

### TRENDS IN REPORTED FRUIT AND VEGETABLE CONSUMPTION AMONG QUEENSLAND ADULTS: 1995-2004

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Increasing fruit and vegetable consumption is a key public health priority. Epidemiological studies have shown that increasing fruit and vegetable intakes decreases the risk of several major chronic diseases including cancers, cardiovascular disease, type 2 diabetes and macular degeneration of the eye. There is little dispute that high intakes of fruit and vegetables confer significant health benefits. However, current consumption appears to be well below the recommended levels in the Queensland adult population.

Data from the 1995 National Nutrition Survey (1), the 2000 AusDiab Survey (2), the 2001 Omnibus Survey (3), the 2001 National Health Survey (4) and the most recent 2004 SNAP Survey (5) indicated that there has been an increase in fruit and vegetable intakes over this time period. The most recent surveys, however, suggest that, in general, 90% of adult Queenslanders ate less than the recommended 5 serves or more of vegetables per day and approximately half ate less than the recommended 2 serves or more of fruit per day.

#### Key findings

- In 2004, approximately half of Queenslanders (44% of males and 58% of females) reported consuming the recommended 2 serves of fruit per day.
- For vegetables, only 10% of adults (9% of males and 11% of females) reported consuming the recommended 5 serves or more per day.
- In general, while most adults reported NOT meeting recommendations for intakes of fruit or vegetables, those at particular risk tended to be:
  - Males
  - Younger age groups
  - Current smokers
  - Obese persons
  - Those at high risk of harm from alcohol in the short term
  - Sedentary persons
- Reported fruit and vegetable consumption did not appear to be influenced by level of education or level of income or SEIFA (area index of socio-economic advantage/disadvantage).

Trends in reported fruit and vegetable intakes from CATI surveys, 2001 – 2004

- From 2001 to 2004 the proportion of adults who reported consuming at least 2 serves of fruit per day increased by approximately 2% for both males and females.
- Over this same period, the proportion of adults who reported consuming at least 4 serves of vegetables per day increased by approximately 12% for males and 8% for females.

Trends in written surveys 1995, 2000 and 2001

- The proportion of adult males and females who reported consuming the recommended number of serves of fruit increased by approximately 2% and 6%, respectively from 1995 to 2001.
- For vegetables, the proportion of females who reported consuming 4 or more serves per day increased by 14%, whereas for males the increase was 8%.

#### Introduction

There is considerable evidence that diets high in vegetables and fruit are associated with lower rates of cancers of most sites (6, 7), lower rates of coronary heart disease (8, 9), stroke (10), hypertension (11), cataracts and macular degeneration of the eye (12) and type 2 diabetes (13).

Globally, comparative quantification of health risks showed that a lack of dietary fruit and vegetables contributes an important share of the world wide burden of disease. A recent World Health Organization report (10) estimated that increasing individual fruit and vegetable consumption up to the theoretical-minimum-risk distribution (600 grams/day for adults) could reduce the world wide burden of disease for:

- ischaemic heart disease by about 31%,
- ischaemic stroke by about 19%,
- cancer of the mouth by 19%,
- cancer of the oesophagus by 20%,
- lung cancer by 12% and,
- colorectal cancer by 2%.

The global mortality and morbidity attributable to inadequate fruit and vegetable consumption was estimated to be 2.726 million deaths or 26.662 million disability adjusted life years (DALYs) (10).

The Australian Burden of Disease Study (14) attributes approximately 11% of all cancers, which relates to 3,000 deaths, to inadequate fruit and vegetable consumption. According to this Australian study (14), inadequate fruit and vegetable intake is responsible for around 3% of the total disease burden, compared to 2% from alcohol and 10% from tobacco.

The importance of nutrition in disease prevention and health maintenance has been emphasised by publications of The National Health & Medical Research Council's 2003 Dietary Guidelines for Australian adults (15), the Commonwealth Department of Health and Ageing's Australian Guide to Healthy Eating 1998 (16), and the Queensland Public Health Forum's Eat Well Queensland (17). All of these publications recommend a minimum daily intake of two serves of fruit and five serves of vegetables and legumes for adults aged 19 years and over as dietary principles to prevent diet-related diseases. A number of national and state initiatives directed at

increasing fruit and vegetable consumption have been introduced recently.

