

THE AUSTRALIAN TOTAL DIET STUDY – A DYNAMIC TOOL IN ESTIMATING NUTRIENT LEVELS AND INTAKE IN THE AUSTRALIAN POPULATION

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Background

Maintaining current and relevant nutrient data is a complex task due to the dynamic nature of the food supply, as well as technological advances in nutrient analysis. Food Standards Australia New Zealand (FSANZ) maintains relevant and current data through an ongoing program.

The Australian Total Diet Study (ATDS) is a major component of the program. The ATDS is a significant national survey that examines levels of nutrients and other components in food and estimates exposure of the population. Traditionally, the ATDS focused on estimating dietary exposure of the Australian population to a range of pesticide residues and contaminants. In recent years, the format has expanded allowing greater flexibility in focusing the study on a wider range of food components such as nutrients.

Study Design

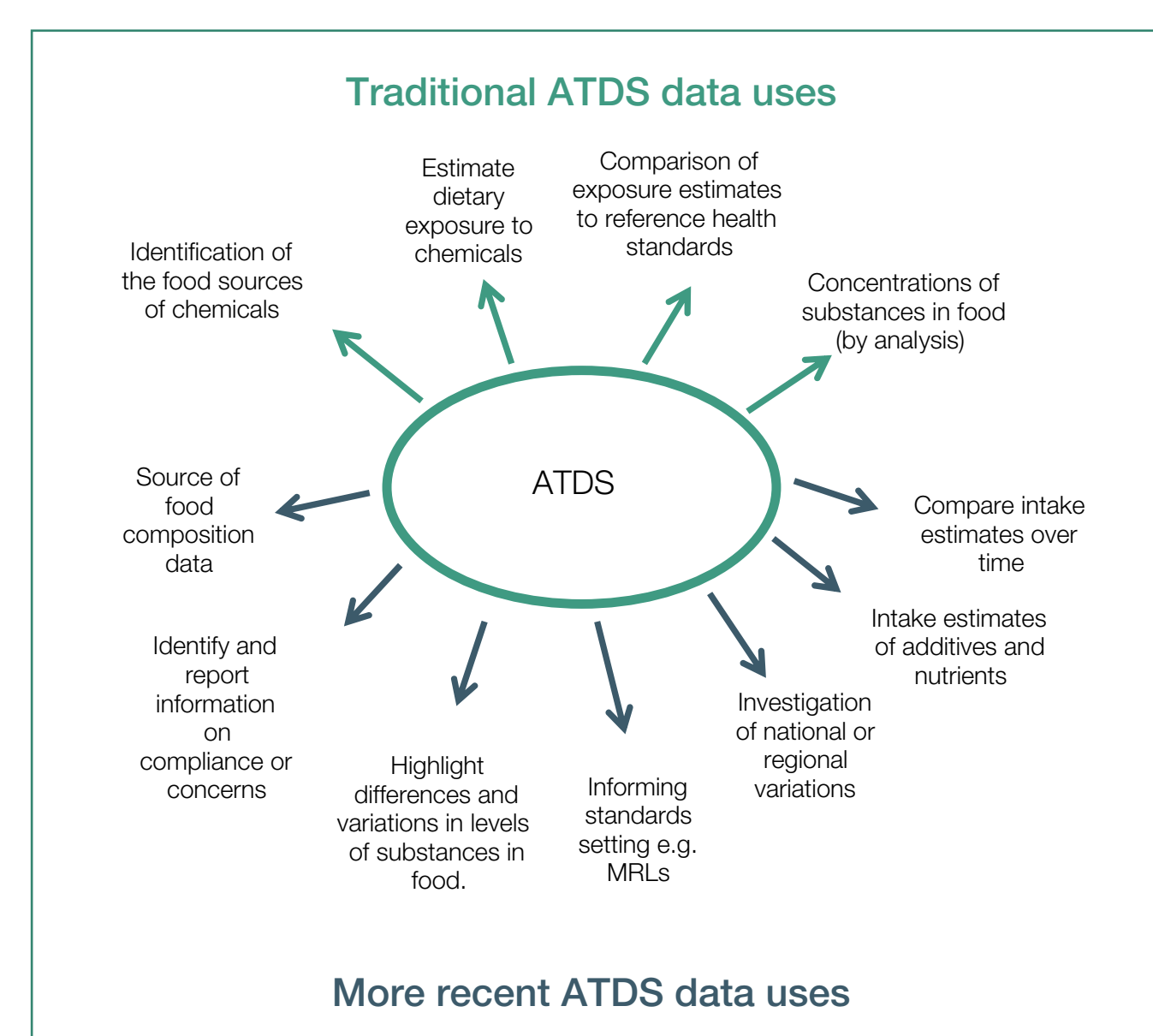
The 22nd ATDS conducted in 2004 focused on trace elements previously identified as having low levels of intake or a lack of current data. FSANZ funded and coordinated the 22nd ATDS, in cooperation with the food regulatory agencies in the States and Territories who sampled foods from their region. The National Measurement Institute was commissioned to conduct sample preparation and analysis.

