

THE ROLE OF
FRUIT JUICE

IN THE AUSTRALIAN DIET

A SECONDARY ANALYSIS OF
THE AUSTRALIAN HEALTH SURVEY: NATIONAL NUTRITION
AND PHYSICAL ACTIVITY SURVEY (2011-12)



FRUIT JUICE INTAKE IN AUSTRALIA - A SNAPSHOT OF THE KEY FINDINGS

WHAT ARE AUSTRALIANS CONSUMING?

- Fruit juice was the third most often consumed non dairy, non alcoholic beverage choice among Australian adults and children
- Among Australians, 23% of children and 15% of adults consumed fruit juice, on the day of the survey
- The highest prevalence of fruit juice consumers was among children aged 2-3 years
- Teenagers (14-18 years) consumed the highest amount of fruit juice compared with other age groups
- Most fruit juice was consumed with a main meal (particularly breakfast), rather than on its own
- Over 80% of Australian children and adults were not eating enough fruit, from fruit alone
- Counting fruit juice as a serve of fruit increased the number of Australians who meet the Australian Dietary Guidelines recommendations for fruit by up to 5 times, compared with fruit alone

SOCIO-ECONOMIC FACTORS

- Higher socio-economic status was generally associated with higher fruit juice intake among children

CONTRIBUTION TO ENERGY AND SUGAR INTAKE

- Fruit juice contributed <1% of total daily energy intake and 3.5% of total daily sugar intake, among all Australians, on the day of the survey
- Fruit juice contributed ~5% of total daily energy and 20% of total daily sugar intake, among fruit juice consumers, on the day of the survey

NUTRIENT CONTRIBUTIONS

- Consumers of fruit juice had a better diet quality score (an estimate of an individual's compliance with the recommendations in the Australian Dietary Guidelines) than non consumers
- The percent of energy from discretionary foods for both children and adults was lower among fruit juice consumers, compared to non consumers
- For consumers, fruit juice contributed almost 60% of total daily vitamin C, 16% of total folate and 14% of total potassium intake

ASSOCIATION WITH WEIGHT STATUS AND PHYSICAL ACTIVITY

- Amongst consumers, the highest intake of fruit juice occurred in the highest tertile of physical activity
- There was no significant association between fruit juice intake and weight status for both children and adults

INTRODUCTION

Fruit juice is part of the fruit category in the Australian Dietary Guidelines¹. The guidelines state that one serve of fruit is approximately 150g of fresh fruit and includes the occasional consumption of 125mL of fruit juice (with no added sugar) or 30g of dried fruit.¹

As consumption of fruit juice can contribute to total fruit serves, it is important to understand prevalence and consumption patterns of fruit juice among Australians. Thus, the Australian Beverage Council commissioned the CSIRO Food and Nutrition Flagship to independently undertake a secondary analysis² of the 2011-12 National Nutrition and Physical Activity Survey (NNPAS).³

The aim of the secondary analysis was to provide an accurate and contemporary understanding of the role of fruit juice in the diet of Australians, and to examine the relationship of fruit juice with nutritional status, lifestyle patterns and other factors related to health. Data were weighted to reflect the demographic structure of the Australian population.

This report, commissioned by Fruit Juice Australia – a dedicated division of the Australian Beverages Council – provides a summary of the key findings contained in the comprehensive CSIRO Food and Nutrition Flagship “Fruit Juice in the Australian Diet” report,² which is a subsection of a broader beverages secondary analyses.⁴

NATIONAL NUTRITION AND PHYSICAL ACTIVITY SURVEY 2011-12

Survey overview

- The Australian Health Survey (AHS) 2011-2013 was conducted by the Australian Bureau of Statistics and includes the National Nutrition and Physical Activity Survey
- It is the largest and most comprehensive health survey ever conducted in Australia

Data collection period

May 2011- June 2012

Survey sample

12,153 persons aged 2 years and over, from across Australia

Survey methods

- Two 24-hour dietary recalls, where respondents were asked about the previous 24 hours intake of food, beverages and dietary supplements. The first dietary recall was conducted face to face with a trained interviewer (day 1), and the second conducted at least eight days later via a telephone interview (day 2)
- Physical activity patterns – respondents were requested to complete 48-hour activity recall and wore a pedometer for one week
- Data are presented for the whole of population and then specifically for consumers (see below)

THE SECONDARY ANALYSIS OF THE NATIONAL NUTRITION AND PHYSICAL ACTIVITY SURVEY (2011-12):

Demographic breakdown

Gender – male, female, total

Age – Children and adolescents (2-18 years) and adults (19 years +)

Seasons – Summer, Autumn, Winter, Spring

Socio-Economic Indexes for Areas (SEIFA) – an index of relative socio-economic disadvantage that ranks areas by the level of social and economic well being in that region (e.g. lowest quintile most disadvantaged, highest quintile least disadvantaged). It accounts for income, educational attainment, unemployment, and dwellings without motor vehicles

Usual intake of fruit juice

The National Cancer Institute (NCI) method was used to estimate the usual intake distribution of fruit juice, by using both Day 1 and Day 2 of the survey data

Occasions of eating

Self-reported occasions of eating: breakfast, lunch, dinner, supper, brunch, morning tea, afternoon tea, snack, drink/beverage, extended consumption, or other

Contribution of fruit juice to fruit intake

Estimates of usual intake were made for fruit serves alone, and for the additional contribution of fruit juice to the intake of total fruit serves (for males and females, 2 years +)

Nutrient contribution from fruit juice

Calculated proportion of nutrients from fruit juice relative to total nutrient intake

Diet quality

Measured using the Dietary Guidelines Index^{5,6} which estimates an individual's compliance with the age gender specific recommendations in the Australian Dietary Guidelines. The Dietary Guidelines Index measures the quantity and quality of foods consumed, with a score out of 100. A higher score represents greater compliance with the Dietary Guidelines as a whole. Diet quality tertiles are described as low, medium or high diet quality

Physical activity

Self-reported by respondents as the average minutes per week (for children) and total minutes per week (for adults) undertaking physical activity, in the seven days prior to interview

Sedentary behavior

Self-reported by respondents as the average minutes per day lying down or doing screen-based activity (for children) and total minutes per week lying down for work, transport and leisure activities (for adults), in the seven days prior to interview

Weight status

Adults – underweight; normal weight; overweight; and obese calculated using body mass index (BMI)

Children and adolescents – age and gender specific BMI cut-offs for underweight, normal weight, overweight and obese were applied using published cut-off values^{7,8}



The aim of the secondary analysis was to provide an accurate and contemporary understanding of the role of fruit juice in the diet of Australians.

