

Trends in Population Levels of Sufficient Physical Activity in NSW 1998-2005

Full Report



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Executive summary

This report presents the trends in physical activity participation in NSW between 1998 and 2005. There is evidence to suggest that the prevalence of sufficient physical activity in NSW has increased significantly in recent years. Due to the potential public health benefits of such a change, closer scrutiny was given to NSW Population Health Survey data (1998 and 2002-2005) in order to determine whether the change reflects actual behavioural trends in the state.

Specifically, trends in sufficient physical activity participation were examined and further analyses of walking, moderate and vigorous intensity activity were conducted. Comparisons were made with surveillance data obtained from other Australian states in order to contextualise the trends seen in NSW.

The main findings from the report suggest that:

- Between 1998 and 2005, there has been a significant increase in the proportion of people aged 16 years and over in NSW undertaking sufficient physical activity (at least 150 minutes of walking, moderate and/or vigorous activity per week over at least five occasions).
- The prevalence of sufficient physical activity was stable from 1998 (47.6%) to 2002 (46.5%), decreased in 2003 (44.7%), increased markedly in 2004 (50.5%) and remained steady in 2005 (51.3%).
- Significant increases in the prevalence of sufficient physical activity occurred among males and females, people in the 35-44 and 45-54 age groups, across BMI categories, people in the second and third most disadvantaged socioeconomic status quintiles, people living in major cities, and among people residing in three Area Health Service areas (Sydney South West, Sydney West, and Northern Sydney Central Coast).
- Walking was a major contributor to the change in prevalence of sufficient physical activity, with increased participation in walking since 2004. There were also some increases in moderate and vigorous activity.
- NSW is the only state showing a sustained increase in prevalence of sufficient physical activity compared with other states using the Active Australia Survey.

It is likely that the apparent increase in NSW in the prevalence of sufficient physical activity is real. This increase may be largely due to greater participation in walking.

This report also considered several possible explanations for the increase in prevalence of sufficient physical activity. Findings suggest that:

- The potential of social desirability bias leading to over-reporting of physical activity participation in recent years can not be ruled out definitively.
- It is possible that increased media coverage of physical activity and obesity between 2001 and 2004 has helped to increase the salience of these issues and motivated people in NSW to participate in physical activity.
- Changes in active commuting behaviours, specifically growth in prevalence of walking to work, and rising petrol prices may have contributed to the increase in physical activity levels.

- It is possible that recent increases in physical activity participation are a result of intensive physical activity promotion work that occurred in the late 1990s in NSW, that led to greater awareness and understanding of the Active Australia moderate physical activity message in NSW compared with other states.
- The prevalence of sufficient physical activity was unlikely to have been affected by changes in Area Health Service boundaries, sample size and survey response rates; the inclusion of household and gardening activity questions from the survey in 1998, 2002 and 2005, and omission in 2003 and 2004; the increased exercise and sport participation rates between 2001 and 2004; or weather and seasonal variation.

1 Introduction

Physical activity is an important factor in promoting good health, in preventing illness and injury and in reducing the overall burden of disease. Being physically active reduces the risk for certain chronic diseases, such as cardiovascular disease, type 2 diabetes, obesity, some cancers and mental ill-health.¹

Physical activity is of benefit in six out of seven of Australia's National Health Priorities.² At the same time, physical inactivity accounts for 6.7% of the total burden of disease, ranking it second only to tobacco smoking (9.7%) in terms of burden of disease from health risk factors.³ The total direct health care cost attributable to physical inactivity is about \$377 million per year.⁴

In 1998 the NSW Physical Activity Taskforce implemented the *Simply Active Every Day* plan with the aim of increasing and encouraging ongoing participation in physical activity.⁵ The plan helped create infrastructure, programs, services and opportunities to support participation, particularly for less active people, while emphasising the health, environmental and economic benefits of participation in physical activity. In addition, the NSW Department of Health provided an overarching framework for planning public health activities in the period from 2000 to 2005 (*Healthy People 2005*), in which promoting physical activity was a strategy to aid chronic diseases prevention.⁶ Accordingly, monitoring population levels of physical activity is important for identifying emerging trends and to inform the planning, implementation and evaluation of physical activity-related health programs and services.

The NSW Department of Health first surveyed population levels of physical activity using the Active Australia Survey in 1998.⁷ The survey was conducted throughout NSW in 1998 using computer-assisted telephone interviews (CATI). In that survey, 47.6% of the population said they were sufficiently active – that is, they participated in at least 150 minutes of walking or moderate or vigorous physical activity over at least five sessions per week. This is the level of physical activity recommended by the US Surgeon General's Report on Physical Activity and Health in 1996⁸ and is the accepted minimum for health benefits.