Ninety-six types of foods, sampled during July and November/December 2004, were tested for five nutrients: iodine, selenium, chromium, molybdenum and nickel. The food types selected included foods which may show regional variation (regional foods) and foods that were not expected to show regional variation (national foods). For each food, at least six primary samples were composited, prepared to a 'table ready' state, and analysed for nutrient levels. Overall, 2223 primary samples were purchased and a total of 740 composite samples analysed. Samples selected provided optimal information for the analytes of interest and represented current consumption patterns in Australia, allowing the data to be extrapolated to a wider range of foods.

Uses of the data

Although there are recognised limitations of the sampling and methods of total diet studies, the ATDS produces a variety of useful, relevant data, which is often utilised internally by FSANZ (figure 1) for purposes including establishing priorities for further investigation, to identify or confirm potential areas of concern, and contributing to FSANZ composition databases. This information is used broadly in the work of FSANZ, including recent considerations of fortification in Australia.

Figure 1: Applications of ATDS data



Identify the concentration of specific nutrients in foods

Table 1 summarises some of the concentration data for nickel in a small range of foods analysed in the 22nd ATDS.

Table 1: Analysis and concentration levels of nickel in foods (µg/kg)

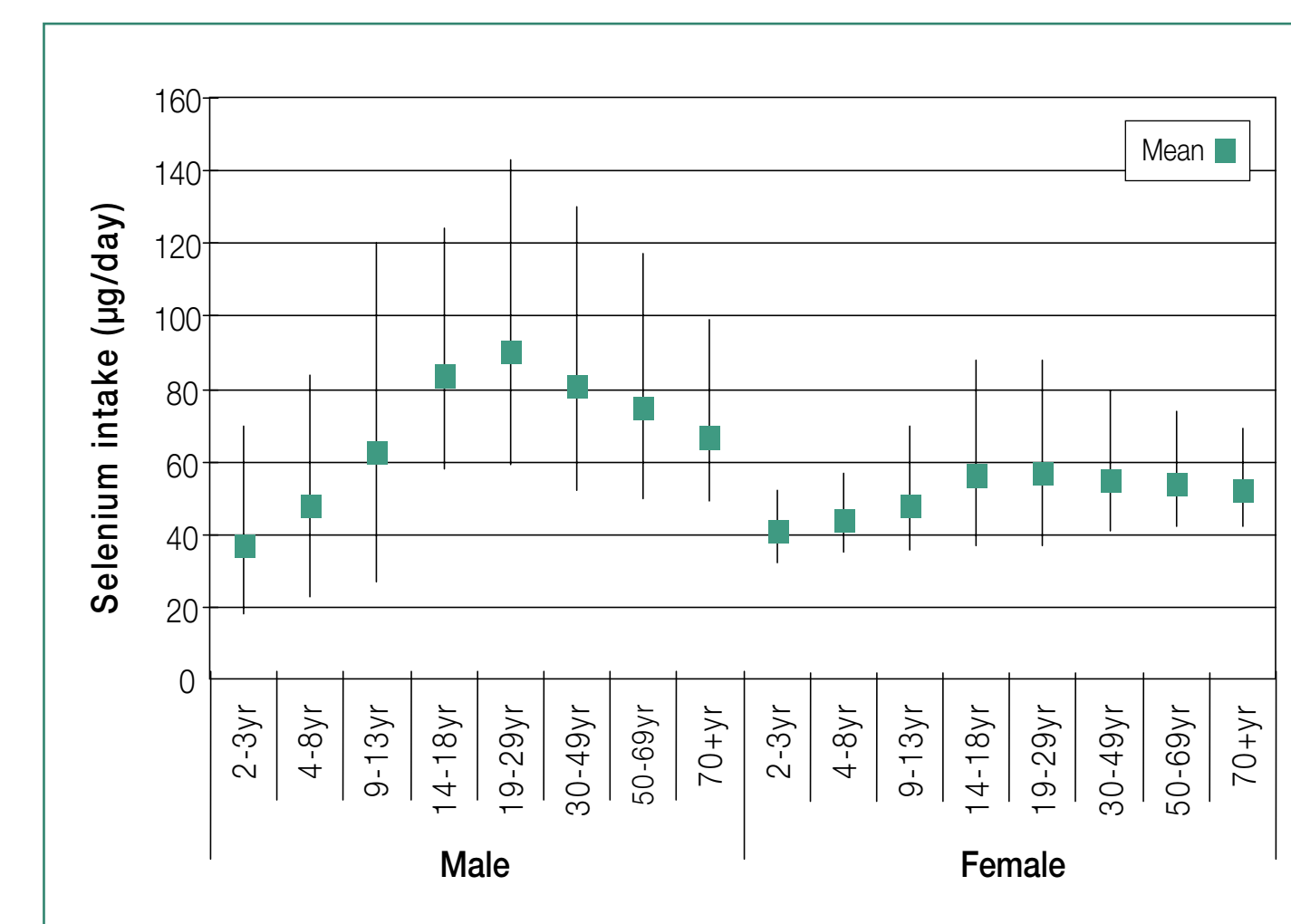
ATDS food	No. analyses	Minimum result	Mean	Maximum result
Avocado	10	130	1043	3100
White bread	10	100	212	400
Single grain breakfast cereal	6	240	348	520
Canned Baked beans	6	430	487	550
Milk chocolate	6	620	685	800
Peanut butter	6	1300	1917	2800
Orange Juice	10	<1	13	43
Chocolate cake (iced)	6	200	425	830
Tomatoes	10	11	31	60