Therefore there is considerable interest in assessing changes in fruit and vegetable consumption in the population. Short dietary questions, which are directed toward usual intakes, have been used at national and state levels to assess specific aspects of food intake and food habits in Australia. These short questions provide data that give, at minimum cost, a reasonably good indication of fruit and vegetable intakes. Also, these questions have been shown to agree well with more detailed methods of dietary assessment (18, 19), as well as with objective biomarkers of fruit and vegetable intakes (20).

This information circular examines trends from 1995 to 2004, in the proportion of Queensland adults who reported their usual consumption of fruit and vegetables in surveys using short dietary questions, and further looks at demography and lifestyle factors associated with fruit and vegetable intakes.

## Methods

The data used in this report are based on Queensland data only, collected from five cross-sectional surveys:

- 1995 National Nutrition Survey (NNS) n= 2396
- 2000 Diabetes, Obesity and Lifestyle (AusDiab) Survey n=1634
- 2001 National Health Survey (NHS) n=3142
- 2001 Queensland Health (Omnibus) Survey n=3084
- 2004 SNAP Survey (Smoking, Nutrition, Alcohol and Physical activity) n=1210.

Each survey provided an estimate of the usual number of serves of fruit and vegetables consumed per day using standard short questions. The 1995 NNS, the 2001 NHS, and 2000 AusDiab were national surveys and used self-completed written questionnaires, while the 2001 Omnibus survey and the 2004 SNAP survey used the Computer Assisted Telephone Interview (CATI) method. Owing to the different data collection methods used, the written surveys and the CATI surveys are presented separately.

Survey participants 18 years of age and over (25 years and over in AusDiab) were asked to respond to the following questions:

- **“How many serves of fruit do you usually eat each day?**  
including fresh, frozen or tinned fruit. A serve = 1 medium piece or 2 small pieces of fruit or 1 cup of diced pieces of fruit.”
- **“How many serves of vegetables do you usually eat each day?**  
including fresh, frozen or tinned vegetables. A serve = ½ cup cooked vegetables or 1 cup of salad vegetables.”

The question related to fruit intake does not specify that it does not include juice, but if the respondent asks about fruit juice, the interviewer indicates that juice is not included. Although the Dietary Guidelines for Australians Adults' (15) recommendation is for at least 5 serves of vegetables, the possible responses in the surveys up to 2004 to the

vegetable question were pre-grouped and one group was “4 to 5 serves.” Therefore, for the earlier surveys it is not possible to distinguish between those who consumed 4 serves or those who consumed the recommended 5 serves or more of vegetables per day. The vegetable question does not specify whether potato chips are included but if the respondent asks, the interviewer indicates that chips can be included.

The 2004 SNAP Survey, however, did record the responses to the vegetable question as individual serves in whole numbers (not grouped), making it possible to estimate the proportion of adults who reported meeting recommended guidelines for vegetable intake.

For all five surveys, sample weights have been applied to produce representative estimates by age and sex for the Queensland population. Due to differences in survey methods and lack of access to the unit record data for one of the surveys, statistical significance tests were not performed.