THE SECONDARY ANALYSIS OF THE NATIONAL NUTRITION AND PHYSICAL ACTIVITY SURVEY (2011-12):

The results of this secondary analysis align with a previously conducted secondary analysis of the 2007 Australian National Children's Nutrition and Physical Activity Survey.⁹

On the day of the survey

In this report, specific beverages are considered in terms of their impact on the sub-section of the population that consumed the beverage on the day of the survey.

Population

All survey subjects (consumers + non consumers).

Consumers

Survey subjects who consumed fruit juice or another specified non-dairy, non-alcoholic beverage on the day of the survey. For example, survey subjects who consumed fruit juice within the 24-hour dietary recall are referred to as 'fruit juice' consumers.

Statistically significant

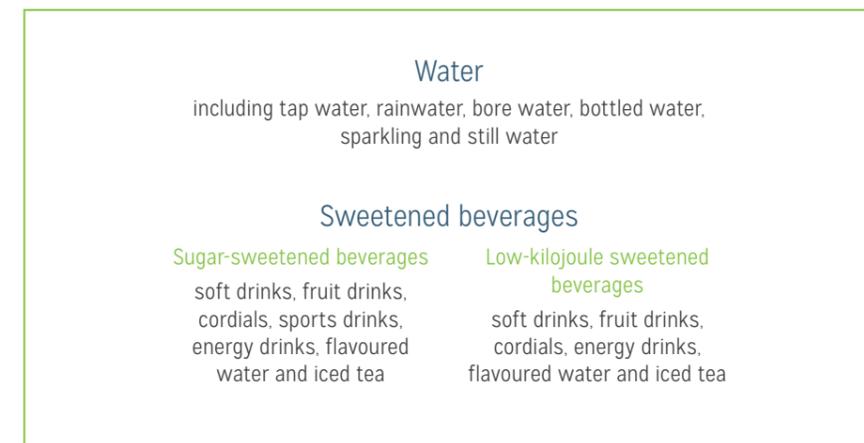
It is to be expected that, with a survey of this size there will be many statistically significant differences detected. In this report, only those of particular interest have been discussed. The reader is referred to the main report and accompanying comprehensive tables for further investigation of significant differences. Statistical significance was set at $p < 0.05$. Significant findings are indicated, where applicable.



The Australian Health Survey (AHS) is the largest, most comprehensive health survey ever conducted in Australia.

BEVERAGE CATEGORIES

Whilst Australians consume a diverse range of beverages, the focus of this secondary analysis was on fruit juice with no added sugar. This excluded:



In this analysis, beverages exclude milk, milk based drinks, meal replacements, vegetable juices, tea, coffee, beer, wine and spirits (including premixed alcoholic drinks).

Figure 1

Non-dairy, non-alcoholic beverage categories



WHO CONSUMED FRUIT JUICE?



DESPITE FRUIT JUICE BEING A POPULAR BEVERAGE CHOICE, NOT MANY AUSTRALIANS WERE FRUIT JUICE CONSUMERS

POPULATION

Among all Australians, fruit juice was the third most often consumed non dairy, non alcoholic beverage choice for both children (2-18 years) and adults (19+ years).

Although significantly ($p < 0.05$) more children than adults consumed fruit juice, less than a quarter (23%) of children (2-18 years) and 15% of adults (19+ years) consumed fruit juice, on the day of the survey.

FACTORS THAT INFLUENCED CONSUMPTION

Age and gender

The highest prevalence of fruit juice consumers was among 2-3 year old children (27%; $p < 0.05$).

The prevalence of fruit juice consumption was not influenced by gender

- Across all age groups prevalence was similar for males (18%) and females (16%).

Household income

There was no significant difference in fruit juice intake by household income.

Socio-economic status

Higher socio-economic status was associated with higher fruit juice intake among children.

- Children in the 2nd or 3rd quintile of relative socio-economic disadvantage (SEIFA) had significantly lower intake of fruit juice compared to the 5th quintile ($p < 0.05$) (see Figure 3)

Among adults, males but not females in the 5th quintile of SEIFA had significantly higher fruit juice intakes compared to the 1st quintile ($p < 0.05$).

Figure 2
Consumption of beverage categories across the population

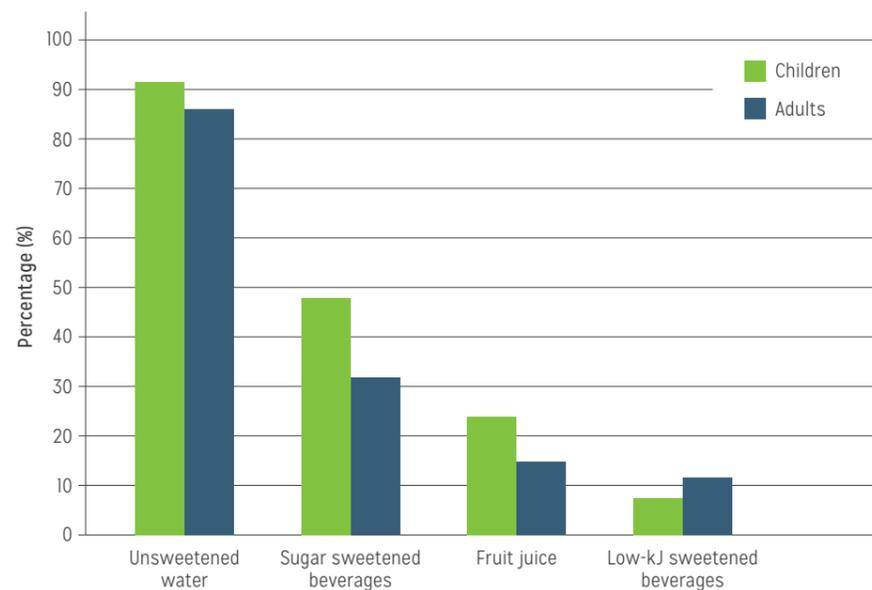
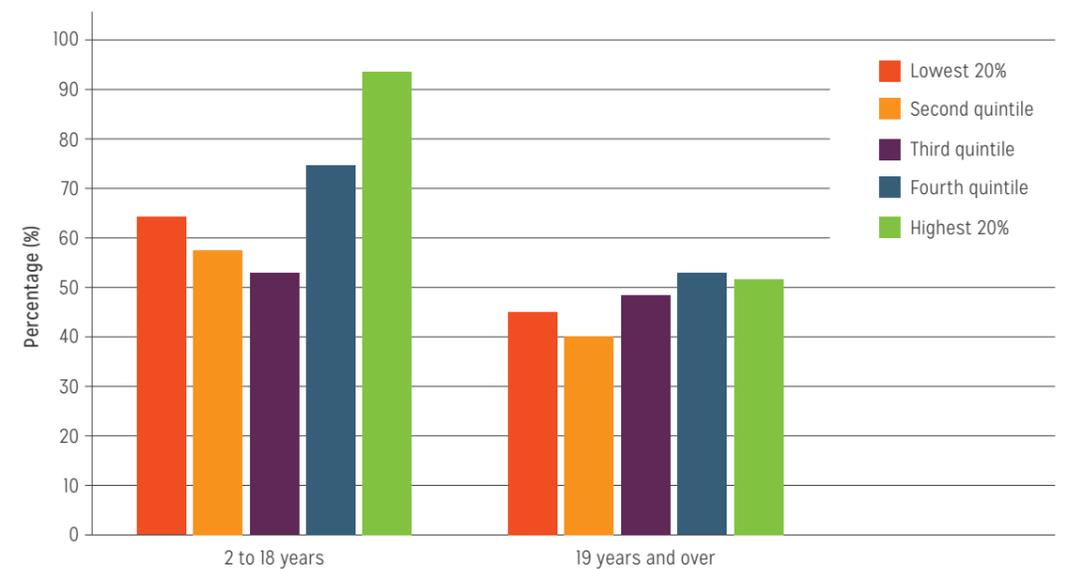