Notes:
 • Results are derived from composite samples.
 • Results have been rounded to one decimal place.
 • The mean assumes that results with a detection limit of less than the limit of reporting are assigned a value of 0.

Estimating nutrient intakes in a variety of population groups

- Figure 2 shows the estimated dietary intake range from the 5th to 95th percentile, of selenium in age and gender groups assessed in the 22nd ATDS.
- Concentration data were combined with 1995 National Nutrition Survey (NNS) consumption data to estimate intakes for age and gender specific groups dietary modelling.
- A single ATDS food (for example white bread) was assumed to represent a whole group of foods (e.g. white bread, bread rolls, bagels, crumpets, fancy breads and donuts). Recipes are used for mixed foods to assign their ingredients to the appropriate ATDS food (e.g. the proportion of cheese on pizza and in sauces). The 96 ATDS foods analysed are mapped to the approximately 4,500 foods reported as consumed in the NNS.
- This process assigns the level of nutrient detected in the ATDS survey foods to the appropriate food consumption data to estimate dietary intake of the nutrient.

Figure 2: Estimated intakes of selenium in age and gender population groups



Identifying the major foods which contribute to nutrient intakes and highlight differences between population groups

The contribution of specific foods to nutrient intake for a variety of population groups can easily be quantified through this study. Molybdenum sources are found to vary across different age groups (Figure 3).

Figure 3: A comparison of the major contributing foods to molybdenum intake in 4-8 yr and 30-49 yr old males