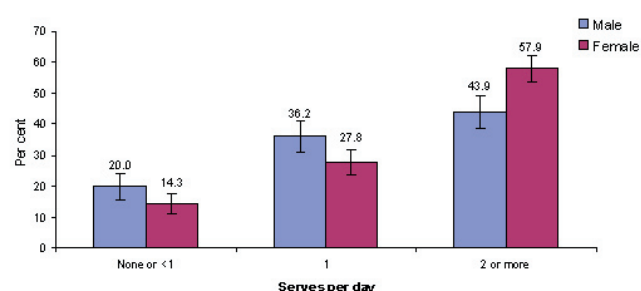
## Results

### 2004 SNAP Survey

#### Gender

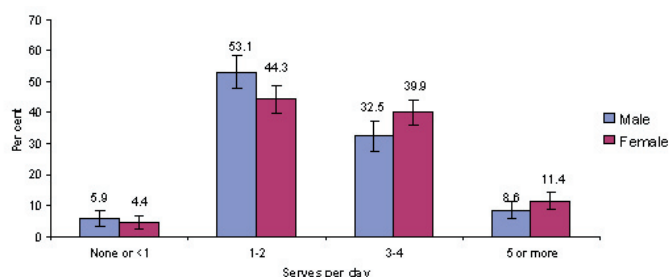
Overall, women reported eating more fruit and vegetables than men, although both reported consuming less than the recommended number of serves per day. Figure 1 indicates that approximately 58% of Queensland females and 44% of males reported usually consuming the recommended 2 serves or more of fruit a day. Yet, about 14% of females and 20% of males and females reported eating less than 1 serve per day or not usually consuming any fruit.

**Figure 1. Reported usual daily intake of FRUIT for Queensland adults by gender - using SNAPS 2004 data**



For vegetables however, only 10% of Queenslanders (about 9% of males and 11% of females) reported consuming the recommended 5 serves or more of vegetables a day (Figure 2). Most adults reported consuming 1 to 2 serves of vegetables. Less than 6% of the population reported not consuming vegetables at all or less than 1 serve per day.

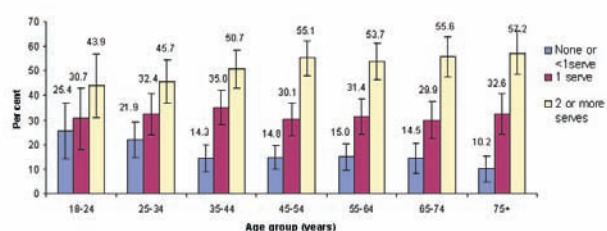
**Figure 2. Reported usual daily intake of VEGETABLES for Queensland adults by gender - using SNAPS 2004 data**



### Age groups

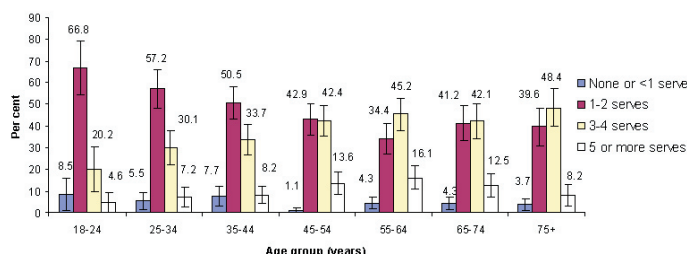
The reported patterns of usual daily fruit intake by age showed that one fourth of young adults aged 18 to 24 reported not consuming any fruit or less than 1 serve per day (Figure 3). In general, the proportion who reported consuming 2 serves or more increased with age.

**Figure 3. Reported usual daily intake of FRUIT for Queensland adults by age group - using SNAPS 2004 data**



Although the pattern was similar for reported daily vegetable consumption, almost 10% of the young adults aged 18 to 24 years reported usually consuming no vegetables or less than 1 serve a day (Figure 4). Again, those who reported consuming the recommended 5 serves per day tended to increase with age.

