Typical food portion sizes consumed by Australian adults: results from the 2011–12 Australian National Nutrition and Physical Activity Survey

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Considerable evidence has associated increasing portion sizes with elevated obesity prevalence. This study examines typical portion sizes of commonly consumed core and discretionary foods in Australian adults, and compares these data with the Australian Dietary Guidelines standard serves. Typical portion sizes are defined as the median amount of foods consumed per eating occasion. Sex- and age-specific median portion sizes of adults aged 19 years and over (n = 9341) were analysed using one day 24 hour recall data from the 2011–12 National Nutrition and Physical Activity Survey. A total of 152 food categories were examined. There were significant sex and age differences in typical portion sizes among a large proportion of food categories studied. Typical portion sizes of breads and cereals, meat and chicken cuts, and starchy vegetables were 30–160% larger than the standard serves, whereas, the portion sizes of dairy products, some fruits, and non-starchy vegetables were 30–90% smaller. Typical portion sizes for discretionary foods such as cakes, ice-cream, sausages, hamburgers, pizza, and alcoholic drinks exceeded the standard serves by 40–400%. The findings of the present study are particularly relevant for establishing Australian-specific reference portions for dietary assessment tools, refinement of nutrition labelling and public health policies.

In light of the far-reaching health and social implications of overweight and obesity, obesity prevention and improving the health status of populations have become critical concerns worldwide1. In 2011–12, approximately 63% of Australian adults were overweight, of which 28% were obese2. Poor diet along with overweight and obesity have been recognised as the leading risk factors of disease burden in Australia3. The fundamental cause of overweight and obesity is energy imbalance with energy intake exceeding energy expenditure attributable to complex interactions of genetics, environmental, dietary and behavioural factors4. Increasing portion sizes may contribute to excess energy intake, and development of obesity and chronic diseases5–7.

The Australian Dietary Guidelines (ADG) encourage people to focus on appropriate portion sizes of ‘core’ foods and avoid ‘discretionary’ foods for optimal nutrition and health4. Foods from the core food groups including bread and cereals, meat and alternatives, milk and alternatives, fruit, and vegetables form the basis of a healthy diet4. Discretionary foods are defined as energy-dense and nutrient-poor foods that are unnecessary in a healthy diet4. In the ADG, standard serves and the recommended number of serves guide individuals to achieve healthy food and nutrient intakes. However, the 2011–12 National Nutrition and Physical Activity Survey (NNPAS) indicates a disconnect between dietary guidelines and what people actually consume. Only 54% and 7% of Australians

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met the recommended intake of fruit and vegetables, respectively. In contrast, discretionary foods contributed 35% of total energy intake of Australians. A lack of awareness among the public regarding appropriate portion sizes and how portion sizes relate to the standard serves and recommended number of serves in the ADG may be a contributing factor.

Typical portion sizes are defined as the median amounts of foods consumed per eating occasion. However, results of national surveys usually report food intake on a per day basis, and do not specify portion sizes of foods consumed per eating occasion. Most studies on typical portion sizes are limited to specific foods such as those high in energy and poor in nutrients, or those contributing most to energy intake. The aim of this study was to update our previous portion size analysis which used the 1995 Australian National Nutrition Survey and to examine the typical portion sizes of a wide range of commonly consumed core and discretionary foods among Australian adults using the 2011–12 NNPAS, and to evaluate the differences between typical portion sizes consumed and the ADG standard serves.

Results

Portion sizes of commonly consumed food categories. The current analyses included a total of 152 food categories. Of these, 97 were core foods and 55 were discretionary foods. Median portion sizes of selected commonly consumed core and discretionary food categories by sex and age are presented in Tables 1 and 2, respectively. A complete list of all food categories analysed are presented in the online supplementary material (Supplementary Tables 1, 2, 3 and 4 online).