Since 2002 the NSW Department of Health, in collaboration with all area health services, has monitored the physical activity levels of the people of NSW as part of the ongoing NSW Population Health Survey.⁹ The survey is conducted all year round using CATI. Data collected in 1998 have provided a baseline for comparisons with data collected in surveys in 2002, 2003, 2004 and 2005.

Recent data regarding the prevalence of physical activity participation in NSW suggest that significantly more people are achieving recommended levels of physical activity.¹⁰ This change deserves closer examination to determine if it reflects actual behavioural trends. Such an increase, if real, may have significant public health benefits and could be an important indicator of the impact of health promotion initiatives.

This report will examine the trends in physical activity participation in NSW from 1998 to 2005. Specifically, the trends in sufficient physical activity levels will be examined, and there will be further analyses of participation in walking, moderate and vigorous intensity physical activity to delineate the activities contributing to the accumulation of sufficient physical activity in NSW. Comparisons will be made with surveillance data from other states in order to contextualise the NSW trends. Possible explanations for the apparent increase in the prevalence of sufficient physical activity in NSW will also be considered.

2 The NSW Population Health Survey – Physical activity module

The physical activity module of the NSW Population Health Survey consists of questions taken from the Active Australia Survey. The following questions were asked in 1998 and in all surveys from 2002 to 2005.¹⁰

- In the last week, how many times have you walked continuously for at least 10 minutes for recreation or exercise or to get to or from places?
- What do you estimate was the total time you spent walking in this way in the last week?
- In the last week, how many times did you do any vigorous physical activity that made you breathe harder or puff and pant? [For example: football, tennis, netball, squash, athletics, cycling, jogging, keep-fit exercises and vigorous swimming]
- What do you estimate was the total time you spent doing this vigorous physical activity in the last week?
- In the last week, how many times did you do any other more moderate physical activity that you haven't already mentioned? [For example, lawn bowls, golf, tai chi and sailing]
- What do you estimate was the total time that you spent doing these activities in the last week?

In addition, the question, 'How do you usually get to work?' was asked from 2002 onwards to measure the prevalence of active commuting to work.

Respondents were asked to exclude household chores and gardening when answering the vigorous and moderate physical activity module items.

Also, in the 1998, 2002 and 2005 surveys, questions about household and gardening activity were included. These questions were placed in the module before the vigorous and moderate activity questions. The aim was to ensure that this activity was not included in the answers to the leisure time activity questions. In these versions of the survey, respondents were asked,

- The next question does not include gardening. In the last week, how many times did you do any vigorous household chores which made you breathe harder or puff and pant?
- What do you estimate was the total time you spent doing these vigorous household chores in the last week?
- In the last week, how many times did you do any vigorous gardening or heavy work around the yard which made you breathe harder or puff and pant?
- What do you estimate was the total time you spent doing vigorous gardening or heavy work around the yard in the last week?

3 Analysis

3.1 Sample

In 1998, 2002 and 2003 the target sample comprised approximately 1000 people in each of the 17 area health services (AHS), giving a total sample of 17,000 people. In 2004, the number of areas was reduced to eight. The target sample for each area was adjusted to 1500 people per area, giving a total sample of 12,000 people.

The sampling frame was developed as follows.¹¹ Records from the Australia on Disk electronic white pages (phone book) were geo-coded using MapInfo mapping software 2.3. The geo-coded telephone numbers were assigned to statistical local areas and area health services. The proportion of numbers for each telephone prefix by area health service was calculated. All prefixes were expanded with suffixes ranging from 0000 to 9999. The resulting list was then matched back to the electronic phone book. All numbers that matched numbers in the electronic phone book were flagged and the number was assigned to the relevant geo-coded area health service. Unlisted numbers were assigned to the area health service containing the greatest proportion of numbers with that prefix. Numbers were then filtered to eliminate contiguous unused blocks of greater than 10 numbers. The remaining numbers were then checked against the business numbers in the electronic phone book to eliminate business numbers. Finally, numbers were randomly sorted. Households were contacted using random digit dialing. One person from the household was randomly selected for inclusion in the survey.

3.2 Response rates

The total number of interviews completed, number of interviews completed with people aged 16 years and over, and overall response rates for 1998 and the period from 2002 to 2004 are presented in Table 1.