**Figure 4. Reported usual daily intake of VEGETABLES for Queensland adults by age group - using SNAPS 2004 data**

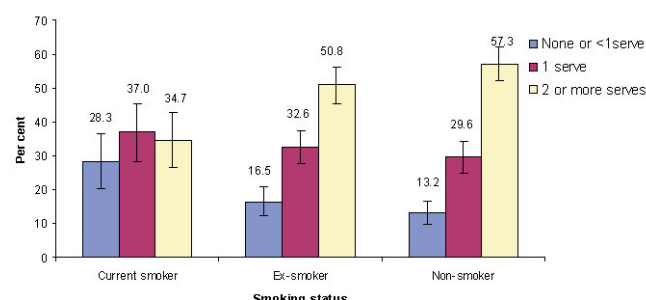


### Lifestyle characteristics

#### Smoking Status

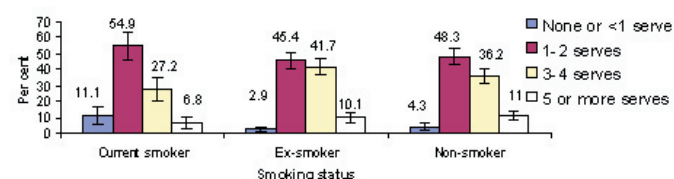
Figure 5 indicates that current smokers were much more likely than non-smokers to not eat fruit or to eat less than one serve per day (28% vs 13% respectively).

**Figure 5. Reported usual daily intake of FRUIT Queensland adults by smoking status - using SNAPS 2004 data**



Current smokers reported a similar pattern regarding usual daily vegetable intake. Figure 6 illustrates that current smokers were more likely than non-smokers to report consuming no vegetables or less than one serve per day (11% vs 4%), and were also less likely to report consuming the recommended five serves or more of vegetables compared with non-smokers (7% vs 11%).

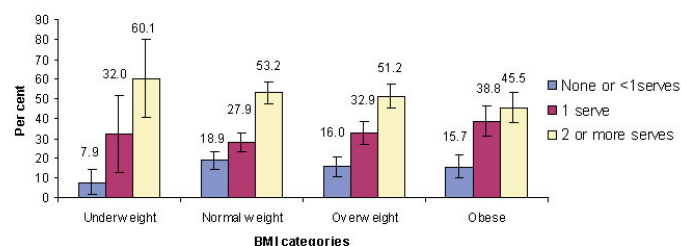
**Figure 6. Reported usual daily intake of VEGETABLES for Queensland by smoking status - using SNAPS 2004 data**



#### Body Mass Index

In the 2004 SNAPS, the proportion of Queensland adults who reported usually consuming the recommended two or more serves of fruit per day decreased with increasing BMI although this did not appear to be significant (Figure 7).

**Figure 7. Reported usual daily intake of FRUIT for Queensland adults by BMI categories - using SNAPS 2004 data**

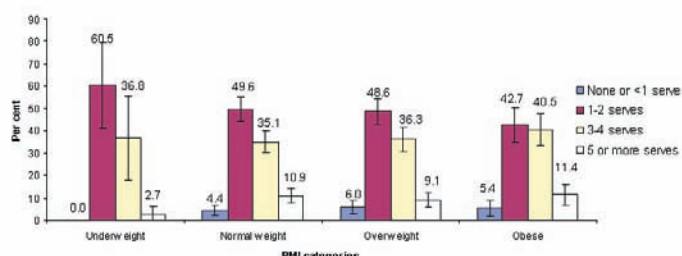


The converse was true for reported vegetable intake. The proportion of Queenslanders consuming the recommended five or more serves of vegetables increased with increasing BMI status; lower for those considered underweight (3%).



compared with those in the normal, overweight and obese categories (approximately 11%, 9% and 11%, respectively; Figure 8).

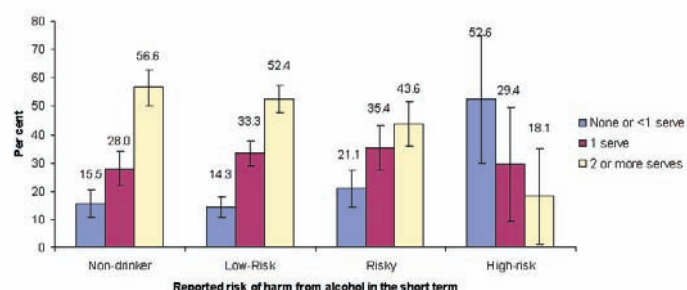
**Figure 8. Reported usual daily intake of VEGETABLES for Queensland adults by BMI categories - using SNAPS 2004 data**