Regardless of core or discretionary food categories, there were significant sex differences in typical portion sizes. The typical portion sizes for males were significantly larger than for females in 76% (115 out of 152) of food categories studied (P < 0.05) (Supplementary Tables 1, 2 online). Typical portion sizes of some food categories such as breakfast cereals, cooked pasta, noodles or rice, chicken, some vegetables, sweet biscuits, sausages, butter, sports and energy drinks, beer, and pizza were more than 30% larger for males compared to portions consumed by females. Significant age differences in typical portion sizes were observed for 68% (103 out of 152) of food categories studied including most breads and cereals, meat and alternatives, milk and yoghurt, most fruits, some vegetables, sweet biscuits, cakes, sausages, sugar-sweetened beverages, and alcoholic drinks (Supplementary Tables 1, 2 online). Typical portion sizes decreased with increasing age, where adults aged 71 years and over had the smallest portion sizes compared to the younger age groups. Typical portion sizes of food categories that did not have significant age differences were cooked oats, pasta, cheese, custard, mandarins, cooked carrot, cucumber, boiled potatoes, margarine, bacon, ham, savoury sauces and condiments such as gravies, pasta sauce and salad dressing. The portion sizes also varied by the use of that given food or beverage, for example, the amount of milk used in beverage was smaller than milk used on cereal (Tables 1 and 2).

Food categories with a wide portion size range included cooked oats, pasta, noodles, rice, grapes, cooked beans and legumes, baked potatoes, pizza, burgers and other mixed dishes including rice, pasta, meat or vegetables. Portion size variations were particularly large for beverages such as water, milk on cereal, flavoured milk, fruit juices, sugar-sweetened beverages, and alcoholic drinks (Tables 1 and 2).

Comparison with the ADG standard serves. There were obvious differences between the NNPAS typical portion sizes and the ADG standard serves (Tables 3 and 4). The portion sizes for food categories under the bread and cereal group were generally larger than the ADG standard serves (e.g. 40 g of bread and 30 g of breakfast cereals). Greater differences were observed in males than in females. Bread portion sizes for males and females exceeded the ADG standard serve by approximately 60% and 40%, respectively. Portion sizes for all ready-to-eat breakfast cereals for males and females were 70% and 18% larger than the standard serve. Breakfast cereals such as wheat-flake biscuits, muesli, and mixed grain flakes contributed the largest differences to the standard serve. Likewise, the portion sizes for cooked cereals including oats, pasta, noodles and rice were significantly larger than the standard serve.

Within the meat and alternatives, meat portions including beef, lamb, chicken and pork were about 90–160% greater than the standard serve. Portion sizes for fish, seafood, and nuts were similar to their standard serves (within ±25%), whereas the portion size for eggs was half of its standard serve. For dairy products including milk, yoghurt, cheese and milk alternatives, the portion sizes were generally smaller than the standard serves, except for flavoured milk, which had a 40–80% greater portion size. With respect to fruits, median portion sizes of apples, pears and oranges were similar to the 150 g standard serve. In contrast, small sized fruits such as mandarin, strawberries and grapes had portion sizes 40–60% smaller than the standard serve. Vegetables such as beetroot, carrot, lettuce, cucumber, tomato were consistently smaller than the 75 g standard serve in both males and females, except for cooked legumes, baked beans, starchy vegetables (i.e. corn and potatoes), and cooked mixed non-leafy vegetables.

Typical portion sizes of discretionary foods such as cakes, buns, muffins, doughnuts, sweet pastries, sausages, hamburgers, pizza, savoury pastries, potato fries, and alcoholic drinks exceeded the 600 kJ standard serves by 40–400%. In contrast, the portion sizes for sweet biscuits, ham, chocolate, potato crisps, and sugar-sweetened beverages were similar to 600 kJ standard serve.

