



Australian Government
Department of Health



Australian and New Zealand Nutrient Reference Values for Sodium

Supporting Document 3

**Review of Dietary Modelling that supported for the
Australian Dietary Guidelines**

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Sodium content of Dietary Models developed in support of 2012 Australian Dietary Guidelines

This supporting document describes the sodium content of the diet which conforms to a more restricted form of the serves of the five food groups, one 'allowance' and 'discretionary' foods¹ as contained in the companion documents of the Australian Dietary Guidelines (www.eatforhealth.gov.au).

The modelling undertaken aimed to determine what the energy intake was that would allow a diet that met the Recommended Dietary Intake (RDI) for the 10 nutrients used as drivers of the model, and the other constraints determined by the Dietary Guidelines Working Committee. Separate modelling was done for life-stage groups with separate NRVs. The composition of the basic food composites used in the modelling were generally lower sodium options (and also lower in sugar etc.). The discretionary group was a catch-all that included foods high in sodium, sugar etc. The model assumed that no discretionary salt would be added to cooking or at the table.

Because energy and sodium were output-only nutrients and not used as drivers, the results show the energy and sodium content of the Foundation diet. The Foundation diet includes only the five food groups and one allowance. It does not include any serves of the discretionary foods. Because the energy content of the Foundation diet did not meet the energy needs of most of the young adult population (and variable proportions of other life-stage groups), and people eat individual foods at meals (not a composite protein that is a mix of beef, lamb, chicken, fish etc.), Monte Carlo simulations were done to examine the nutrient content of dietary patterns that adhered to the five food groups and one allowance, but included additional serves of them to increase energy content to the energy requirements of the population.

¹ The five food groups identified in the ADG are grain and cereal foods (mostly wholegrain/high fibre); vegetables and legumes; lean meat and poultry, fish, eggs, tofu, nuts and seeds and legumes/beans; milk, yoghurt, cheese and alternatives, mostly reduced fat; and fruit. 'Allowance' foods are unsaturated spreads and oils. Discretionary foods are those that are high in saturated fat, added sugars, salt and/or alcohol and should be chosen only occasionally and consumed in small amounts.

Energy requirements vary by body size and activity level, therefore a range of scenarios were modelled. The average height of men and women in the 1995 National Nutrition Survey was used as was a tall height. Calculation of BMR also requires a weight to be set. The actual weight of the population was not used to calculate the BMR owing to the increasing levels of overweight in the population. Instead, all models were done for a weight that yielded a BMI of 22 kg/m² for the height being modelled. These are the BMR values shown in the energy chapter of the 2006 NRVs [1].

“In 2011-12, the average Australian man (18 years and over) was 175.6 cm tall and weighed 85.9 kg. The average Australian woman was 161.8 cm tall and weighed 71.1 kg.” Height has increased since 1995. “On average, Australians are growing taller and heavier over time. Between 1995 and 2011-12, the average height for men increased by 0.8 cm and for women by 0.4 cm, while the average weight for men increased by 3.9 kg and for women by 4.1 kg.” [2].

The energy content of the Foundation diets for four different cuisine styles was in the range of 8950 kJ-9000 kJ for men aged 19-30 and 6700-7400 kJ for women of the same age. These were associated with sodium intakes ranging from 1000-1400 mg/day in men and 900-1400 mg/day in women.

However, although these plans achieve the nutrient targets, their energy content only achieves an energy level approximately equal to the mean energy requirement of a short man (160 cm) and woman (150 cm) who is not active. However these heights were at approximately the 1-2nd centile of height in the 1995 survey. This means that most (more than 95%) of the adult population needs to eat more food than is described in the Foundation diet owing to their taller height. If they are more active than a PAL of 1.4, then additional energy is required. In other words, the Foundation diets cannot be used as a ‘reality check’ owing to their inadequate energy content.

Energy and sodium content of Foundation diets calculated from composite food groupings to meet the RDI of 10 nutrients for two age groups within the constraints set by the Dietary Guidelines Working Party, for 4 styles of cuisine [3]

Sex		19-30 years		70 years and older		Source
		Energy including fibre (kJ)	Sodium (mg)	Energy including fibre (kJ)	Sodium (mg)	(page)
M	Omnivore	8944	1411	7305	1265	241
	Plant-based ovo-lacto vegetarian	8958	1296	7354	1176	243
	Pasta-based	8947	1338	7378	1208	247
	Rice-based	9002	998	7224	980	244
F	Omnivore	7384	1405	6587	1178	239-40
	Plant-based ovo-lacto vegetarian	6765	1188	6095	1071	242
	Pasta-based	7253	1159	6554	988	246
	Rice-based	7153	926	6596	1014	245

In 2012, the average height of young adult men was 177 cm and women, 163 cm. The table below shows the results of Monte-Carlo modelling of 7-day diets to achieve the energy requirements of men 175 cm tall and women 165 cm tall. Only patterns with no more than seven serves of ‘extras’ per week were selected for presentation. There are a range of patterns because different assumptions can be made about the relative proportions of the five food groups for increasing consumption to meet the additional energy requirement.