## Alcohol consumption

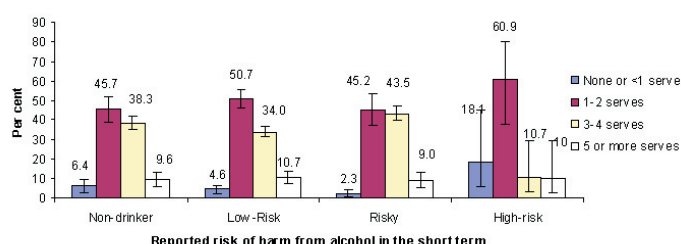
Figure 9 illustrates that those with a high risk of harm from alcohol in the short term were three times more likely than non-drinkers to report that they eat no fruit or less than 1 serve per day and were much less likely to report eating two or more serves of fruit per day (18% vs 57%) compared with non-drinkers.

**Figure 9. Reported usual daily intake of FRUIT for Queensland adults by reported alcohol consumption - using SNAPS 2004 data**



The pattern was similar for high risk drinkers compared to non-drinkers or low-risk drinkers regarding reported vegetable intake. Figure 10 indicates that those with a high risk of harm from alcohol in the short term were more likely than non-drinkers to not eat vegetables or eat less than one serve per day (18 vs 6%).

**Figure 10. Reported usual daily intake of VEGETABLES for Queensland adults by reported risk of harm from alcohol consumption in the short term -using SNAPS 2004 data**

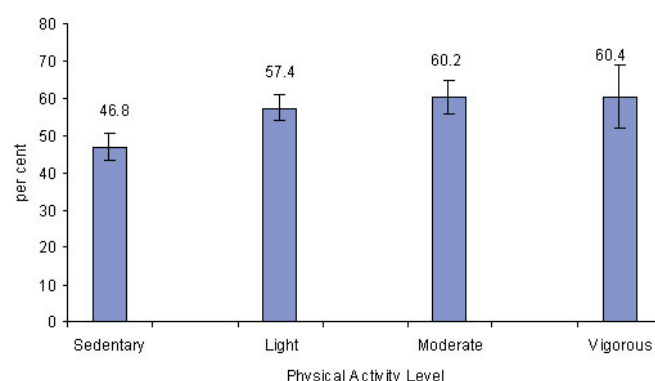


## Physical activity

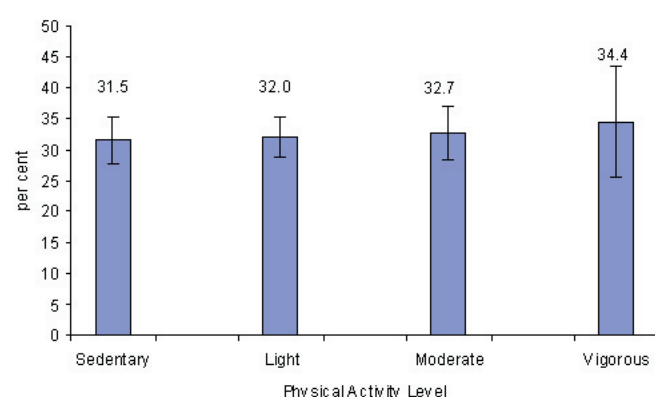
Data on reported physical activity and usual daily fruit and vegetable consumption were available from the 2001 NHS. Figures 11 and 12 show that, overall, adults who were sedentary were less likely to report consuming the recommended two or more serves of fruit than were those who engaged in light, moderate or vigorous levels of physical activity. There were only slight differences in the proportion of adults who reported consuming four or more serves of vegetables by activity level.

The data for vegetable intake for these surveys was only recorded as 4 – 5 serves grouped together, and thus is presented as 4 serves or more.

