2017. In this case, the SDT is the average intake of a nutrient that may help in the prevention of chronic disease. 'Average' refers to the median intake of the population. The Sodium SDT was revised to 2,000 mg/day for adults. This is based on analysis of data indicating that if sodium intake at a population level were to decrease from the current average of about 3600mg/day to 2000mg/day, reductions in average population blood pressure could be achieved. It also aligns well with dietary modelling underpinning the Australian Dietary Guidelines (ADG) to support nutritional adequacy in the whole diet. For the review of the sodium UL, the analysis of currently available data failed to determine an identifiable point at which the relationship between increasing sodium intake and increasing blood pressure did not occur in the range of tested data (between 1200 and 3300mg). In other words, increased sodium intake was associated with increased blood pressure at all measured levels of intake. The revised UL is thus 'not determined' reflecting the lack of an identifiable low risk level. The 2006 Potassium NRVs have not been reviewed, as potassium was outside the scope of the 2017 review. As potassium can blunt the effect of sodium on blood pressure, intakes at the 90th centile of current population intake may help to mitigate the effects of sodium on blood pressure until intakes of sodium can be lowered. At the level of 4,700 mg/day for potassium there is also evidence of protection against renal stones. Increased potassium intake should be through greater consumption of fruits and vegetables.
Dietary Fibre	Men 38 g Women 28 g	Upper level at 90th centile of intake for reduction in CHD risk. Increased intakes should be through replacement of nutrient-poor, energy-dense foods and drinks and plenty of vegetables, fruits and wholegrain cereals.
LC n-3 fats (DHA:EPA:DPA)	Men 610 mg Women 430 mg	The suggested dietary target is equivalent to the 90th centile of intake in the Australian/New Zealand population to be attained by replacing energy-dense, low nutrient foods and drinks with LC n-3-rich foods such as fish such as tuna, salmon and mackerel, lean beef or low energy density, LC n-3-enriched foods.

a For most nutrients, unless otherwise noted, this is based on the 90th centile of current population intake. Average intake may be based on the mean or median depending on the nutrient and available data.

TABLE 24. ACCEPTABLE MACRONUTRIENT DISTRIBUTION RANGES (AMDR) FOR MACRONUTRIENTS TO REDUCE CHRONIC DISEASE RISK WHILST STILL ENSURING ADEQUATE MICRONUTRIENT STATUS

Nutrient	Lower end of recommended intake range	Upper end of recommended intake range	Comments
Protein	15% of energy	25% of energy	On average, only 10% of energy is required to cover physiological needs, but this level is insufficient to allow for EARs for micronutrients when consuming foods commonly eaten in Australia and New Zealand. Intakes in some highly active communities (eg hunter-gatherers, Arctic, pastoralists) are as high as 30% with no apparent adverse health. No predominantly sedentary western societies have intakes at this level from which to assess potential adverse outcomes. Thus, a prudent UL of 25% of energy has been set.
Fat	20% of energy	35% of energy	The lower end of the range is determined by the amount required to sustain body weight and to allow for intakes of EARs of micronutrients. Some communities, notably some Asian groups, have average fat intakes below this level, but members of these groups are often smaller in stature and their overall nutrient status is not always known. The upper level was set in relation to risk of obesity and CVD, bearing in mind that high fat diets are often high in saturated fat, a known risk factor for heart disease, and are also often energy dense, increasing a propensity to over-consumption of energy. Saturated and trans fats together should be limited to no more than 10% of energy.
Linoleic acid (n-6 fat)	As per relevant age/gender AI: Equates to 4-5% dietary energy	90th centile of population intake: Equates to 10% of dietary energy	Based on intakes to help optimise chronic disease risk, notably CHD. There is some animal-based evidence that intakes up to 15% could be acceptable, but human evidence is limited. 10% as energy equates to about the 90th centile of current population intakes.
α-linolenic acid (n-3 fat)	As per relevant age/gender AI: Equates to 0.4–0.5% dietary energy	90th centile of population intake: Equates to 1% dietary energy	Based on intakes to help optimise chronic disease risk, notably CHD.
Carbohydrate	45% of energy (predominantly from low energy density and/or low glycaemic index foods)	65%of energy (predominantly from low energy density and/or low glycaemic index food sources)	The upper bound carbohydrate recommendations were set so as to accommodate the essential requirements for fat (20%) and protein (15%). It is of importance to note that the types of carbohydrates consumed are of paramount importance in relation to their health effects.

The National Health and Medical Research Council

The National Health and Medical Research Council (NHMRC) was established in 1936 and is now a statutory body within the portfolio of the Australian Government Minister for Health and Ageing, operating under the *National Health and Medical Research Council Act 1992* (NHMRC Act). NHMRC advises the Australian community and the Australian Government, and State and Territory governments on standards of individual and public health, and supports research to improve those standards.

The NHMRC Act provides four statutory obligations:

- to raise the standard of individual and public health throughout Australia;
- to foster development of consistent health standards between the states and territories;
- to foster medical research and training and public health research and training throughout Australia; and
- to foster consideration of ethical issues relating to health.

NHMRC also has statutory obligations under the *Prohibition of Human Cloning Act 2002* (PHC Act) and the *Research Involving Human Embryos Act 2002* (RIHE Act).

The activities of the NHMRC translate into four major outputs: health and medical research; health policy and advice; health ethics; and the regulation of research involving donated IVF embryos, including monitoring compliance with the ban on human cloning and certain other activities.

NHMRC approves and publishes a variety of clinical, public and environmental health guidelines and advice products. These focus on addressing clinical and public health priorities. These National Health Priority Areas (NHPAs) have been designated by Australian governments as key targets because of their contribution to the burden of disease in Australia. The NHPAs underpin much of the work undertaken by NHMRC, with funding for research and translation activities being provided across all these areas, reflecting the strengths and interests of researchers.

The NHPAs are:

- arthritis and musculoskeletal conditions
- asthma
- cancer control
- cardiovascular health
- dementia
- diabetes mellitus
- injury prevention and control
- mental health
- obesity

In consultation with the Council of NHMRC, a number of other major health issues have been identified:

- Create stronger pathways to capture the economic value of research discoveries
- Improve the health of Aboriginal and Torres Strait Islander peoples
- Harness the power of new technologies to improve health care
- Prepare for rapid and unpredictable change
- Develop and promote robust frameworks to support evidence-based decision-making
- Address the social, environmental and community dimensions of health
- Strengthen the quality of evidence from research

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