It is evident that the Foundation diet meets only about 75% of the energy needs of a young adult of average activity. This is associated with an average sodium intake ranging 1900-2700 mg/day, depending on which of the five food groups in increased to what extent. A tall active young man needs to eat an additional 6000 kJ per day compared to the Foundation diet and this increases the associated sodium content of the diet to around 2300-2800 mg/day. The energy requirement of an older man of average activity is about 2200 kJ higher

than the Foundation diet for this person. Sodium content is higher in proportion, an average of 1500-2000 mg across the models. The maximum and minimum of the 100 Monte-Carlo simulations for each of the 7-day diets is also shown.

A similar pattern is seen for women. The average sodium content of diets for a young adult of average activity ranged from 1700 mg-2000 mg/day. The Appendix did not list any 7-day diets that contained as few as 7 serves of extras per week for tall, very active young women. The average sodium content of diets for an elderly women ranged from 1450-1600 mg/day.

Using foods which do not contain excess sodium, sugar or saturated fat, and excluding alcohol and discretionary salt use, and which also meet micronutrient and energy requirements of the population as recommended in the Australian Dietary Guidelines, lead to average daily sodium intakes in the order of 1900-2200 mg in young men and 1700-2000 mg in young women of average activity. Few of the minima are as low as the 2006 Suggested Dietary Target (SDT) of 1600 mg/day.

Average, maximum and minimum daily energy and sodium content of Total Omnivore diets containing not more than 7 serves of extra foods per week; models for the average young adult man and woman, an active young adult and an elderly adult of average activity [3]

Sex	Age (years)	Height (cm)	PAL	N serves of 'extras' per week	Energy (including fibre) content of 7- day total diets (kJ/day)*			Sodium content of 7-day total diets (mg/day)			Source (page)
					Average*	Min	Max	Average	Min	Max	
M	19-30	175	1.7	7	12384	11941	12705	1893	1634	2148	316
		175	1.7	7	12483	12107	13040	2149	1770	2914	318
		175	1.7	7	12350	11851	13200	2213	1859	3073	320
	19-30	190	2	7	15731	15314	16130	2278	1956	3102	323
		190	2	7	15847	15328	16388	2772	2290	3766	325
	70+	175	1.7	3.5	9822	9473	10196	1507	1147	2214	358
		175	1.7	7	9929	9558	10332	1724	1447	2589	359
		175	1.7	7	9842	9519	10213	1817	1550	2714	360
		175	1.7	0	9816	9519	10334	2025	1715	2811	361
		175	1.7	0	9799	9398	10248	1891	1593	2811	362
F	19-30	165	1.7	7	9837	9419	10234	1870	1439	3221	371
		165	1.7	3.5	9876	9496	10459	1711	1479	2860	372
		165	1.7	7	9819	9433	10306	1821	1491	2733	373
		165	1.7	7	9878	9503	10381	1857	1523	2688	374
		165	1.7	3.5	9856	9419	10377	1986	1622	2909	375

Sex	Age (years)	Height (cm)	PAL	N serves of 'extras' per week	Energy (including fibre) content of 7- day total diets (kJ/day)*			Sodium content of 7-day total diets (mg/day)			Source (page)
					Average*	Min	Max	Average	Min	Max	
		165	1.7	0	9840	9442	10245	1728	1484	2612	376
	19-30	180	2	7	No diets with few extras						
	70+	165	1.7	3.5	8580	8247	9083	1602	1398	2479	413
		165	1.7	3.5	8661	8310	9077	1444	1223	2221	414
		165	1.7	0	8548	8253	9104	1602	1399	1780	415
		165	1.7	3.5	8607	8262	9038	1587	1358	2464	416
		165	1.7	7	8486	8140	8916	1507	1283	2412	417
		165	1.7	7	8696	8350	9127	1555	1322	2381	418

* There is little variation in energy content of the dietary patterns because the model was constrained to meet the average energy requirement of the age-sex group.

References

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