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Dietary salt intake in the Australian population

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Abstract

Objective: To update the estimate of mean salt intake for the Australian population made by the Australian Health Survey (AHS).
Design: A secondary analysis of the data collected in a cross-sectional survey was conducted. Estimates of salt intake were made in Lithgow using the 24 h diet recall methodology employed by the AHS as well as using 24 h urine collections. The data from the Lithgow sample were age- and sex-weighted, to provide estimates of daily salt intake for the Australian population based upon (i) the diet recall data and (ii) the 24 h urine samples.
Setting: Lithgow, New South Wales, Australia.
Subjects: Individuals aged ≥20 years residing in Lithgow and listed on the 2009 federal electoral roll.
Results: Mean (95 % CI) salt intake estimated from the 24 h diet recalls was 6·4 (6·2, 6·7) g/d for the Lithgow population compared with a corresponding figure of 6·2 g/d for the Australian population derived from the AHS. The corresponding estimate of salt intake for Lithgow adults based upon the 24 h urine collections was 9·0 (8·6, 9·4) g/d. When the age- and sex-specific estimates of salt intake obtained from the 24 h urine collections in the Lithgow sample were weighted using Australian census data, estimated salt intake for the Australian population was 9·0 (8·6, 9·5) g/d. Further adjustment for non-urinary Na excretion made the best estimate of daily salt intake for both Lithgow and Australia about 9·9 g/d.
Conclusions: The dietary recall method used by the AHS likely substantially underestimated mean population salt consumption in Australia.

Keywords
Salt
Sodium
Diet recall
Diet survey
24 h urine sample
Australia

CVD is the leading cause of death and disability worldwide[1]. There is a positive association between dietary salt intake, blood pressure and CVD[2]. Equally there is a significant body of evidence demonstrating that reducing salt consumption can be effective in lowering blood pressure, with projected large benefits for cardiovascular mortality and medical expenditure[3,4].

Collection of 24 h urine samples is the preferred method for determining population salt intake[5] although it does not capture the approximate 10 % of dietary salt lost through non-urinary routes[6]. In Australia, a number of small studies have measured salt consumption using 24 h urine samples but no nationally representative study has been conducted using this method[7–12]. Collection of 24 h urine samples is burdensome for subjects, which is a barrier to use in population surveys. In Australian population surveys, including the most recent Australian Health Survey (AHS) 2011–13, 24 h dietary recalls were used to measure dietary intake. Diet recalls are known to underestimate intake of energy and also salt[13,14], although in Australia there has been no investigation of how accurate the estimates of dietary salt intake derived from population dietary surveys are compared with 24 h urine collections.

The appropriate prioritisation of salt reduction strategies in Australia requires knowledge of current intake levels and the foods that are the major contributors to dietary salt intake. The aims of the present study were to: (i) compare mean dietary salt intake estimates derived from 24 h diet recalls and 24 h urine collections for the population of Lithgow, New South Wales, Australia; (ii) compare the proportion of salt intake deriving from different dietary sources in Lithgow and Australia; and (iii) use these findings to update the national estimates of mean Australian salt intake derived from the 2011–13 AHS.

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Methods

The present study comprises a secondary analysis of the data collected in a cross-sectional survey conducted in Lithgow in 2011[15] and the AHS, which was done nationwide between 2011 and 2013.

Lithgow study

Participant selection and recruitment

Participant selection and recruitment have been reported in detail previously[15]. Briefly, individuals aged 20 years or above who were residents in Lithgow and listed on the 2009 federal electoral roll were eligible for inclusion. There were no exclusions based on intercurrent illness, use of medications or any other aspect of demography or personal history. Participants were recruited using two recruitment strategies, which were random sampling and volunteer sampling. The random sample of adults (≥20 years old) was selected from the entire adult Lithgow population using the federal electoral roll and the volunteer sample of adults was recruited at local shopping centres. Estimates of salt consumption from the random and volunteer samples were comparable and for the current analyses the samples have been combined[16].

Data collection

Data collection procedures commenced with a visit to the study participant by a trained research assistant. Once consent was obtained, the four components of the study, namely a general questionnaire, physical measurements, one multiple-pass 24 h dietary recall and a single 24 h urine collection, were initiated. The general questionnaire, anthropometric measurements and 24 h dietary recall were completed at the time of the visit. The urine collection was done within 3 d of the diet recall.