Discussion

The current analyses examined the typical portion sizes of commonly consumed core and discretionary foods among Australian adults, and assessed how these compared to the ADG standard serves. There were significant sex and age differences in typical portion sizes among a large proportion of food categories studied, regardless of their classification as core or discretionary foods. Comparison of typical portion sizes with ADG standard serves revealed consistent trends among core food categories with breads and cereals, meat and chicken cuts, and starchy vegetables being consumed in larger amounts than their standard serves. In contrast, the portion sizes of...
| Foods                          | 19–30 years | 31–50 years | 51–70 years | 71 + years | Overall M:F |
|-------------------------------|-------------|-------------|-------------|------------|-------------|
| **Breads and cereals**        |             |             |             |            |             |
| Bread rolls, white            | 69          | 69          | 69          | 69         | 69          |
| Bread, white                  | 68          | 64          | 54          | 54         | 54          |
| Bread, wholemeal              | 66          | 56          | 56          | 56         | 56          |
| Breakfast cereal, all²        | 68          | 47          | 47          | 47         | 47          |
| Oats, cooked                  | 312         | 198         | 198         | 198        | 198         |
| Rice Bubbles/ Corn Flakes     | 35          | 33          | 37          | 37         | 37          |
| Rice, cooked                  | 201         | 145         | 92          | 201        | 145         |
| Wheat-flake biscuits          | 70          | 51          | 34          | 34         | 34          |
| **Meat and alternatives**     |             |             |             |            |             |
| Beef steak, cooked            | 186         | 150         | 156         | 126        | 126         |
| Chicken cuts, cooked          | 174         | 104         | 113         | 93         | 93          |
| Eggs, whole                   | 51          | 42          | 51          | 42         | 42          |
| Fish, cooked                  | 121         | 107         | 110         | 61         | 61          |
| Lamb, cuts, cooked            | 150         | 143         | 104         | 154        | 154         |
| Nuts                          | 31          | 22          | 28          | 28         | 28          |
| **Milk and alternatives**     |             |             |             |            |             |
| Cheese, cheddar, full fat     | 25          | 25          | 25          | 25         | 25          |
| Milk, in beverage, full fat   | 41          | 31          | 41          | 31         | 31          |
| Milk, on cereal, full fat     | 258         | 129         | 129         | 154        | 154         |
| Yoghurt, flavoured, full fat  | 175         | 134         | 123         | 149        | 149         |
| **Fruit**                     |             |             |             |            |             |
| Apples                        | 164         | 164         | 164         | 164        | 164         |
| Bananas                       | 111         | 98          | 98          | 98         | 98          |
| Fruit juices                  | 315         | 237         | 305         | 263        | 263         |
| Grapes                        | 126         | 99          | 75          | 94         | 94          |
| Mandarin                      | 75          | 75          | 75          | 75         | 75          |
| Pears                         | 181         | 181         | 181         | 181        | 181         |
| **Vegetables**                |             |             |             |            |             |
| Broccoli, cooked              | 58          | 38          | 58          | 58         | 58          |
| Carrot, cooked                | 53          | 18          | 53          | 49         | 49          |
| Cucumber, raw                 | 26          | 26          | 26          | 26         | 26          |
| Green peas                    | 38          | 38          | 50          | 50         | 50          |
| Mixed vegetables              | 126         | 127         | 127         | 143        | 143         |
| Potatoes, boiled              | 175         | 122         | 122         | 192        | 192         |
| Tomato, raw                   | 38          | 38          | 29          | 29         | 29          |
| **Fats**                      |             |             |             |            |             |
| Margarine                     | 10          | 5           | 7           | 7          | 7           |
| Olive oil                     | 18          | 18          | 18          | 18         | 18          |
| **Beverages**                 |             |             |             |            |             |
| Coffee, made up               | 250         | 200         | 220         | 223        | 223         |
| Tea, made up                  | 250         | 200         | 230         | 230        | 230         |
| **Mixed dishes**              |             |             |             |            |             |
| Savoury pasta/ noodles dishes³| 399         | 312         | 327         | 338        | 349         |
| Savoury rice dishes⁴          | 281         | 219         | 235         | 270        | 270         |
| Soup, made up                 | 420         | 357         | 420         | 309        | 309         |