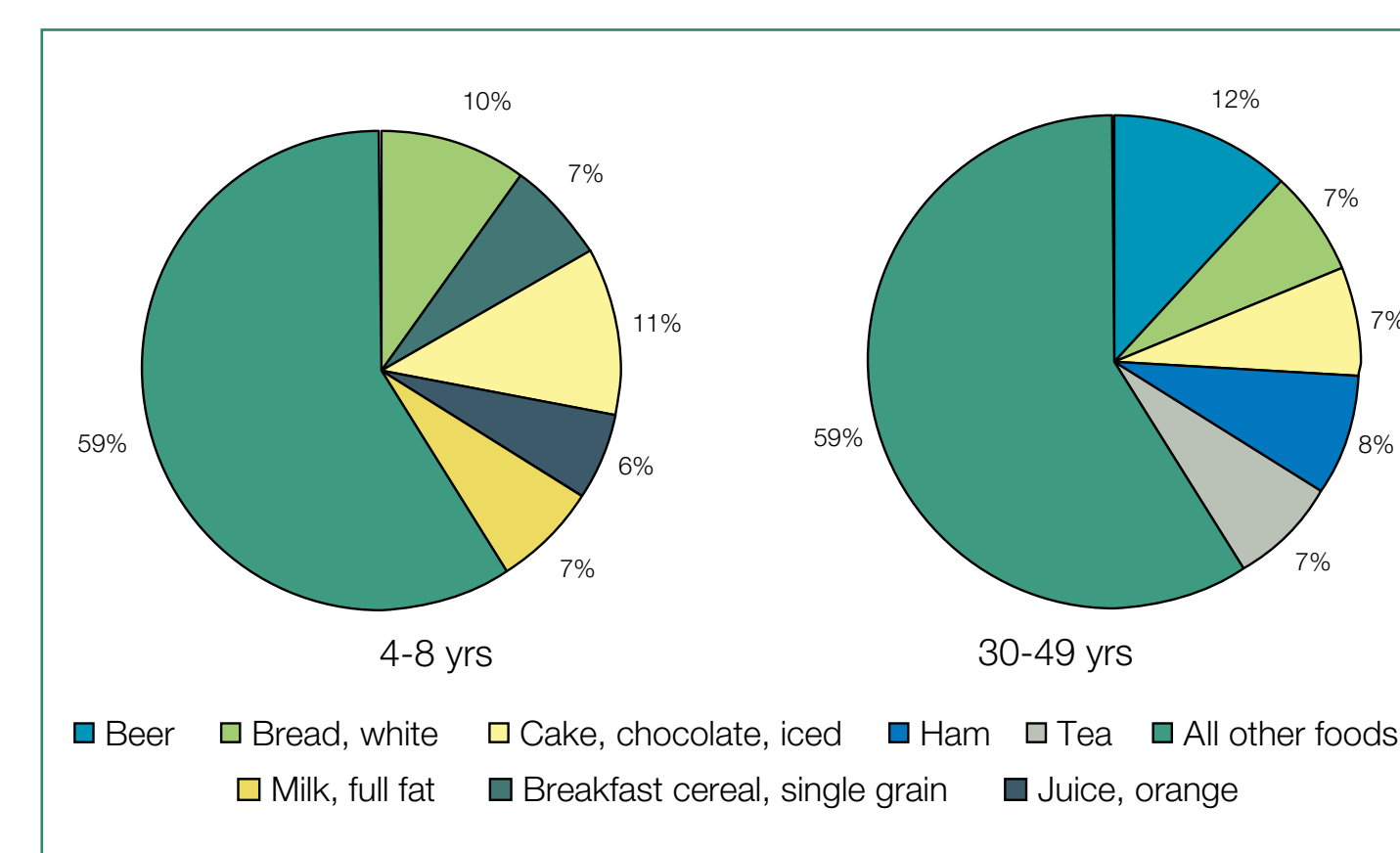