24 h diet recall

A five-pass 24 h food recall was used to determine all food and beverages consumed from midnight to midnight on the day before the interview, based upon methodology developed by the Agricultural Research Service of the US Department of Agriculture[17]. This method does not include estimation of discretionary salt intake, but in the Lithgow sample discretionary salt intake was estimated by collection of information about the quantity of salt added during food preparation and prior to consumption. Participants were asked to estimate the amount of salt added using teaspoon measures and gram weights were assigned to common ways of adding salt; i.e. pinch (0·3 g salt), shakes/twists (0·4 g salt) of the salt shaker. Food model booklets were used to assist with the reporting of quantity and prompts were provided by interviewers to probe for complete food descriptions, variable recipe ingredients and food preparation techniques.

Dietary analysis

Dietary data collected from the Lithgow sample were entered into the nutrient analysis package Foodworks Professional Edition version 7 (Xyris Software, Highgate Hill, Australia). Discretionary salt added at the table or during cooking was entered separately for each individual and removed from the total salt value for the analyses that do not include discretionary salt. Suspected implausible diet recalls were excluded from all analyses on the basis of extreme levels of energy intake (<2510 or >14 644 kJ/d for women and <3347 or >17 572 kJ/d for men)[18,19]. The Food Standards Australia New Zealand AUSNUT 2007 database was used as the primary source of nutrient values for this analysis because the foods in AUSNUT have a more comprehensive set of nutrient values compared with the nutrients included in the laboratory-analysed database of foods in NUTTAB[20]. AUSNUT guidelines[21] were used to code each food and beverage into twenty-one major food categories.

24 h urine collection

The 24 h urine collection was obtained using standard methods[15]. For each individual, the 24 h Na excretion value (mmol/d) was calculated as the concentration of Na in the urine (mmol/l) multiplied by the urinary volume (l/d) multiplied by the time adjustment factor. The conversion from Na (mmol/d) to Na (mg/d) was made by multiplying by 23, and the conversion from Na (g/d) to salt (g/d) was made by multiplying the Na value by 2·54. Data for individuals with suspected incomplete urine collections and suspected over-collections were excluded. Incomplete urine samples were defined as: urinary creatinine <4 mmol/d for women or <6 mmol/d for men; a 24 h urine volume of <500 ml for either sex; or extreme outliers for urinary creatinine (i.e. >3 SD from the mean).

Australian Health Survey

The Australian dietary data used in the current paper were collected as part of the National Nutrition and Physical Activity Survey 2011–12, one of four components of the AHS 2011–13. In the National Nutrition and Physical Activity Survey, 9500 households Australia-wide were sampled. A five-pass 24 h diet recall was completed in one adult and one child aged 2–17 years in each selected household. The US Department of Agriculture Automated Multiple-Pass Method was adapted for use in the National Nutrition and Physical Activity Survey[17]. This method is directly comparable with the diet recall that was completed in the Lithgow sample. However, no estimate of discretionary salt use was made in the National Nutrition and Physical Activity Survey.

In the Lithgow survey, food and beverage intakes were categorised into the same food classification groups that were used in the AHS with the exception of an additional category ‘dairy and meat substitutes’ included in the AHS.

In the Lithgow analysis, dairy milk and meat substitutes were included in 'milk products and dishes' and 'meat, poultry and game products and dishes', respectively. For presentation of the AHS data in the current paper, milk and meat substitutes were added to 'milk products and dishes' and 'meat, poultry and game products and dishes', respectively. Additional details of the survey can be found in the *Australian Health Survey: Users' Guide 2011–13*[22]. We report dietary Na intake and dietary sources of Na for the population of Australia (aged over 19 years), which were accessed from *Australian Health Survey: Nutrition First Results – Food and Nutrients, 2011–12*[23]. No direct analyses were undertaken using the dietary data collected in the AHS. Nutrient intake for all respondents was included in these published data and there was no exclusion for low-energy reporters. In the AHS, 24 h urine samples for measurement of dietary salt intake were not collected.