Table 1: Total number of interviews completed, number of interviews with people aged 16 years and over, and overall response rates for 1998-2005.

	1998	2002	2003	2004	2005
Total number of completed interviews	17,497	15,442	15,837	11,830	13,701
Number of interviews with people aged 16 years and over	17,497	12,622	13,088	9786	11,500
Response rate ^a	65%	67.6%	67.9%	61.2%	57.7%

^a Response rate = completed interviews divided by completed interviews and refusals

3.3 Data analysis

For analysis, the survey sample was first weighted to adjust for differences in the probabilities of selection among subjects. These differences were due to the varying number of people living in each household, the number of residential telephone connections for the household, and the varying sampling fraction in each health area. Post-stratification weights were used to reduce the effect of differing non-response

rates among males and females and different age groups on the survey estimates. These weights were adjusted for differences between the age and sex structure of the survey sample and the Australian Bureau of Statistics 2003 mid-year population estimates (excluding people resident in institutions) for each area health service. Further information on the weighting process is provided elsewhere¹²

Secondly, for trend analyses, samples for survey years 1998, 2002, 2003 and 2004 were re-weighted, and age and gender standardised to that of the 2005 sample.

The Australian Institute of Health and Welfare (AIHW) developed the scoring protocol for the Active Australia Survey.¹³ Total minutes were calculated by summing minutes in the last week spent in walking (continuously for at least 10 minutes), moderate and vigorous intensity physical activity. Any time spent in vigorous intensity physical activity was weighted by two. Sufficient physical activity was defined as achieving a total of at least 150 minutes of moderate intensity physical activity over five separate occasions in the previous week.¹⁴

As the physical activity data were not normally distributed, the median and interquartile range were calculated to show central tendency and dispersion.

In order to examine differences in participation in physical activity within the population, data were stratified by sex, age, Body Mass Index (BMI), socioeconomic status, geographic remoteness and AHS area of residence.

Socioeconomic status was determined using the Index of Relative Socio-Economic Disadvantage from the Socio-Economic Indexes For Areas (SEIFA),¹⁵ which describe the socioeconomic aspects of geographical areas, including income, educational attainment, level of unemployment and prevalence of people in unskilled occupations. The first quintile indicates the least disadvantage, and the fifth quintile indicates the most disadvantage.

Geographic remoteness was ascertained using the Accessibility-Remoteness Index for Australia (ARIA)¹⁶ in the 2002 and 2003 Surveys, and using the updated Accessibility-Remoteness Index of Australia Plus (ARIA+)¹⁷ in 2004 and 2005. The ARIA and ARIA+ measure the remoteness of a locality based on its accessibility to services,¹⁰ Localities were grouped into three categories: major cities (about 74% of the population); inner regional (about 18% of the population); and outer regional to very remote areas (about 8% of the population).

As the variables for socioeconomic status and geographic remoteness in 1998 were not comparable to those from 2002 onwards, this report does not present data on sufficient physical activity stratified by these two demographic indicators for 1998.

For the purposes of this report, a consistent approach was employed for data analysis, whereby 'don't know' or 'refused' responses were excluded. This report found that trends were in the same direction as those reported by the NSW Department of Health, although the figures were slightly lower than those reported by the NSW Department of Health.^{7 10 11 18 19}