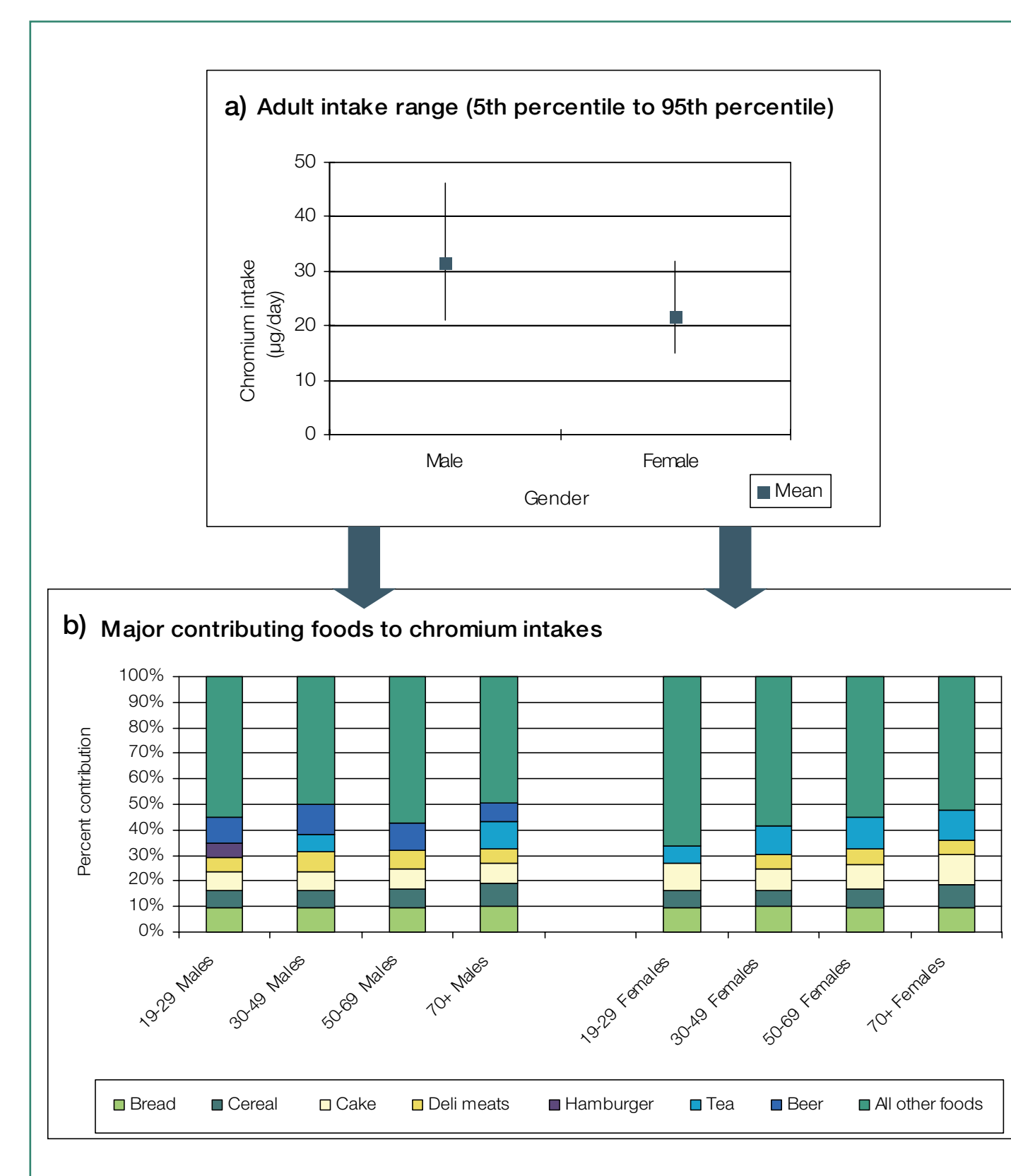