Statistical analysis

The Goldberg method was applied to the Lithgow sample to determine low-energy reporters. Low-energy reporters were defined as reporting an energy intake of less than 90 % of their calculated BMR (energy intake:BMR <0·9)[24]. Analyses were conducted both when low-energy reporters were included and after the exclusion of low-energy reporters. The characteristics of low-energy reporters were compared with those who did not under-report energy intake using independent-samples *t* tests. The data from the Lithgow sample were age- and sex-weighted, using census data for Lithgow, to provide estimates of daily salt intake for the adult Lithgow population based upon (i) the diet recall data and (ii) the 24 h urine samples. The data from Lithgow were then used to make estimates of daily salt intake for the adult Australian population, using census data for Australia, based upon (i) the diet recall data from Lithgow and (ii) the 24 h urine samples from Lithgow. In each case the weighting used the age- and sex-specific salt intake estimates obtained from the study sample to make population estimates that correspond to the age and sex structure of the target population. Three age groups were defined (20–39, 40–59 years and 60 + years) for each sex. To obtain estimates for the Lithgow and Australia population we used 2011 census data for persons aged 20 years or over from the Australian Bureau of Statistics[25]. Post-stratification weighting was used to adjust the sample data according to the age and sex structure of the population at large, and the finite population correction was applied. Data are presented as mean (95 % CI) unless otherwise specified. Statistical analyses were conducted using the statistical software package Stata 13 for Windows.

Results

There were 449 participants who consented to take part in the Lithgow study of whom thirty-seven were subsequently excluded: twenty-five because of absent or suspected incomplete urine collections, seven due to implausible diet recall data, three because consent was withdrawn and two because age was found to be below the cut-off (i.e. <20 years). This left 412 individuals with complete 24 h urine collections and diet recall data, of whom approximately half were female, with a mean age of 58 (54, 57) years and a mean BMI of 29·5 (28·9, 30·0) kg/m^2 (Table 1). There were ninety-three (23 %) individuals who were identified as low-energy reporters on the basis of the Goldberg method. Low-energy reporters had a greater BMI (31·7 *v.* 28·8 kg/m^2; $P < 0{\cdot}001$) and a lower salt intake (4·5 *v.* 6·6 g/d; $P < 0{\cdot}001$) than those who did not under-report energy intake, but were not different with regard to age, sex distribution or salt intake estimated from 24 h urine collections. The adult population of Lithgow is 15 112, which is made up of about 50 % females. The mean age and BMI is 51 years and 29·3 kg/m^2, respectively, for the population of Lithgow. The adult Australian population comprises about 16·7 million people who are, on average, 47 years of age with a BMI in the overweight range.

Estimated salt intake for Lithgow and Australia

The mean salt intake estimated for the Lithgow population using the diet recall data was 6·8 (6·5, 7·1) g/d. If discretionary salt intake was excluded from the calculation the estimate was 6·4 (6·2, 6·7) g/d (Table 2), which corresponds to a value of 6·2 g/d determined as the mean salt intake for Australia by the AHS using the same method. When low-energy reporters were excluded from the analyses the corresponding estimate of daily salt intake for Lithgow was 0·5 g/d higher (see online supplementary material, Supplemental Table 1). Based on the 24 h urine collections, the estimated mean salt intake for the Lithgow population was 9·0 (8·6, 9·4) g/d. Salt intake estimated by all methods was higher in males than females in the Lithgow population (see Supplemental Table 2). When the age- and sex-specific estimates of salt intake obtained from the Lithgow diet recall data were weighted up to the Australian population using 2011 census data, the estimated mean adult intake was 6·5 (6·2, 6·8) g/d excluding discretionary salt intake and 6·8 (6·5, 7·2) g/d including discretionary salt intake. Excluding low-energy reporters also inflated these values by 0·5 g/d. The same approach based upon the 24 h urine data from Lithgow resulted in a daily salt intake estimate for Australia of 9·0 (8·6, 9·5) g/d. Analysis by sex showed estimated salt intake in males was 10·3 (9·5, 11·1) g/d and for females the estimate was 7·8 (7·3, 8·3) g/d (see Supplemental Table 2).

Inflation of daily salt intake estimates for Lithgow and Australia by 10 % to account for known non-urinary Na excretion[6] provides a best estimate of daily salt intake for both Lithgow and Australia of about 9·9 g/d.