**Figure 11. Proportion of Queensland adults who reported usually consuming 2 or more serves of FRUIT per day, by physical activity level using NHS 2001 data**



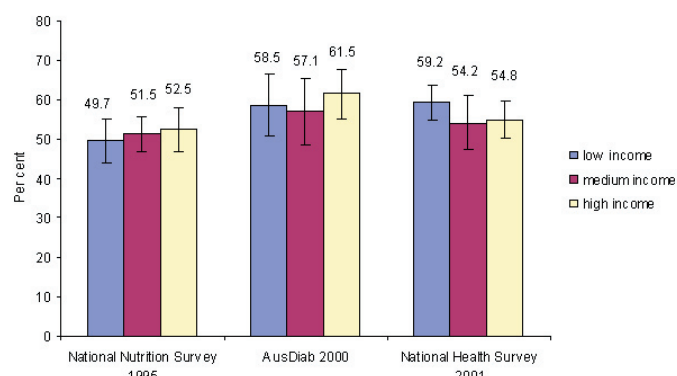
**Figure 12. Proportion of Queensland adults who reported usually consuming 4 or more serves of VEGETABLES per day, by physical activity level using NHS 2001 data**



## Income

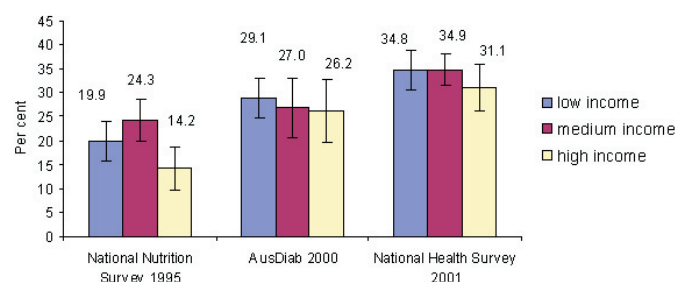
Data on fruit and vegetable intakes by income and educational level were available from the 1995 NNS, the 2000 AusDiab, and the 2001 NHS. Figure 13 suggests that in all three surveys, income had little effect on reported fruit consumption.

**Figure 13. Proportion of Queensland adults who reported usually consuming 2 or more serves of FRUIT per day, by income category, 1995 to 2001**



Although vegetable consumption was expected to increase as income level increased, as reported by some authors (22), this pattern was generally not observed in these surveys. Income appeared to have little effect on reported usual daily vegetable consumption (Figure 14).

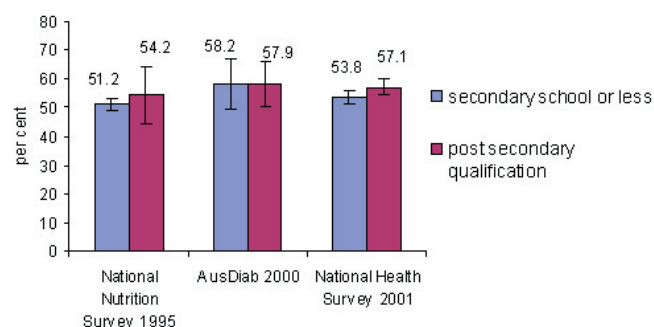
**Figure 14. Proportion of Queensland adults who reported usually consuming 4 or more serves of VEGETABLES per day, by income category, 1995 to 2001**



## Education

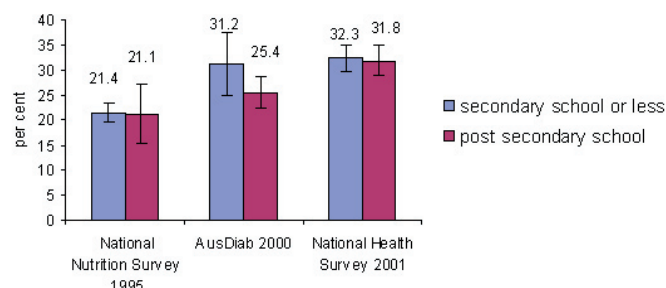
Also in these three surveys, the proportion of adults who reported consuming 2 or more serves of fruit, or 4 or more serves of vegetables, did not appear to differ with educational level (Figures 15 and 16).

**Figure 15. Proportion of Queensland adults who reported usually consuming 2 or more serves of FRUIT per day, by education level, 1995 to 2001**



Queensland adults with secondary education or less were just as likely as those with post secondary education to report consuming 2 or more serves of fruit and 4 or more serves of vegetables.