4 Trends in participation in sufficient physical activity in NSW

4.1 Proportion of people achieving sufficient levels of physical activity

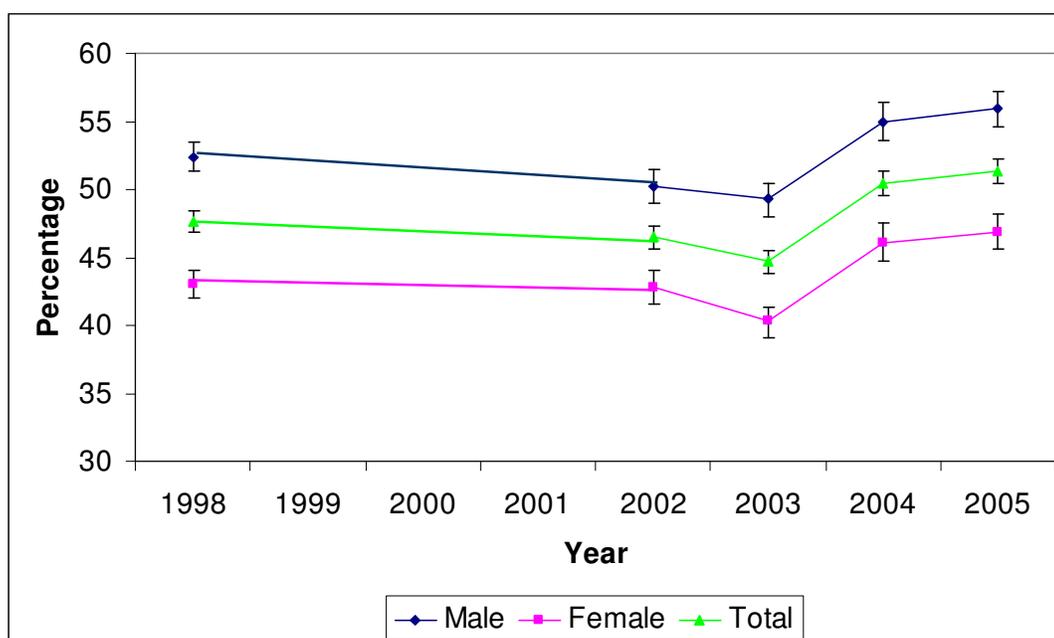
Table 2 presents the proportion of people aged 16 years and over in NSW achieving sufficient amounts of physical activity during the period from 1998 to 2005 with stratification by demographic characteristics.¹

There has been a significant increase in the proportion of people in NSW who are sufficiently active for health from 1998 to 2005. In 1998, 47.6% of people in NSW over 16 years of age were sufficiently active. The prevalence remained stable at 46.5% in 2002 then dropped slightly 44.7% in 2003. It increased markedly to 50.5% in 2004, then remained steady at 51.3% in 2005.

4.1.1 Differences by sex

The trends in sufficient physical activity levels for males and females were similar to that for the whole population, with significant increases in the proportion of sufficiently active males and females from 2004 (Figure 1). In 1998, 52.4% of males reported achieving sufficient amounts of physical activity, and the prevalence increased in 2004 and 2005 to 55.0% and 55.9% respectively. A similar trend was evident among females, with the proportion of females achieving sufficient physical activity increasing from 43.0% in 1998 to 46.1% and 46.9% in 2004 and 2005 respectively. The prevalence of sufficient physical activity was consistently higher among males than among females.

Figure 1. Participation in sufficient physical activity (% , 95% CI) for males, females and all persons in NSW, 1998-2005



¹ Confidence intervals are presented in Appendix A.

Table 2. Proportion of people in NSW achieving sufficient levels of physical activity by demographic characteristics, 1998-2005

Variable	Year of survey				
	1998 (n=17,494) %	2002 (n=12,622) %	2003 (n=13,008) %	2004 (n=9786) %	2005 (n=11,435) %
Sex					
Male	52.4	50.2	49.3	55.0	55.9
Female	43.0	42.8	40.3	46.1	46.9
Total	47.6	46.5	44.7	50.5	51.3
Age group					
16-24 years	64.9	59.2	60.3	62.6	63.9
25-34 years	51.1	47.5	46.8	54.2	55.3
35-44 years	45.7	46.5	41.8	50.8	51.5
45-54 years	46.1	44.7	42.9	48.3	50.2
55-64 years	43.1	43.8	43.7	47.0	46.8
65-74 years	40.1	41.8	39.8	45.5	45.5
75 years & over	28.6	32.1	26.5	31.8	32.4
BMI category					
Not overweight/obese	51.6	49.6	48.8	56.2	54.2
Overweight	46.7	46.4	43.9	53.0	52.8
Obese	38.3	39.7	34.5	42.7	42.2
Socioeconomic status quintiles ^a					
Quintile 1		51.7	49.8	53.5	56.0
Quintile 2		50.9	51.4	51.7	52.5
Quintile 3		44.9	42.7	50.0	50.6
Quintile 4		44.3	41.5	50.1	49.6
Quintile 5		43.0	40.8	46.5	46.5
Geographic remoteness					
Major cities		47.4	45.8	50.8	52.1
Inner regional		46.6	43.2	50.0	49.5
Outer regional to Very remote		49.8	39.7	50.3	50.0
Area Health Services of residence					
Sydney South West	48.1	44.8	45.4	51.4	50.0
South Eastern Sydney	51.2	53.0	48.0	54.6	54.9
Illawarra					
Sydney West	43.8	39.6	40.9	44.5	48.5
Northern Sydney	50.0	47.1	47.8	53.5	54.3
Central Coast					
Hunter New England	45.2	46.1	42.7	46.9	49.8
North Coast	47.5	48.8	43.4	54.2	50.0
Greater Southern	46.9	48.3	42.2	48.4	49.7
Greater Western	43.2	43.5	41.1	46.2	49.6

All estimates weighted and standardised to 2005 age + sex distribution.