Table 1. Median portion sizes and interquartile range (grams) of commonly consumed core foods among consumers by age and sex (2011–12 NNPHS). ¹All data were weighted to represent population estimates. IQR: Interquartile range; M: F Male to female ratio; sample sizes varies within age/sex group as median intake.
were based on per consumer. Significance of sex- and age- differences in typical portion sizes was tested by Mann-Whitney test and Kruskal-Wallis test respectively. All food categories had significant sex- and age-differences except for cooked oats, mandarins, cooked carrot, boiled potatoes, full fat milk in beverage, olive oil, and savoury rice dishes. Breakfast cereal, all includes all ready-to-eat breakfast cereals such as bran, rice bubbles/corn flakes, wheat-flake biscuits, muesli, and mixed grain flakes. Savoury pasta/noodle dishes include all past and noodle sauce dishes, stir-fried noodle with meat or vegetables, pasta or noodle salad. Savoury rice dishes include paella, fried rice, risotto with egg, meat, or vegetables.

milk, yoghurt, cheese, small sized fruits, and non-starchy vegetables were generally smaller than their standard serves. Portion sizes of discretionary foods such as cakes, potato fries, hamburgers, pizza, sausage, beer, and wine exceeded the 600 kJ standard serve by approximately 40–400%.

The sex- and age-specific typical food portion sizes found in the present study are consistent with previous portion size literature. The sex differences in portion sizes may be a consequence of greater energy requirement of males relative to females. Furthermore, it has been suggested that females' stronger beliefs in healthy eating and greater involvement in dieting and weight control may partly contribute to the sex differences in eating habits, and potential better portion size control of females compared with males. Not surprisingly, the 2011–12 AHS found that dieting behaviours were more prevalent in females than in males. The smaller portion sizes among elderly people may be partially explained by the decreased energy requirement attributable to both lower metabolic rate and physical activity level.

ADG standard serves together with the number of serves per day, help people to quantify the total daily amounts of food required for nutrient and energy requirements. However, evidence has shown that standard serves are generally not well understood by the public. A Canadian study found participants (n = 145) overestimated standard serves (e.g. grains, fruit and vegetables) and underestimated the number of serves they consumed. It is noteworthy that public health messages may overlook the fact that people have different interpretations of a standard serve and more education in this area is needed. As indicated by current results, core foods with typical portion sizes smaller than standard serves (e.g. milk, yoghurt, cheese, non-starchy vegetables, and some fruits) will need to be consumed more frequently to ensure dietary guidelines are met. The findings that typical core food portion sizes of bread, cereals, meat and chicken cuts being larger than the standard serves were similar to the findings of a small Australian pilot study, which asked participants to serve themselves the typical amount of foods that they normally consume at one eating occasion. This study also found that self-selected portion sizes of rice, pasta, breakfast cereal, and meat were larger than the ADG standard serves, except for milk, which was smaller.

Portion sizes of discretionary foods are particularly relevant to the current climate of excess energy intake and overweight/obesity. The ADG recommend adults limit their consumption of discretionary foods to 0–3 serves depending on their energy requirement. Typical portion sizes of some discretionary food categories in this study were approximately 40–400% larger than the ADG standard serve of 600 kJ, highlighting the importance of targeting these food categories to reduce excess energy intake. Typical portion sizes of pizza and hamburgers were 2–4 times higher than a standard serve, while cakes and muffins, and pastries were 1.5 times higher. In contrast, typical portion sizes of soft drinks, fruits, drinks, sweet biscuits, chocolate, and potato crisps were similar to a standard serve of discretionary food. Foods typically consumed in small portion sizes (e.g. < 20 g) such as sugar, honey, jam, and butter contributed significantly lower energy compared with a standard serve.

The accuracy of portion size estimation is an important limitation to our study. Studies have shown portion size estimation is difficult for nearly all people, regardless of age, sex, body weight or socio-economic status. Foods that are particularly difficult to estimate include amorphous foods that take the shape of the container they are in, foods in small quantities, and foods with multiple components such as mixed dishes. Indeed, large variations were observed in typical portion sizes of cooked cereals, beverage, and mixed dishes in this study. Moreover, portion size may be deliberately misreported. People may report smaller portion sizes of discretionary foods or larger portions of fruits and vegetables for social desirability reasons but this could not be measured in our study. The current study has several strengths. The current analyses were based on a large sample of national representative Australian population. The utilisation of measurement aids such as real-sized food and container images in 24 hour recall has been demonstrated to improve the accuracy of the portion size estimates, but there is also potential for these measures to influence the recall of portion size. For example, the median portion sizes of some food categories in the current analyses were similar to the portion size depicted in the food model booklet such as meat cuts, fruits, and beverages.