Figure 3
Fruit juice intake by SEIFA quintiles (index of relative socio disadvantage), for children and adults



HOW MUCH FRUIT JUICE DID AUSTRALIANS DRINK?

THE MEAN INTAKE OF FRUIT JUICE PER PERSON ACROSS THE POPULATION WAS 52.4 ML, OR A FIFTH OF A GLASS (250 ML). IN COMPARISON, FRUIT JUICE CONSUMERS DRANK, ON AVERAGE, JUST OVER 1 CUP (250 ML) OF FRUIT JUICE PER DAY - WITH TEENAGERS DRINKING THE HIGHEST AMOUNT COMPARED TO OTHER AGE GROUPS

POPULATION

Among the population:

- The intake of fruit juice (52.4 mL) was lower than water (1071 mL) and sugar sweetened beverages (187.9 mL; $p < 0.05$)
- Teenagers 14-18 years of age consumed the highest amount of fruit juice (87 mL; $p < 0.05$ compared to all other age groups)
- Adults aged 71 years or older consumed the lowest amount of fruit juice (36.9 mL; $p < 0.05$ compared to all other age groups)
- Males (59.9 mL) consumed significantly more fruit juice than females (44.9 mL; $p < 0.05$)

Figure 4
Population - mean intake of fruit juice: adults

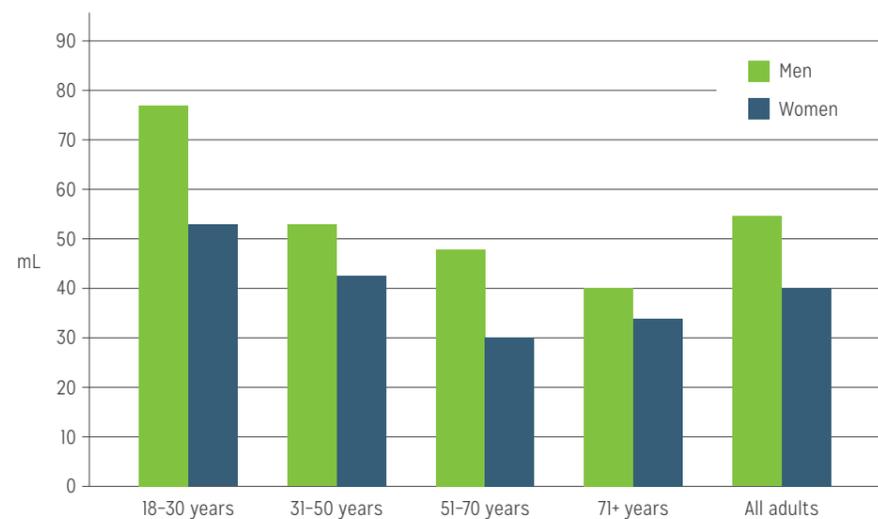


Figure 5
Population - mean intake of fruit juice: children

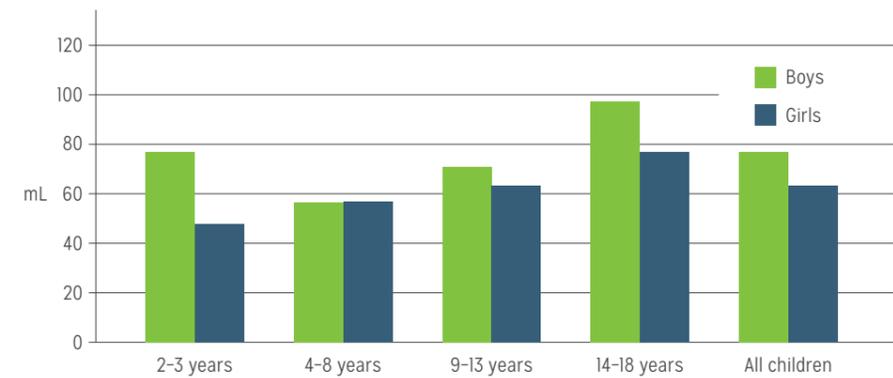
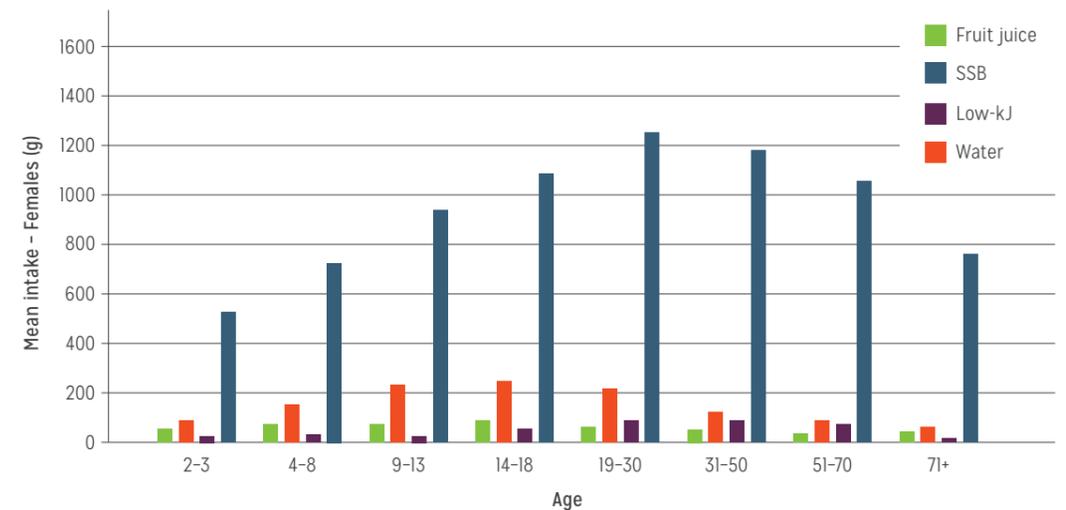
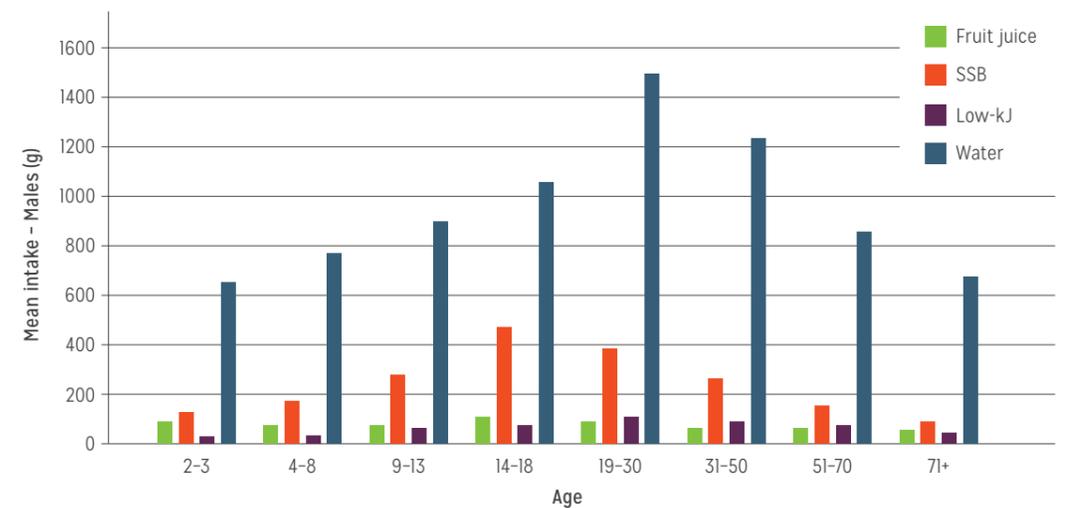