PA=Physical activity

Sufficiently active=Total 5 sessions and 150 minutes of PA per week (PA of at least 10 mins; vigorous minutes x 2)

n=NSW total sample size: 'don't know' and 'refused' responses are excluded in the analyses.

^aQuintile 1=least disadvantaged; Quintile 5=most disadvantaged

4.1.2 Differences by age group

Table 2 shows that the proportion of people in NSW achieving sufficient levels of physical activity decreased with increasing age. The highest proportion of sufficiently active people was among those aged 16-24 years and remained steady from 1998 to 2005 (64.9% and 63.9% respectively). In all other age groups, the prevalence of sufficient physical activity showed similar trends to the state population, increasing noticeably from 2004. Significant increases were observed among people aged 35-44 years and 45-54 years, with rises of 45.7% to 51.5% and 46.1% to 50.2% respectively from 1998 to 2005.

4.1.3 Differences by Body Mass Index

Between 1998 and 2005, the proportion of people achieving sufficient amounts of physical activity was highest among those with BMI in the normal or low range ($<25\text{kg/m}^2$), and lowest among people who were obese ($>30\text{kg/m}^2$) (Table 2). All BMI categories showed significant growth in the prevalence of sufficient activity between 2003 and 2004, with increases maintained in 2005.

4.1.4 Differences by socioeconomic status

The lowest proportion of sufficiently active people was found in the most disadvantaged quintile (Table 2). The proportion of sufficiently active people in the third and fourth quintiles showed the greatest change from 1998 to 2005, with significant increases shown between 2002 and 2004.

4.1.5 Differences by geographic remoteness

As shown in Table 2, the proportion of sufficiently active people increased significantly in major cities between 2002 and 2004.

Major cities (74% of the population), had 47.4% of people reporting sufficient activity in 2002. The prevalence rose to 50.8% in 2004 and was maintained in 2005.

People living in inner regional towns (18% of the population), showed a non-significant upward trend in the prevalence of sufficient physical activity between 1998 and 2005.

People living in outer regional to very remote areas (8% of the population) showed little change in their physical activity levels between 1998 and 2005.

4.1.6 Differences by Area Health Services area of residence

The prevalence of sufficient physical activity by AHS area of residence showed similar trends to the state population with a decline between 1998 and 2003, then an increase from 2004 (Table 2). Significant increases in the proportion of people achieving sufficient physical activity were found among people living in Sydney South West, Sydney West, and Northern Sydney Central Coast AHS between 2002 and 2004.

4.2 Median minutes of physical activity participation

Tables 3, 4 and 5 show the median weekly minutes spent in different types of physical activity stratified by demographic group.² Due to the skewed distribution, the median values for moderate and vigorous minutes were almost all zero.

The trends in total median minutes spent in physical activity reflect the increasing trends in the prevalence of sufficient physical activity. The median minutes per week spent walking increased across nearly all demographic groups between 1998 and 2004, with the change maintained in 2005. In contrast, moderate and vigorous activity showed almost no change in median minutes per week across all demographic variables.

Table 3 shows that among males the median weekly minutes spent walking rose from 90 minutes in 2003 to 120 minutes in 2004. The upper quartile limit for vigorous physical activity also increased slightly between 1998 and 2005, suggesting that males participated more often in vigorous activities over this period. Similar patterns in weekly median minutes for walking and vigorous physical activity are evident for females, but with smaller increases.

Walking and total median minutes increased in all age groups (Table 3). People aged 16-24 years old had the highest total median number of minutes spent in physical activity, and greater participation in vigorous activity. The upper quartile values for vigorous physical activity also shifted upwards in the 35-44 and 45-54 age groups, although not enough to shift the median value from zero.

The median weekly minutes spent walking increased across all BMI categories (Table 4). The total median minutes spent doing physical activity decreased as BMI increased, consistent with the prevalence of sufficient physical activity reported earlier. Of particular note is the increase in the upper quartile values for vigorous activity for obese persons in 2004 and 2005, suggesting that there was some increase in the time spent doing vigorous physical activity among some people in this group over this period.