In conclusion, this study examined the most up-to-date typical portion sizes of a comprehensive list of commonly consumed core and discretionary food categories in the Australian population. These findings can be used in clinical practice to assist health educators in nutrition counselling; in nutrition research such as the development of dietary assessment tools and in public health nutrition to monitor food consumption trends, design public health campaigns, refine nutrition labelling and support public health policies and guidelines. Future dietary interventions and public health campaigns should focus on education regarding portion size. It is important to clarify that a general message to decrease portion size of all foods is not appropriate. Future guidance should encourage people to increase the portion of low energy, nutrient rich core foods such as fruit and vegetables, and decrease portions for energy dense and nutrient poor discretionary foods.

**Methods**

**Study design and participants.** This study used data from adults aged 19 years and over (n = 9341) who participated in the 2011–12 NNAPAS. The 2011–12 NNAPAS, focused on the collection of dietary intake...
| Foods | 19–30 years | 31–50 years | 51–70 years | 71 + years | Overall |
|-------|-------------|-------------|-------------|------------|---------|
|       | Male | IQR   | Female | IQR   | Male | IQR   | Female | IQR   | Male | IQR   | Female | IQR   | Median IQR | Median IQR | Median IQR | Median IQR | Median IQR | Median IQR | Median IQR |
| Cakes, buns, muffins | 110 | 67–143 | 114 | 63–163 | 110 | 72–163 | 96 | 56–142 | 95 | 61–160 | 81 | 44–132 | 81 | 48–140 | 76 | 44–131 | 1.16 |
| Savoury pizza | 20 | 11–42 | 19 | 12–30 | 20 | 12–38 | 19 | 12–28 | 20 | 12–29 | 15 | 10–28 | 14 | 11–25 | 13 | 7–19 | 1.18 |
| Tomato sauce | 37 | 18–51 | 31 | 17–39 | 29 | 16–38 | 20 | 16–34 | 25 | 16–37 | 18 | 14–32 | 22 | 16–33 | 18 | 12–28 | 1.47 |
| Ham | 17 | 13–34 | 17 | 17–34 | 18 | 17–34 | 17 | 17–25 | 17 | 17–24 | 17 | 17–28 | 1.00 |
| Sausages and frankfurts | 178 | 89–202 | 152 | 89–178 | 152 | 86–202 | 101 | 89–178 | 114 | 89–178 | 94 | 82–178 | 142 | 89–178 | 97 | 76–135 | 1.50 |
| Butter and dairy blends | 10 | 5–12 | 8 | 5–10 | 7 | 5–10 | 5 | 5–10 | 7 | 5–10 | 5 | 5–10 | 5 | 5–10 | 5 | 1.40 |
| Ice-cream | 102 | 78–175 | 80 | 69–110 | 83 | 75–138 | 75 | 25–200 | 83 | 70–132 | 78 | 66–100 | 83 | 39–138 | 69 | 46–101 | 1.06 |
| Honey | 29 | 14–29 | 14 | 7–28 | 14 | 7–29 | 10 | 7–25 | 14 | 7–23 | 7 | 7–11 | 11 | 7–29 | 11 | 7–24 | 1.27 |
| Jams and conserves | 14 | 7–41 | 14 | 7–28 | 19 | 7–41 | 11 | 7–21 | 14 | 7–28 | 14 | 7–14 | 14 | 7–24 | 12 | 7–15 | 1.00 |
| Chocolate | 25 | 18–50 | 30 | 16–53 | 36 | 20–55 | 26 | 15–50 | 25 | 13–50 | 25 | 13–50 | 20 | 13–51 | 16 | 10–30 | 1.12 |
| Sugar, white | 8 | 4–13 | 7 | 4–10 | 7 | 4–13 | 6 | 4–8 | 7 | 4–9 | 5 | 4–8 | 6 | 4–8 | 5 | 4–8 | 1.17 |
| Potato crisps | 42 | 15–75 | 35 | 17–46 | 23 | 19–50 | 21 | 14–45 | 21 | 19–46 | 20 | 14–45 | 19 | 5–100 | 15 | 8–35 | 1.33 |
| Potatoes, fries/ wedges | 99 | 57–128 | 95 | 57–137 | 85 | 57–128 | 70 | 31–104 | 64 | 31–115 | 71 | 29–110 | 57 | 29–72 | 69 | 29–85 | 1.03 |
| Mayonnaise | 14 | 14–21 | 14 | 14–21 | 20 | 14–21 | 20 | 14–21 | 17 | 14–21 | 20 | 14–21 | 14 | 8–19 | 14 | 14–20 | 1.00 |
| Tomato sauce | 21 | 14–42 | 14 | 14–21 | 14 | 14–28 | 14 | 11–21 | 14 | 14–21 | 14 | 14–37 | 14 | 12–14 | 16 | 14–44 | 1.00 |
| Hamburger | 238 | 206–311 | 196 | 155–304 | 256 | 195–350 | 207 | 155–327 | 301 | 214–350 | 214 | 155–317 | 186 | 146–228 | 175 | 99–280 | 1.25 |
| Pizza | 281 | 185–375 | 188 | 100–281 | 300 | 162–400 | 185 | 100–281 | 299 | 162–375 | 185 | 98–325 | 195 | 153–238 | 153 | 91–344 | 1.60 |
| Savoury pastries | 175 | 130–175 | 175 | 126–351 | 175 | 130–175 | 140 | 74–175 | 175 | 130–192 | 158 | 81–175 | 175 | 130–178 | 135 | 42–175 | 1.09 |