Figure 6
Mean consumption of non-dairy, non-alcoholic beverages across age groups



HOW MUCH FRUIT JUICE DID AUSTRALIANS DRINK?

CONSUMERS

Among fruit juice consumers, children and adults consumed similar amounts of fruit juice, but males consumed significantly more than females on the day of the survey ($p < 0.05$).

Teenage boys and girls aged 14-18 years consumed significantly higher amounts compared with other age groups: 433 mL and 360 mL, respectively ($p < 0.05$).

Table 1
Mean consumption of fruit juice for all consumers



1 FRUIT SERVE  **IS 125mL FRUIT JUICE**
WITH NO ADDED SUGAR, CONSUMED OCCASIONALLY



Figure 7
Fruit juice intake among consumers: children

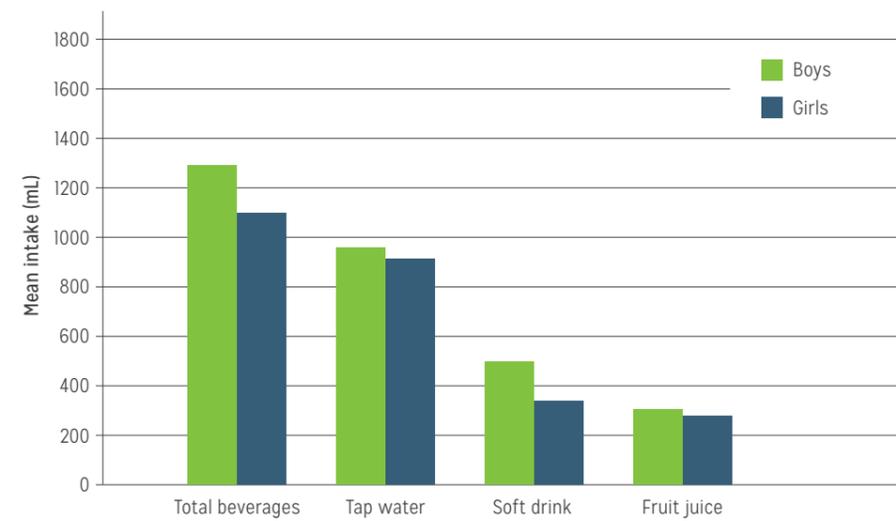
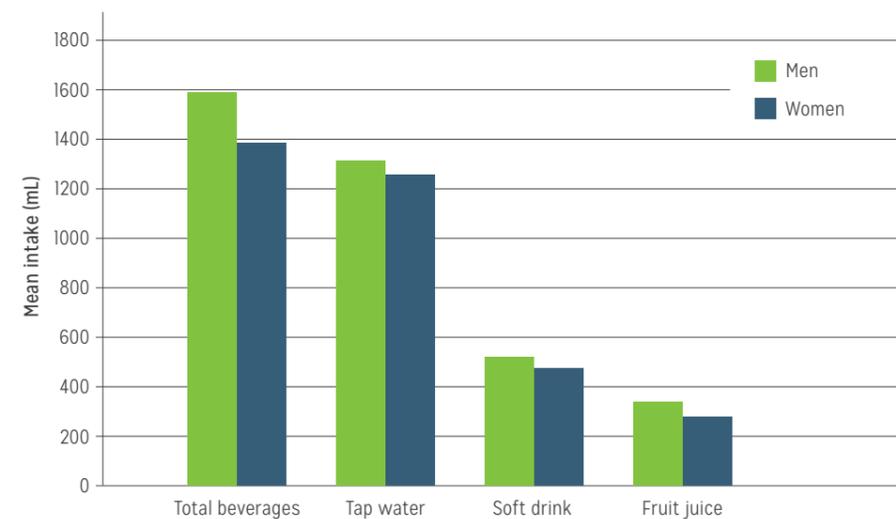


Figure 8
Fruit juice intake among consumers: adults



WHEN WERE CONSUMERS DRINKING FRUIT JUICE?