Figure 4 provides an example of how this information can be combined to examine the estimated intake of a population group and the similarities or differences in the major foods which contributed to the level of intake.

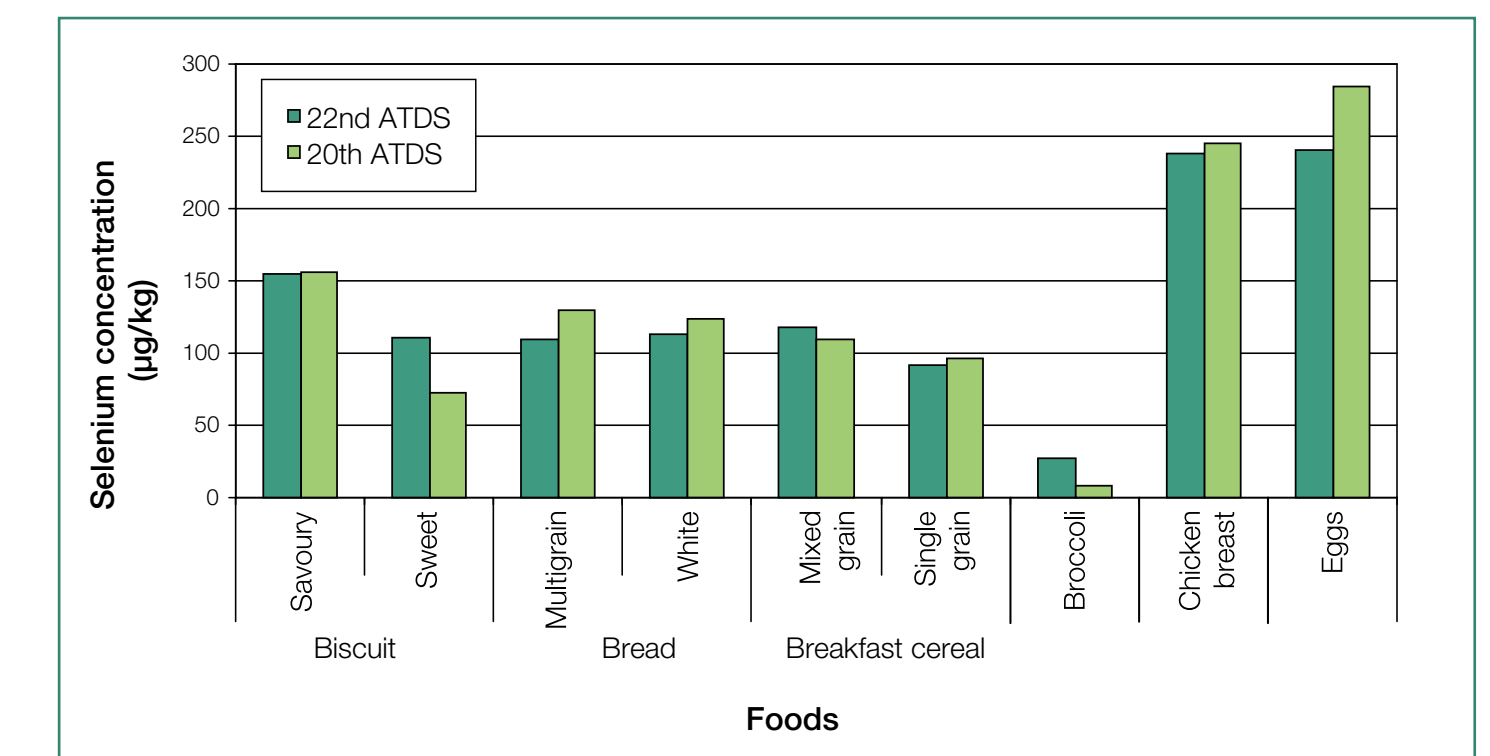
Figure 4: (a) Estimated dietary intake of chromium in adult males and females aged 19+ in Australia and (b) the major foods which contribute to this intake



Indication of areas for further investigation

ATDS data can identify or confirm potential issues and monitor their status over time. Within the limitations of the study, comparison of nutrient concentrations from analysis of the same foods across multiple surveys can assess whether we need to investigate the substance further. In 2000/2001, FSANZ analysed selenium levels in a small range of commonly consumed foods in the 20th ATDS (FSANZ, 2003). This available data was compared to selenium levels found in the 22nd ATDS (Figure 5).