**Table 2.** Median portion sizes and interquartile range (grams) of commonly consumed discretionary foods among consumers by age and sex (2011–12 NNPas)\(^1\). All data were weighted to represent population estimates. IQR: Interquartile range; M: F Male to female ratio; sample sizes varies within age/sex group as median intake were based on per consumer. Significance of sex- and age- differences in typical portion sizes was tested by Mann-Whitney test and Kruskal-Wallis test respectively. All food categories had significant sex- and age-differences except for ham, tomato sauce, mayonnaise, jam and conserves.

and physical activity information, and was a component of the 2011–13 Australian Health Survey (AHS)\(^29\). The NNPA was conducted throughout Australia from May 2011 to June 2012 within approximately 9,500 private dwellings (77% of participating dwellings) across Australia. A stratified multistage area sampling was used for sample selection, and to ensure the selected sample was representative of the Australian population. One face-to-face 24-hour recall, which was collected using the five-phase automated multiple-pass method, was used to analyse the typical portion size data\(^29\). Participants were asked to report all foods consumed on the day prior to the interview, from midnight to midnight the previous night. The dietary intake data were coded to an Australian Food, Supplement and Nutrient Database (AUSNUT) 8-digit food code and categorised into food classification groups based on the food and measures database developed by Food Standard Australia New Zealand (FASNZ). Detailed study design and operation have been reported on the Australian Bureau of Statistics (ABS) website\(^29\).