FRUIT JUICE WAS A MORNING BEVERAGE CHOICE AND WAS PRIMARILY ENJOYED AS PART OF A MEAL RATHER THAN ON ITS OWN



CONSUMERS

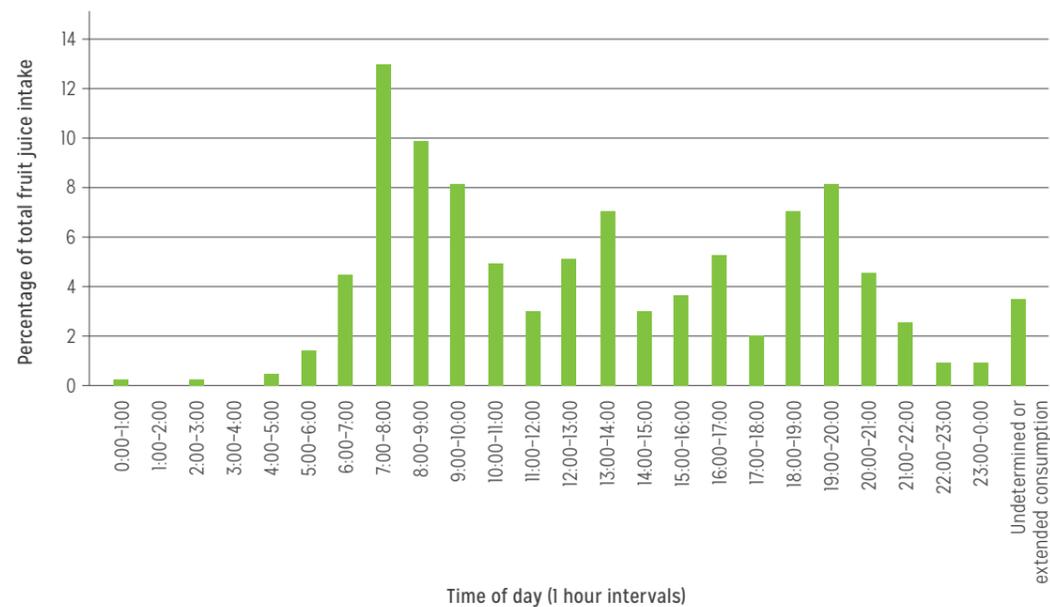
Time of Day

About 30% of fruit juice was consumed between 7-10am, and increased to 40% when the hours were extended to between 6-11am.

- The pattern of intake was similar in males and females.
- For adults, most fruit juice was consumed in the morning between 5-7am and in the evening between 7-9pm.
- Children consumed a greater proportion of fruit juice between 4-7pm.

Figure 9

Fruit juice consumption over the day as a percentage of total fruit juice consumed



FRUIT JUICE WAS PRIMARILY CONSUMED AT MAIN MEALS AND MOSTLY WITH OTHER FOOD (79% OF THE TIME), RATHER THAN ON ITS OWN.

WHAT CONTRIBUTION DID FRUIT JUICE MAKE TO DAILY FRUIT SERVES?

AUSTRALIANS WERE NOT MEETING THEIR DAILY FRUIT INTAKE RECOMMENDATIONS³ – INCLUDING FRUIT JUICE AS A FRUIT SERVE CAN MAKE A POSITIVE CONTRIBUTION TO FRUIT INTAKE

81% of children and 93% of adults did not meet their daily fruit recommendations, from fruit alone (excluding fruit juice and dried fruit)

Including fruit juice as a serve of fruit **more than doubled** the percentage of the population who met their daily fruit recommendations per the Australian Dietary Guidelines (from 10% → 24%).

Specifically, compliance with the Dietary Guidelines fruit intake target:

- Nearly **tripled** among children aged 9-13 years → from 12% to 33%
- **Quadrupled** among young adults aged 19-30 years → from 4% to 18% and;
- Increased by almost **5 times** among those who consumed the greatest amount (aged 14-18 years) → from 5% to 24%

1 SERVE OF FRUIT

Approximately 150g of fresh fruit.
Occasionally 125mL of fruit juice (with no added sugar) or 30g dried fruit.



DAILY RECOMMENDATION

1 serve for 2-3 years
1.5 serves for 4-8 years
2 serves for 9 years or older

WHAT WAS THE CONTRIBUTION OF FRUIT JUICE TO ENERGY AND SUGAR?

FRUIT JUICE CONTRIBUTES LITTLE ENERGY AND SUGAR TO THE DIET OF ALL AUSTRALIANS IN COMPARISON TO OTHER FOODS AND BEVERAGES

TOTAL DAILY ENERGY

AMONG THE POPULATION

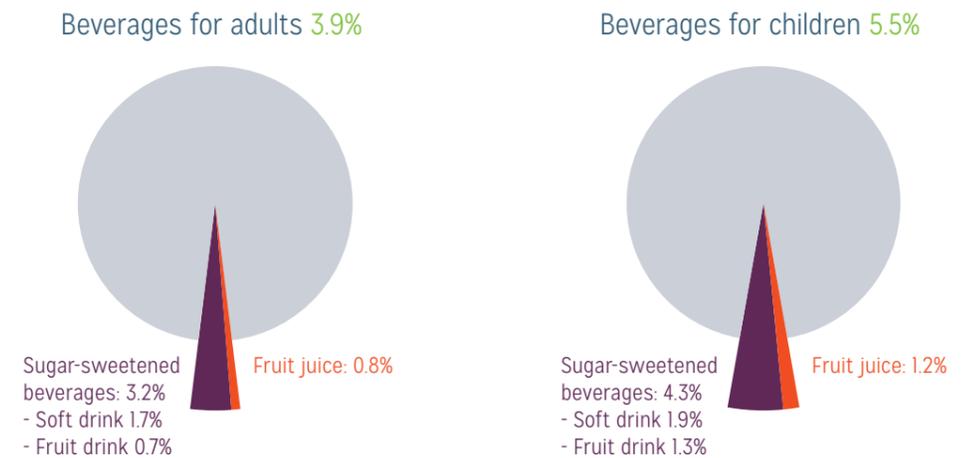
- Non dairy, non alcoholic beverages contributed on average, 5.5% and 3.9% to total energy intake among children and adults, respectively
- Fruit juice contributed on average, <1% to total daily energy intake among all Australians, with sugar-sweetened beverages contributing (3.4%)

Figure 10

Total daily energy contribution of beverages: population



FRUIT JUICE: <1% of total daily energy intake



WHAT WAS THE CONTRIBUTION OF FRUIT JUICE TO ENERGY AND SUGAR?