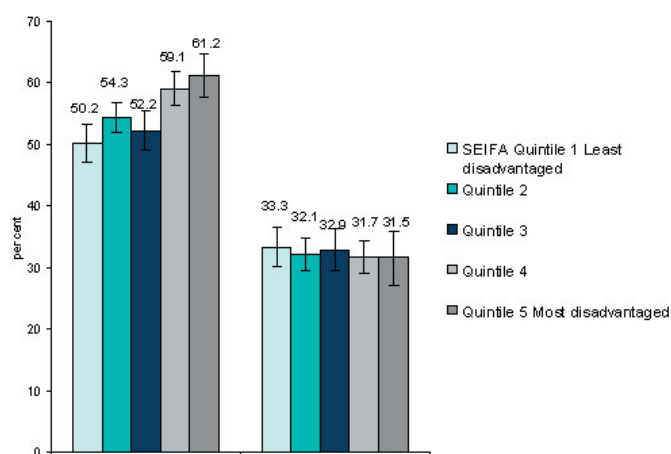
**Figure 16. Proportion of Queensland adults who reported usually consuming 4 or more serves of VEGETABLES per day, by education level, 1995 to 2001**



## Socio-Economic Index For Areas (SEIFA)

SEIFA is a tool that enables the investigation of the socio-economic well-being of Australian communities, and identifies areas of advantage and disadvantage. Data from the 2001 NHS (Figure 17) suggest that more adults from the most disadvantaged areas reported consuming at least 2 serves of fruit, but there appeared to be little effect of SEIFA levels on the proportion of Queensland adults who reported 4 or more serves of vegetables per day.

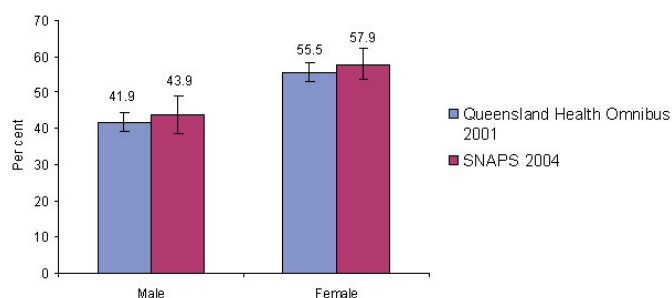
**Figure 17. Proportion of Queensland adults who reported usually consuming 2 or more serves of FRUIT per day, or 4 or more serves of VEGETABLES per day, by SEIFA quintile, using NHS 2001 data**



### Trends in fruit and vegetable intakes using CATI survey data

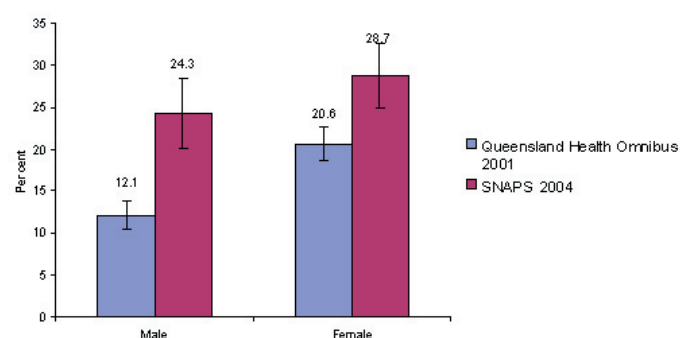
Data from the 2001 and 2004 CATI surveys suggest that there was a slight (2%) increase in the proportion of both males and females who reported consuming the recommended number of servings of fruit per day (Figure 18).

**Figure 18. Proportion of Queensland adults who reported consuming the recommended two serves of FRUIT per day using 2001 and 2004 CATI survey data**



Trends in vegetable consumption over this time period showed a greater increase of 12% for males and 8% for females consuming 4 or more serves per day (Figure 19). Vegetable consumption for these comparisons is based on 4 serves or more per day, not the recommended 5 serves or more per day.