Table 1 Characteristics of survey participants, the Lithgow population and the Australian adult population

Variable	Lithgow sample (*n* 412)	Lithgow population (*n* 15 112)	Australian population (*n* 16 655 081)
Age (years), mean	58	51	47
95 % CI	54, 57		
Female (%)	55·6	49·5	49·2
Height (cm), mean	167	168	169
95 % CI	166, 168	168, 169	168, 170
Weight (kg), mean	82·5	83·5	83·5
95 % CI	80·7, 84·2	81·6, 85·4	81·3, 85·7
BMI (kg/m^2), mean	29·5	29·3	29·2
95 % CI	28·9, 30·0	28·8, 29·9	28·5, 29·9
BMI classification (%)			
Underweight	0·5	0·5	0·6
Normal	21·6	22·0	22·8
Overweight	38·3	38·2	37·6
Obese	39·6	39·3	38·9
Education (%)			
Secondary or below	62·9	63·3	63·5
Tertiary	26·7	27·1	27·4
Postgraduate	10·4	9·6	9·2
Self-rated health status (%)			
Poor	22·1	23·8	24·5
Good	28·2	27·0	26·4
Excellent	49·8	49·3	49·1
Current smoker* (%)	11·9	13·8	15·7
Ever smoked† (%)	44·7	44·5	44·7
Time since last alcoholic drink (%)			
≤1 week	56·6	56·5	56·5
>1 week	43·4	43·5	43·5

Mean age and sex of the Lithgow population and the Australian population are derived from census data; other estimates for Lithgow and Australia are based upon weighting of sample data to the age and sex structure of Lithgow population and the Australian population aged ≥20 years.
*>1 cigarette/d.
†Ever smoked >1 cigarette/d.

Table 2 Measured and estimated mean daily salt intake for Australians aged ≥20 years based upon dietary surveys and 24 h urine collections done in Lithgow and compared with values reported by the Australian Health Survey

	Measured salt intake from survey			Derived salt intake using Lithgow sample data weighted up to each population				Reported by the Australian Health Survey*	
	Lithgow sample			Lithgow		Australia		Australia	
	Mean	95 % CI	IQR†	Mean	95 % CI	Mean	95 % CI	Mean	%‡
Dietary including discretionary salt									
Dietary Na (mg/d)	2555	2444, 2666	700–8256	2662	2549, 2776	2688	2560, 2816		
Dietary salt (g/d)	6·5	6·2, 6·8	1·8–16·3	6·8	6·5, 7·1	6·8	6·5, 7·2		
Dietary without discretionary salt									
Dietary Na (mg/d)	2410	2306, 2515	700–6031	2534	2424, 2643	2572	2447, 2696	2431	0·7
Dietary salt (g/d)	6·1	5·9, 6·4	1·8–15·3	6·4	6·2, 6·7	6·5	6·2, 6·8	6·2	
Measured using 24 h urine collection									
Na (mg/d)	3446	3310, 3582	953–8158	3545	3392, 3698	3558	3377, 3738		
Salt (g/d)	8·8	8·4, 9·1	2·4–20·7	9·0	8·6, 9·4	9·0	8·6, 9·5		

*Australian Health Survey estimates from adults aged ≥19 years.
†Interquartile range (25th percentile–75th percentile).
‡Relative SE of the estimate (%).

Sources of dietary salt

The proportions of dietary salt deriving from each major food category for the Lithgow population are directly comparable to those reported by the AHS for the Australian population (Table 3). For analyses excluding discretionary salt, the food categories which contributed most to dietary salt consumption in the Lithgow and Australian populations were cereal and cereal products (20·9 *v.* 17·6 %), meat, poultry and game products and dishes (19·9 *v.* 18·8 %), cereal-based products and dishes (16·9 *v.* 23·5 %), milk products and dishes (9·1 *v.* 7·7 %), soups (6·2 *v.* 5·0 %), and savoury sauces and condiments (6·1 *v.* 6·4 %). In the Lithgow population, 4·5 (3·6, 5·3) % of salt intake was estimated to be discretionary salt added at the table or during food preparation.

Table 3 Measured and estimated proportions of daily salt intake deriving from different foods sources for Australians aged ≥20 years based upon dietary surveys done in Lithgow and compared with values reported by the Australian Health Survey