**Determination of portion size.** The portion size of a food was defined as the amount of food that an individual consumed at one eating occasion. A food model booklet containing the actual size photographs and drawings of different-sized Australian sourced beverage and food containers, shapes and mounds, rulers, rings, a grid, a wedge, meat and chicken cuts, and chocolate bar sizes were provided to assist respondents with portion size estimation\(^29\). Respondents were asked for the time they began eating or drinking each food as well as what the respondent would call each eating occasion\(^29\). If an individual consumed a food item multiple occasions a day, the average portion size for those multiple occasions was calculated and treated as a single record for that individual.
The classification of food categories was based on grouping similar foods together using the AUSNUT 8-digit food codes consistent with our previous analysis. Food categories were classified further into core and discretionary foods according to the ADG and the ABS discretionary food list, respectively. The bread and cereal group consisted of different types of breads, breakfast cereals, cooked rice, and wheat flour biscuits.
|                          | Male 19 + years |                          | Female 19 + years |                          |
|--------------------------|-----------------|--------------------------|-------------------|--------------------------|
|                          | n   | Median | IQR | n   | Median | IQR | Percent Difference | n   | Median | IQR | Percent Difference |
| Tomato sauce             | 316 | 14     | 14–28 | 61 | 61–122 | 90  | 237               | 14     | 14–21 | 61 | 61–90 | 90  |
| Ham                      | 573 | 17     | 17–34 | 79 | 79–159 | 87  | 558               | 17     | 17–25 | 79 | 79–134 | 87  |
| Sugar, white             | 1272 | 7     | 4–12 | 108 | 67–194 | 82  | 1177              | 6      | 4–8   | 90 | 67–134 | 85  |
| Jams and conserves       | 378  | 14    | 7–28 | 154 | 77–307 | 74  | 489               | 14     | 7–16  | 129 | 77–159 | 79  |
| Honey                    | 363  | 14    | 7–29 | 188 | 94–377 | 69  | 393               | 11     | 7–20  | 151 | 94–163 | 75  |
| Butter and dairy blends  | 760  | 7     | 5–10 | 218 | 145–291 | 64  | 1002              | 5      | 5–10  | 146 | 145–290 | 76  |
| Savoury biscuits         | 521  | 20    | 12–34 | 348 | 202–628 | 42  | 927               | 17     | 11–27 | 303 | 187–483 | 50  |
| Mayonnaise               | 310  | 20    | 14–21 | 390 | 334–576 | 35  | 435               | 20     | 14–23 | 349 | 292–503 | 42  |
| Fruit drinks             | 345  | 312   | 208–392 | 542 | 387–732 | 10  | 364               | 284    | 208–364 | 503 | 366–658 | 16  |
| Sweet biscuits           | 887  | 28    | 16–39 | 561 | 302–776 | 7   | 1149              | 19     | 15–33 | 388 | 287–685 | 35  |
| Cordials                 | 294  | 659   | 335–763 | 584 | 399–1043 | 3  | 253               | 357    | 263–473 | 414 | 149–574 | 31  |
| Potato crisps            | 290  | 20    | 19–50 | 595 | 388–1080 | 1  | 251               | 21     | 14–45 | 454 | 298–944 | 24  |
| Chocolate                | 636  | 28    | 16–50 | 602 | 331–997 | 9   | 886               | 25     | 15–50 | 545 | 320–978 | 9   |
| Soft drinks, sugar-sweetened | 913 | 390 | 343–507 | 655 | 524–786 | 9   | 759               | 364    | 260–390 | 575 | 427–655 | 4   |
| Ice-cream                | 578  | 84    | 74–138 | 845 | 542–1149 | 41  | 571               | 79     | 64–102 | 651 | 440–940 | 9   |
| Potatoes, fries/wedges   | 579  | 74    | 57–128 | 933 | 540–1402 | 56  | 466               | 72     | 36–114 | 835 | 363–1187 | 39  |
| Wines, red/white         | 641  | 347   | 238–495 | 1036 | 710–1603 | 73  | 914               | 297    | 188–475 | 876 | 590–1450 | 46  |
| Beers, regular alcohol   | 806  | 758   | 279–1212 | 1083 | 541–1733 | 81  | 156               | 379    | 333–756 | 542 | 503–1061 | 10  |
| Cakes, buns, muffins     | 600  | 110   | 65–163 | 1532 | 882–2190 | 155 | 830               | 95     | 49–142 | 1282 | 747–2042 | 114 |
| Savoury pastries         | 426  | 175   | 130–175 | 1592 | 1414–1720 | 165 | 333               | 160    | 80–175 | 1592 | 793–1701 | 165 |
| Sausages and frankfurts  | 352  | 152   | 89–200 | 1629 | 913–2072 | 172 | 261               | 101    | 89–178 | 1082 | 913–1993 | 80  |
| Hamburgers               | 345  | 247   | 197–345 | 2425 | 2070–2838 | 304 | 257               | 203    | 155–306 | 2025 | 1627–2715 | 238 |
| Pizza                    | 212  | 291   | 164–375 | 3103 | 1872–4106 | 417 | 254               | 188    | 100–281 | 2005 | 1627–2987 | 234 |