**Figure 19. Proportion of adult Queenslanders who reported consuming 4 or more serves of VEGETABLES per day, using 2001 and 2004 CATI survey data**



### Trends in fruit and vegetable intakes using written survey data

Reported fruit and vegetable consumption data is available from the 1995 NNS, the 2000 AusDiab and the 2001 NHS, and show a similar trend to the CATI surveys. The trends from 1995 to 2001 indicate an overall increase of about 4% in proportions of adults (2% in males and 6% among females) who consumed the recommended two serves of fruit per day (Figure 20).

**Figure 20. Proportion of adult Queenslanders who reported consuming 2 or more serves of fruit per day, by sex, 1995 to 2001**

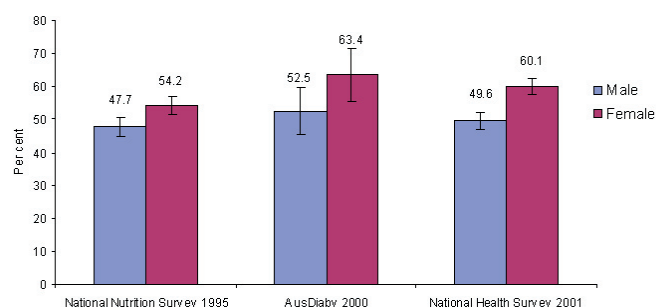
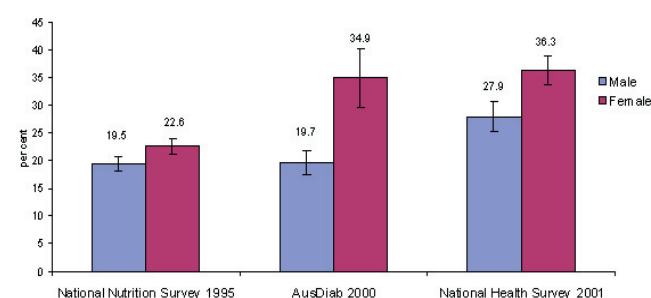


Figure 21 suggests that the proportion of adults who reported consuming 4 serves or more of vegetables increased overall by about 11% (8% among males and 14% of females).

**Figure 21 suggests that the proportion of adults who reported consuming 4 serves or more of vegetables increased overall by about 11% (8% among males and 14% of females).**



These data suggest that there is some agreement between the CATI surveys and written surveys, and that there was a slight increase in the proportion of adults consuming the recommended serves of fruit per day and around a 10% increase in the proportion of adults who consumed at least 4 serves of vegetables per day.

### Conclusion

Although there appears to have been a slight increase in the proportion of Queensland adults reporting meeting recommended intakes of fruit and 4 serves or more of vegetables between 1995 and 2004, the proportion of adults meeting recommended intakes is still alarmingly low. In general, more females than males reported better intakes at all ages with the lowest proportion of adults reporting recommended intakes in the younger age groups.

As with many types of health monitoring endeavours, methodological issues are important here. While all of the surveys used exactly the same questions related to fruit and vegetable intakes, the methods of administering the questionnaires were different. The national surveys; the 1995 NNS and the 2001 NHS, and the AusDiab were self-completed written questionnaires, whereas the 2001 Omnibus and the 2004 SNAP Survey were telephone

interviewed. It is possible that telephone interviews provided more reliable estimates than self-completed questionnaires. Also, the representativeness of the surveys may have differed. The large national surveys and the two CATI surveys are considered to be quite representative of the Queensland population, whereas in the AusDiab study, there was a low response rate and also some evidence that the cohort may have been of slightly higher socioeconomic status and more health conscious (23).

There are also acknowledged difficulties encountered in collecting dietary data. Respondents may under report or over report intake, depending on their level of knowledge about recommendations or their desire to please the interviewer. Respondents may have difficulty in estimating usual intakes, or be unable to accurately remember usual intake. Estimating portion sizes is also a challenge for some survey participants.

These data support the need for continued campaigns aimed at increasing the consumption of fruit and vegetables and the need to target younger age groups, particularly males. These data also indicate the importance of continuing to monitor fruit and vegetable intakes. These relatively simple questions have been shown to be useful tools to do this (20).

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