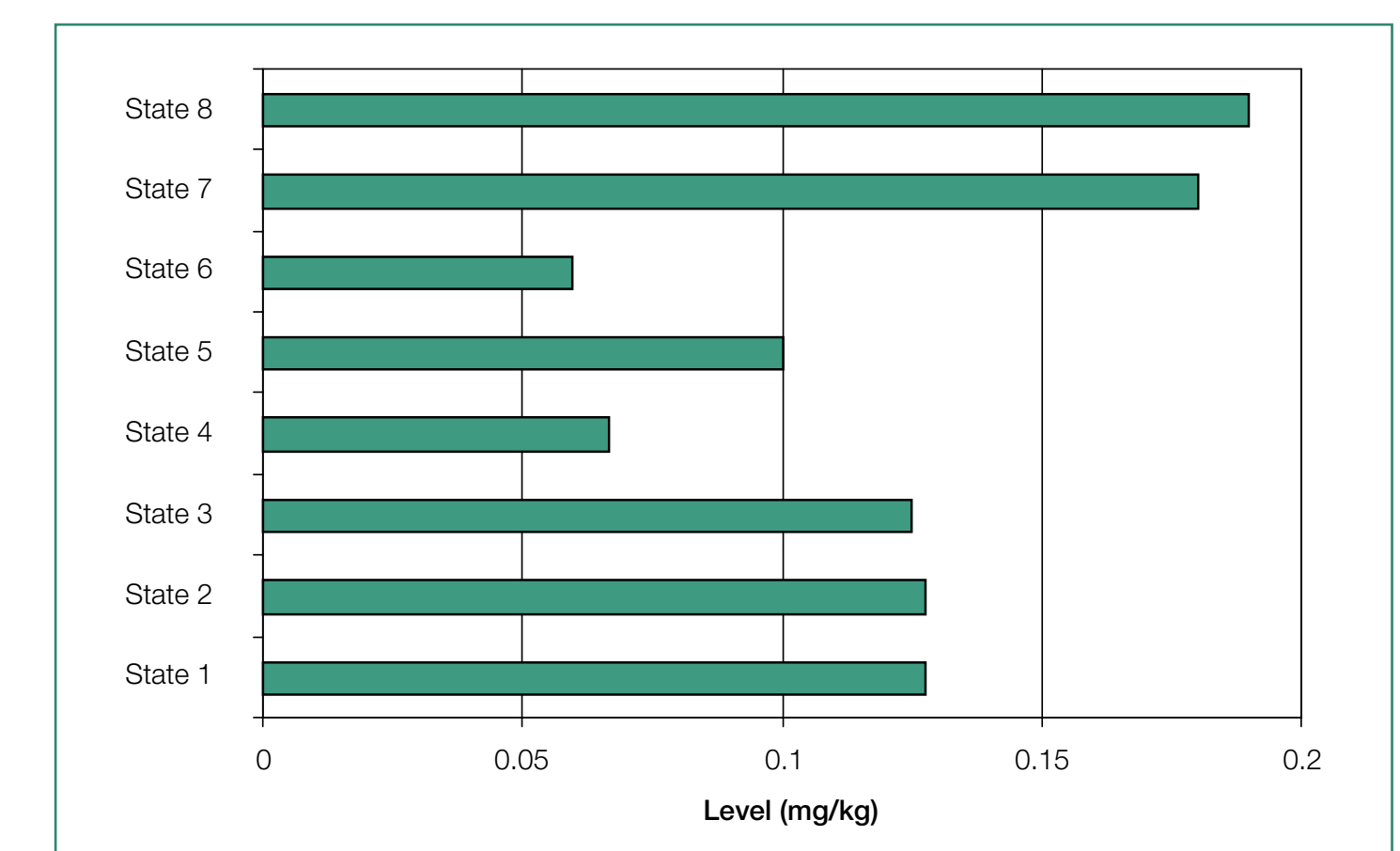
Figure 5: A comparison of selenium concentration levels in foods collected for the 20th and 22nd ATDS



Investigation of potential regional differences in concentration data

- ATDS data can be analysed to identify regional differences in the levels of substances in foods. This is important where there is potential regional variation in foods or where fortification of food is being considered to address low nutrient intakes.
- Foods were sampled as national or regional foods, to ensure more samples were collected where there may be regional variation in composition.
- FSANZ used the 22nd ATDS data to investigate whether there were differences by geographic location in the iodine concentration data available for food and water. The iodine analyses for these foods and beverages showed some minor variations in foods however overall the study showed no obvious trends by geographic location. Figure 6 shows the variation of iodine concentration in the milk samples from different regions.

Figure 6: Mean iodine concentration levels in milk collected from each state within Australia



Conclusions

- The 22nd Australian Total Diet Study:
 - produced new trace element concentration data in Australian foods;
 - filled data gaps in food composition;
 - provided food specific nutrient data at both national and regional levels; and
 - estimated nutrient intakes of a range of trace elements for a range of Australian population subgroups and identified the major contributing foods for intakes.

Overall the study demonstrated the flexibility of the ATDS data and was a useful, effective tool for gathering significant public health information about the Australian diet and identifying inadequate or excess dietary intakes in comparison to the reference health standard in population groups.

References

Food Standards Australia New Zealand (FSANZ), (2003) *The 20th Australian Total Diet Study*. Food Standards Australia New Zealand, Canberra.