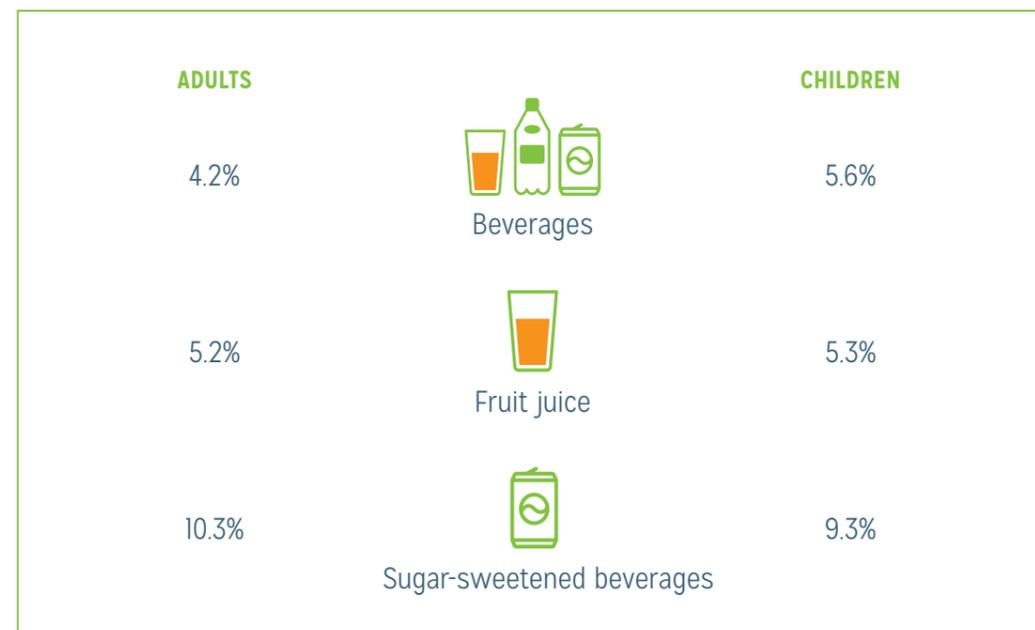
FRUIT JUICE CONTRIBUTES LITTLE ENERGY AND SUGAR TO THE DIET OF ALL AUSTRALIANS IN COMPARISON TO OTHER FOODS AND BEVERAGES

TOTAL DAILY ENERGY

AMONG CONSUMERS

- Non dairy, non alcoholic beverages contributed on average, 5.6% and 4.2% to total energy intake among children and adults, respectively
- Fruit juice contributed a similar percentage of total energy to both children and adult consumers (5.3% and 5.2%, respectively, or an average of approximately 5%), while sugar-sweetened beverages contributed 10.0% of total energy intake

Figure 11
Total daily energy contribution of beverages: consumers



FRUIT JUICE: ~5% of total daily energy intake



TOTAL DAILY SUGAR

AMONG THE POPULATION

- Non dairy, non alcoholic beverages contributed on average, 21.2% to the total sugar intake of children and 15.8% to the total sugar intake of adults
- Fruit juice contributed, on average, 3.5% of total daily sugar intake among all Australians (3.1% among adults and 4.6% among children), with sugar-sweetened beverages contributing, on average, the most (13.5%)

Figure 12
Total daily sugar contribution of beverages: population



FRUIT JUICE: 3.5% of total daily sugar intake

Beverages for adults 15.8%

Beverages for children 21.2%



Sugar-sweetened beverages: 12.7%
Fruit juice: 3.1%



Sugar-sweetened beverages: 16.5%
Fruit juice: 4.6%

WHAT WAS THE CONTRIBUTION OF FRUIT JUICE TO ENERGY AND SUGAR?

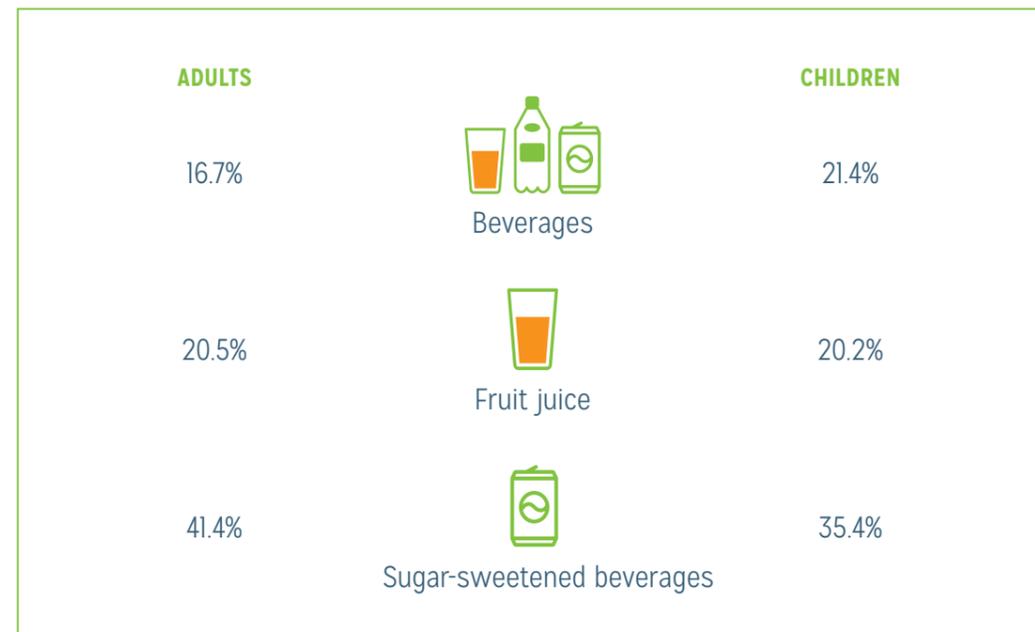
FRUIT JUICE CONTRIBUTES LITTLE ENERGY AND SUGAR TO THE DIET OF ALL AUSTRALIANS IN COMPARISON TO OTHER FOODS AND BEVERAGES

TOTAL DAILY SUGAR

AMONG CONSUMERS

- Non-dairy, non-alcoholic beverages contributed on average, 16.7% to the total sugar intake of adults and 21.4% to the total sugar intake of children
- Fruit juice contributed on average, about 20% to total sugar intake among both adults and children
- Sugar sweetened beverages contributed 35.4% and 41.4% to total sugar intake for children and adults, respectively

Figure 13
Total daily sugar contribution of beverages: consumers



FRUIT JUICE: 20% of total daily sugar intake

WAS FRUIT JUICE ASSOCIATED WITH DIET QUALITY?

CONSUMERS OF FRUIT JUICE HAD A BETTER DIET QUALITY SCORE THAN NON CONSUMERS. THEY ALSO CONSUMED LESS ENERGY FROM DISCRETIONARY FOODS

Diet quality was measured using a composite index to estimate an individual's compliance with the Australian Dietary Guidelines.

POPULATION

Among adults, there was an increase in mean fruit juice intake with increasing tertiles of diet quality score. However, no difference was observed for children.

CONSUMERS

Among adults, there was a decrease in fruit juice consumption with increasing tertiles of diet quality score. A clear pattern was not seen among children.

ADDITIONAL ANALYSIS

Examining the dietary intake of those who consumed fruit juice on the day of the survey in more detail, they reported a lower percentage of energy from discretionary foods (-3% energy) and a higher diet quality score (+5.5/100 points) compared with non consumers of fruit juice. The difference in the intake of core and discretionary foods between consumers and non consumers of fruit juice was modest. In contrast, comparing those who consumed sugar sweetened beverages on the day of the survey to those who did not, there were greater differences in consumption of core and discretionary foods.

A similar pattern was seen for children. Children who consumed fruit juice had a better diet quality score, a lower intake of discretionary foods and a greater intake of core foods (except dairy) compared to those who did not have fruit juice on the day of the survey.