	Measured sources of Na from survey		Derived sources of Na using Lithgow data weighted up to each population*				Reported in the Australian Health Survey†	
	Lithgow sample		Lithgow population		Australia		Australia	
	Mean	95 % CI	Mean	95 % CI	Mean	95 % CI	Mean	%‡
Cereal and cereal products	21·3	20·0, 22·5	20·9	19·7, 22·2	20·8	19·4, 22·1	17·6	0·4
Meat, poultry and game products and dishes	18·9	17·4, 20·4	19·9	18·2, 21·6	20·1	18·1, 22·1	18·8	0·7
Cereal-based products and dishes	16·2	14·6, 17·8	16·9	15·2, 18·6	17·2	15·2, 19·1	23·5	0·9
Milk products and dishes	9·2	8·5, 10·0	9·1	8·3, 9·8	9·0	8·2, 9·9	7·7	0·3
Soups	6·8	5·5, 8·1	6·2	4·9, 7·4	5·9	4·6, 7·2	5·0	0·5
Savoury sauces and condiments	6·3	5·3, 7·2	6·1	5·2, 7·1	6·2	5·2, 7·2	6·4	0·6
Fish and seafood products and dishes	4·2	3·4, 5·0	4·0	3·2, 4·7	3·8	3·0, 4·7	3·8	0·4
Vegetable products and dishes	3·9	3·4, 4·4	3·9	3·4, 4·5	4·0	3·4, 4·6	4·7	0·3
Non-alcoholic beverages	3·7	3·1, 4·2	3·6	3·1, 4·0	3·5	3·0, 4·0	4·2	0·2
Miscellaneous	2·1	1·5, 2·7	2·3	1·5, 3·0	2·4	1·5, 3·3	1·1	0·1
Fats and oils	1·9	1·7, 2·1	1·9	1·7, 2·1	1·8	1·6, 2·0	1·1	0·1
Egg products	1·4	1·0, 1·7	1·2	0·9, 1·5	1·1	0·8, 1·3	1·2	0·1
Legume and pulse products and dishes	1·4	0·9, 1·8	1·3	0·9, 1·8	1·3	0·9, 1·8	0·8	0·1
Snack foods	0·8	0·5, 1·1	0·9	0·6, 1·2	1·0	0·6, 1·3	1·4	0·2
Confectionery and health bars	0·6	0·4, 0·7	0·6	0·4, 0·7	0·6	0·4, 0·7	0·5	0·0
Alcoholic beverages	0·5	0·4, 0·5	0·5	0·4, 0·6	0·5	0·4, 0·7	1·0	0·1
Seed and nut products and dishes	0·4	0·2, 0·6	0·4	0·2, 0·5	0·4	0·2, 0·5	0·5	0·1
Sugar products and dishes	0·3	0·1, 0·5	0·2	0·1, 0·4	0·2	0·1, 0·3	0·1	0·0
Fruit products and dishes	0·2	0·1, 0·2	0·2	0·1, 0·2	0·1	0·1, 0·2	0·2	0·0
Special dietary foods	0·1	0·0, 0·2	0·1	0·0, 0·3	0·2	0·0, 0·3	0·3	0·1

*Estimated from age- and sex-weighted analysis.
†Australian Health Survey estimates from adults aged ≥19 years.
‡Relative SE of the estimate (%).

Discussion

The 2011–13 AHS reported that average Australian salt consumption was 6·2 g/d based on the results of a diet recall questionnaire. When the same tool was administered in a sample of the Lithgow population the estimate of daily salt intake was directly comparable at 6·4 g/d. However, when salt consumption was measured using 24 h urine collections – the preferred method for measuring population salt intake – the estimate of mean salt consumption in Lithgow was much higher. Applying the Lithgow 24 h urine data to the Australian population resulted in a correspondingly much larger estimate of average intake for Australia, which was further inflated to about 9·9 g/d when non-urinary Na losses were also adjusted for. This final best estimate is more than 50 % greater than the 6·2 g/d initially reported by the AHS and far above the WHO's recommended maximum of 5 g/d.

A 9·9 g/d estimate of average salt intake aligns more closely with the first ever report of salt consumption in Australia made using 24 h urine samples[11] and a number of other studies conducted since, which report average consumption levels of 8–9 g/d without adjustment for non-urinary salt losses[7–10]. The most recent large study to report for the State of Victoria showed comparable results and no change in mean population salt consumption between 2011 and 2014[9].

The difference between the estimates of daily salt intake provided by the AHS and our analyses is large and has substantial implications for the priority that might be given to reducing salt intake in Australia. At a mean intake of 6·2 g/d, salt would not be a priority for public health because this level of consumption is only marginally above the target set by the WHO and far better than almost every other developed country for which data are available[26]. At 9·9 g/d, however, the picture is entirely different: 9·9 g/d is double the WHO's target for daily salt intake and suggests a several-fold greater disease burden attributable to excess salt consumption in Australia than would be attributable to an average consumption of 6·2 g/d.