Table 4. Comparison of median typical portion sizes and interquartile range (grams) for commonly consumed discretionary foods among adults 19 years and over (2011–12 NNPAS) with Australian Dietary Guidelines (ADG) 600 kJ standard serve for discretionary foods. *Percentage difference calculated as (NNPAS energy per portion−600kJ)*100/600kJ, P < 0.0001 (one sample Wilcoxon Signed Rank tests). †All data were weighted to represent population estimates. IQR: Interquartile range.

oats, rice, pasta and noodles. The meat and alternative group included cooked beef cuts, lamb cuts, pork cuts, chicken, fish, other seafood, eggs, nuts, and meat alternatives. The milk and alternatives group included milk, yoghurt, and cheese of varying fat types, custard, flavoured milk, and milk substitutes. Milk was further classified based on its use: ‘in beverage’ or ‘on cereal’, according to the food combination code: ‘beverage with additions’ and ‘cereals with additions’. The fruit group was comprised of commonly consumed pome, berry, citrus, tropical, and dried fruits (such as apples, pears, strawberries, bananas, and raisins) and pure fruit juices. The vegetable group included cooked green and orange vegetables, raw salad vegetables, cooked legumes/beans, and starchy vegetables. The portion sizes of unsaturated spreads and oils such as margarine and olive oil; and fluids including water, tea and coffee were also assessed. Discretionary foods included pizza, hamburgers, potato fries, processed meats, biscuits and cakes, confectionary and snacks, sugar-sweetened beverages, sauces and condiments, sugar and spreads, and alcoholic drinks. Only foods and beverages reported as a single item were captured in the above food categories. Mixed dishes were coded as a single item if insufficient detail was given to code as multiple items such as soups, savoury rice dishes, savoury pasta/noodle dishes, vegetable dishes and meat dishes.

**Comparison with ADG standard serves.** In the ADG, the standard serves of core foods were determined according to the average weight of current household measures or of usual consumption units, taking into account the nutritional contribution of the food item in total diets. The standard serves for discretionary foods were established on the basis of 600 kJ cut-off. The NNPAS median portion size of individual food categories was compared to the ADG standard serves. The percentage difference between NNPAS median portion size and ADG standard serve was calculated as (median portion size−standard serve)/standard serve × 100. The standard serve for beverages given in volume (mL) were converted to grams based on the density measures provided by the AUSNUT food measures file. For example, the recommended standard serve of regular milk (250 mL) is equivalent to 258 g based on the density of 1.03 g/mL.

**Statistical analysis.** Data were analysed according to sex and the following age groups: 19 to 30 years (n = 1592), 31 to 50 years (n = 3565), 51 to 70 years (n = 2906), and 71 years and over (n = 1278). Median portion sizes, 25th and 75th percentiles (grams) were determined for food categories in all sex and age subgroups with more than ten consumers. Differences in median portion sizes by sex were tested using Mann-Whitney tests. Kruskal-Wallis tests were conducted to compare the median portion sizes across the four age groups. Median
energy per portion (kJ) of discretionary foods was determined for comparison with the 600 kJ standard serve. One sample Wilcoxon Signed Rank tests were performed to test the differences between median portion sizes and the ADG standard serves. Percentage differences within 25% were considered as similar. Personal weighting factors were applied to the dataset to ensure that the survey estimates conform to the population estimates by sex, age, area of usual residence and seasonal effects. All statistical analyses were performed using SPSS 20.0 (SPSS Inc, Chicago, IL, USA) with statistical significance set as P < 0.05 (two-sided).

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Author Contributions
A.R., T.G. and V.F. conceived the study hypothesis and design. M.Z. performed the statistical analysis, interpreted the data, and wrote the manuscript. A.R. assisted in statistical analysis, data interpretation and study supervision. J.W., J.L., T.G. and V.F. assisted in data interpretation and supervised the study. J.W., T.G., V.F. and B.N. were responsible for obtaining funds. All authors critically reviewed/edited the manuscript, and approved the content of the final manuscript.

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