CONTRIBUTION OF FRUIT JUICE TO NUTRIENT INTAKES FOR FRUIT JUICE CONSUMERS

Fruit juice provided valuable nutrients to the diet of consumers. On average, fruit juice contributed:

- ~60% of total daily vitamin C
- 16% of total folate
- 14% of total potassium intake

Figure 14
Contribution of fruit juice to total nutrient intake: consumers

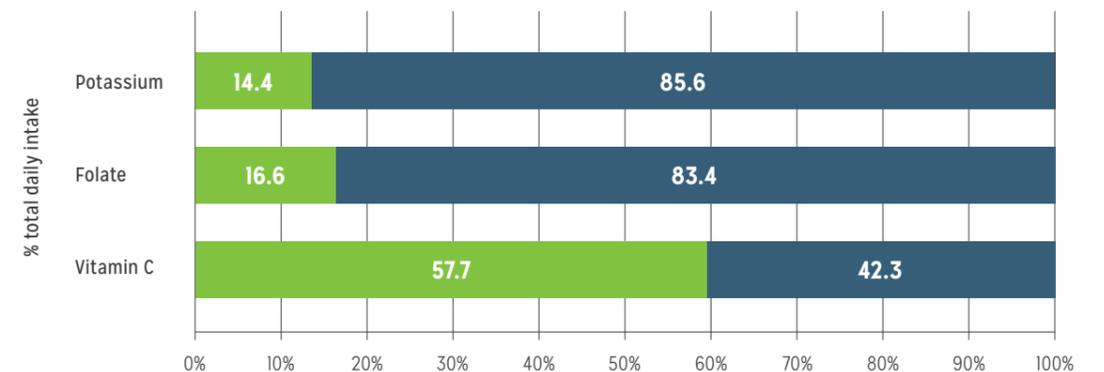
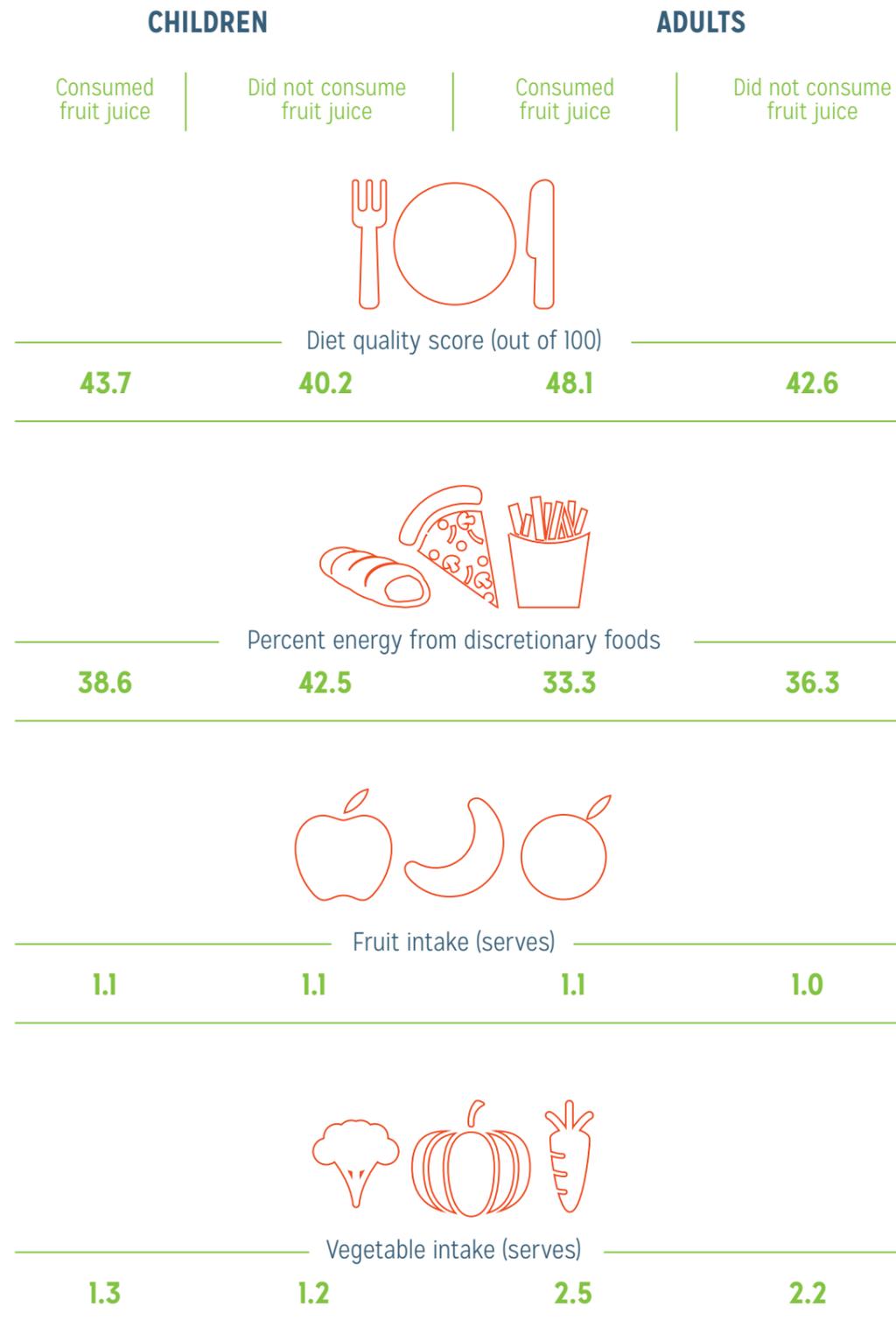