Underestimation of population salt intake by dietary recall methods is well established[13,14,27], as is the impact of underestimation of salt intake on the implementation of salt reduction strategies[5]. The present analyses represent the first effort to make a robust national assessment of population salt consumption in Australia based upon 24 h urine collections. The discrepancy we observed between salt intake estimated by the diet recall and 24 h urine methods is attributable to a number of issues. First, under-reporting of absolute food consumption in dietary surveys is well established[28]. In our analyses removal of low-energy reporters modestly increased the estimate of salt intake from the diet recall method but a large discrepancy between salt intakes estimated from the dietary recall and 24 h urine collections still remained. Interestingly, estimated salt intake from the 24 h urine collections was not different by energy reporting status, indicating that

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individuals who do not accurately self-report their dietary intake probably still complete a 24 h urine collection reasonably well. The reported data from the AHS include low-energy reporters; this has been a point of criticism and in the future analyses should be conducted on the dietary data collected in the AHS to directly determine the effect of under-reporting. The under-reporting rate in the AHS was similar to what was observed in the Lithgow sample (16–26 % depending on sex and age group) using the same method and therefore it is expected that the estimate would be inflated to a similar extent if low-energy reporters were removed[22,24]. A second challenge is the lack of a robust scalable method for estimating discretionary salt use (salt added during cooking or at the table). In the Lithgow sample we attempted to collect data on discretionary salt use and, although the method used has not been validated, it showed 5 % of total salt consumption was from salt added at the table or during food preparation. This is likely an underestimate, as data from more robust methods suggest discretionary salt intake contributes 8–11 %[29,30]. Discretionary salt intake was not measured in the AHS but because the proportion of salt intake ascribed to discretionary use in Australia is small, this discrepancy is likely to have had only a minimal impact. Finally, dietary surveys rely on the use of food composition databases which often do not have up-to-date nutrient information for packaged food products and do not include all of the brands available. As such, the variation in salt content of food products is not taken into consideration. Each of these limitations is difficult to overcome and the findings of the current analyses suggest that if dietary surveys are used for population assessment of salt intake then 24 h urine samples should be completed in a sub-sample to enable calibration.

Our analyses used an indirect approach to estimate salt intake for the Australian population from data collected in Lithgow. The validity of this approach is supported by the use of the same multiple-pass method for administering the diet recall questionnaire in both the Lithgow survey and the AHS, and the observed highly comparable food sources of dietary salt across the Lithgow population and the Australian population. However, these analyses are limited by the use of one 24 h urine sample and diet recall to characterise salt intake. Due to the significant within-person variability observed with these methods, multiple collections/recalls are recommended to improve precision[6]. Further limitations of the analyses are the incomplete response rates achieved in both surveys and the inherent uncertainty in generalising data from a selected population in regional New South Wales to Australia as a whole. On balance, however, we believe the method is likely to provide a much more valid estimate of average population salt consumption in Australia than the diet recall data from the AHS alone.

These findings call for a reinvigorated effort to achieve reduction of salt consumption in Australia. This will require a multifaceted approach that encompasses government, industry and civil society. The now defunct Food and Health Dialogue launched by the federal government in 2009 had salt reduction as a priority and, like the successful UK programme before it[31], had reformulation of processed and restaurant foods as a centrepiece. Unfortunately the programme achieved only limited success[32, 33] and the absence of a recent fall in Victorian salt consumption levels suggests that Australia will need to do much more if it is to achieve to the WHO's 2025 goal of reducing population salt consumption by 30 %. The present analyses highlight the greatest contributors to total dietary salt intake as food categories targeted by the Food and Health Dialogue, which need to remain a focus for the government's new Healthy Food Partnership[34]. The reduced average Na content of breads (9 %, 39 mg/100 g), ready-to-eat breakfast cereals (25 %, 79 mg/100 g) and processed meats (8 %, 101 mg/100 g) achieved by the Food and Health Dialogue demonstrates that changes can be achieved[33], although the magnitude and scope of the ambitions must be increased if a significant national reduction in average salt intake is to be achieved. Modelling suggests that mandatory salt reduction targets would prove more effective and more cost-effective but the political interest in new regulation is presently muted[35].

Conclusion

The present analyses show that the national salt consumption data provided by the AHS 2011–13 substantially underestimated mean population intake. The data reinforce the need for action on salt, which should be a priority for the government's new Healthy Food Partnership.

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Supplementary material

To view supplementary material for this article, please visit https://dx.doi.org/10.1017/S1368980017000799

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