Figure 15
Fruit juice and diet quality



FRUIT JUICE INTAKE AND PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOUR

AMONGST CONSUMERS, THE HIGHEST INTAKE OF FRUIT JUICE OCCURRED IN THE HIGHEST TERILE OF PHYSICAL ACTIVITY

POPULATION

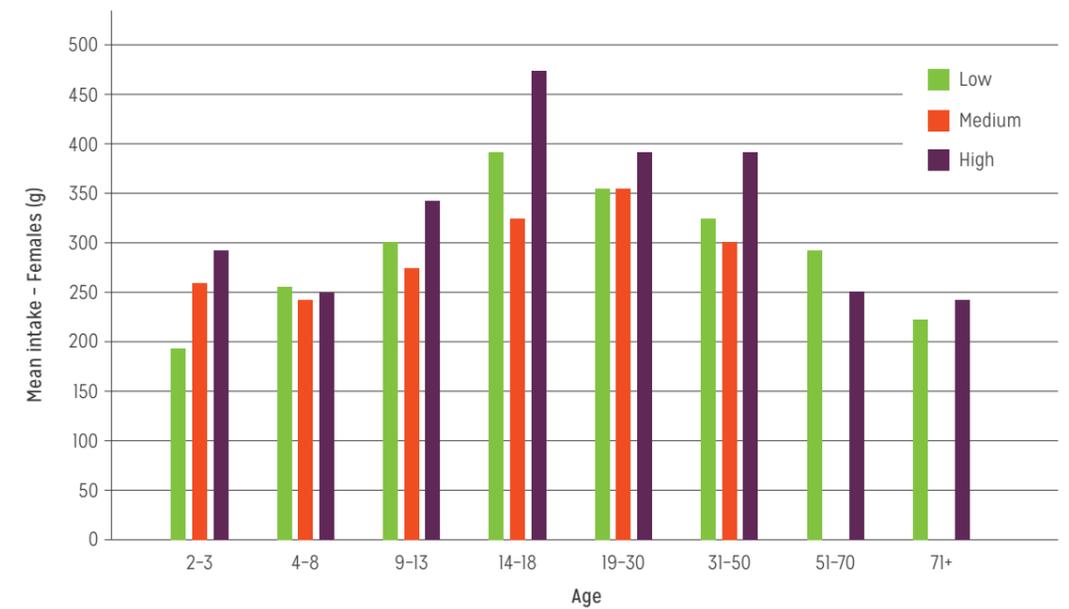
There was no consistent pattern of fruit juice intake across tertiles of physical activity by age group across the population.

CONSUMERS

Amongst fruit juice consumers, there was a suggestion that the highest intake of fruit juice occurred in the highest tertile of physical activity, specifically for the younger age groups. For most consumers of fruit juice, intake was highest in the highest tertile of time spent in sedentary behaviour.

Figure 16

Fruit juice intake by age group across tertiles of physical activity, for juice consumers



WAS FRUIT JUICE ASSOCIATED WITH WEIGHT STATUS?

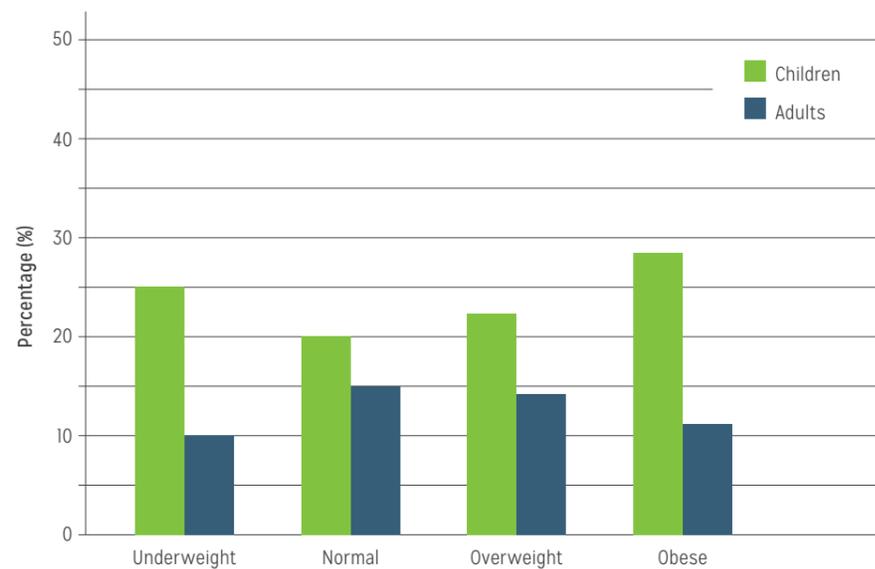
THERE WAS NO SIGNIFICANT ASSOCIATION BETWEEN FRUIT JUICE INTAKE AND WEIGHT STATUS†, FOR BOTH CHILDREN AND ADULTS



POPULATION

Across the adult population, consumption of fruit juice generally decreased with increasing weight status for both males and females. Among children, fruit juice consumption did not vary across weight status groups and was similar for boys and girls ($p>0.05$).

Figure 17
Percentage of population who consumed fruit juice by weight status: adults and children



†It is important to note that a mis-reporting of total energy intake in this survey is greater with increasing weight status and needs to be taken into consideration when interpreting any relationship between intake and weight status.

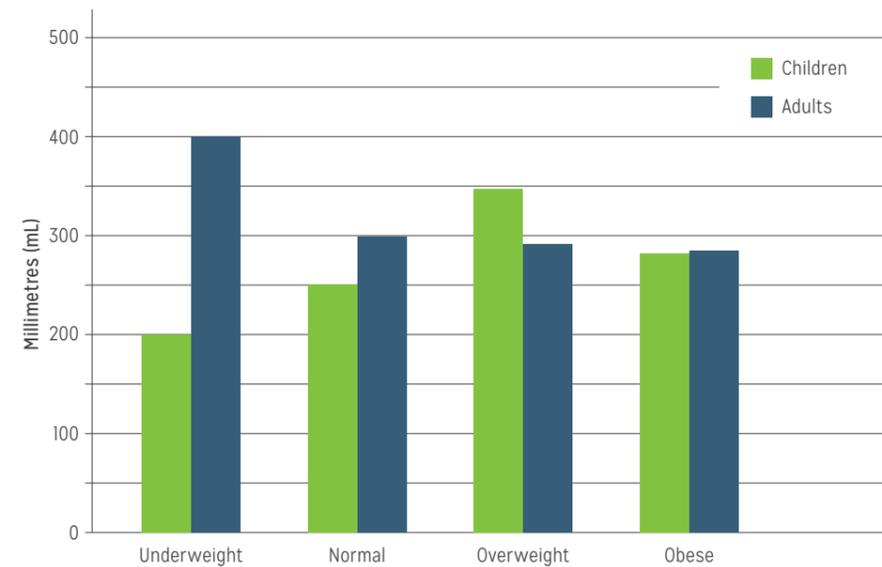


CONSUMERS

Among adult consumers, fruit juice intake generally decreased with increasing weight status ($p>0.05$). Fruit juice intake was highest in underweight adults (425mL for females, 630mL for males) however, relatively few consumers were included in this group.

Among children, there was no significant difference in fruit juice intake across weight status categories ($p>0.05$).

Figure 18
Mean fruit juice intake by weight status for consumers: adults and children



Note: Due to potential misreporting of total energy intake in the Australian Health Survey, interpret weight association with care.



There was no significant association between fruit juice intake and weight status, for both children and adults.

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Fruit Juice Australia (FJA) is the industry voice for the \$816 million fruit juice industry that supports almost 4,500 direct processing jobs in the country. Members of FJA comprise over 90% of the industry's production volume.

For more information please contact:



Fruit Juice Australia
Australian Beverages Council
2 Allen Street WATERLOO NSW 2017
www.australianbeverages.org