Table 4 shows that walking and total weekly minutes spent in physical activity increased in all socioeconomic quintiles. There were noticeable changes in the walking median minutes among people in the fourth quintile between 2002 and 2005. Among people in the third quintile, the weekly median minutes spent walking increased by 30 minutes between 2003 and 2004.

The amount of time spent walking rose among people living in all localities (Table 5). The median weekly minutes people spent walking increased by 30 minutes in major cities, by 15 minutes in inner regional areas, and by 60 minutes in outer regional to very remote areas between 2003 and 2004. In 2005 the median weekly minutes of walking increased a further 30 minutes in inner regional areas, but dropped 15 minutes in outer regional to very remote areas.

All AHS showed growth in weekly median minutes spent walking between 2003 and 2004, except Sydney West AHS which showed an increase from 2004 to 2005 only (Table 5). The increases in median weekly minutes ranged between 20 and 30 minutes.

² Interquartile ranges (25th-75th) are presented in Appendices B, C and D.

Table 3. Median weekly minutes spent in physical activity by sex and age in NSW, 1998-2005

Variable	Median weekly minutes (IQR)	Year of survey				
		1998 (n=17,494)	2002 (n=12,622)	2003 (n=13,008)	2004 (n=9786)	2005 (n=11,435)
Sex						
Male	Walking	90	90	90	120	120
	Moderate PA	0	0	0	0	0
	Vigorous PA	0	0	0	0	0
	Total	240	240	240	300	300
Female	Walking	90	90	90	120	105
	Moderate PA	0	0	0	0	0
	Vigorous PA	0	0	0	0	0
	Total	150	160	150	180	180
Total	Walking	90	90	90	120	120
	Moderate PA	0	0	0	0	0
	Vigorous PA	0	0	0	0	0
	Total	190	200	180	240	210
Age group						
16-24 years	Walking	105	105	90	120	120
	Moderate PA	0	0	0	0	0
	Vigorous PA	60	45	60	80	60
	Total	330	300	300	360	330
25-34 years	Walking	90	90	90	120	120
	Moderate PA	0	0	0	0	0
	Vigorous PA	0	0	0	20	0
	Total	210	200	210	280	240
35-44 years	Walking	80	90	80	100	120
	Moderate PA	0	0	0	0	0
	Vigorous PA	0	0	0	0	0
	Total	180	180	170	240	210
45-54 years	Walking	90	90	90	105	120
	Moderate PA	0	0	0	0	0
	Vigorous PA	0	0	0	0	0
	Total	180	180	180	210	210
55-64 years	Walking	90	90	90	120	120
	Moderate PA	0	0	0	0	0
	Vigorous PA	0	0	0	0	0
	Total	160	180	180	200	180
65-74 years	Walking	80	90	90	120	120
	Moderate PA	0	0	0	0	0
	Vigorous PA	0	0	0	0	0
	Total	150	180	150	210	180
75 years & over	Walking	50	60	40	60	60
	Moderate PA	0	0	0	0	0
	Vigorous PA	0	0	0	0	0
	Total	70	100	72	90	90

All estimates weighted and standardized to 2005 age + sex distribution. PA=Physical activity; n=NSW total sample size: 'don't know' and 'refused' responses are excluded in the analyses.

Table 4. Median weekly minutes spent in physical activity by Body Mass Index (BMI) category and socioeconomic status quintiles in NSW, 1998-2005

Variable	Median weekly minutes (IQR)	Year of Survey				
		1998 (n=17,494)	2002 (n=12,622)	2003 (n=13,008)	2004 (n=9786)	2005 (n=11,435)
BMI category						
Not overweight/ obese	Walking	90	90	90	120	120
	Moderate PA	0	0	0	0	0
	Vigorous PA	0	0	0	0	0
	Total	210	210	210	270	240
Overweight	Walking	90	90	90	120	120
	Moderate PA	0	0	0	0	0
	Vigorous PA	0	0	0	0	0
	Total	200	210	180	240	240
Obese	Walking	60	75	60	70	90
	Moderate PA	0	0	0	0	0
	Vigorous PA	0	0	0	0	0
	Total	130	140	120	150	165
Socioeconomic status quintiles^a						
Quintile 1	Walking		120	90	120	120
	Moderate PA		0	0	0	0
	Vigorous PA		0	0	0	0
	Total		230	220	285	270
Quintile 2	Walking		105	90	120	120
	Moderate PA		0	0	0	0
	Vigorous PA		0	0	0	0
	Total		210	210	240	210
Quintile 3	Walking		90	90	90	120
	Moderate PA		0	0	0	0
	Vigorous PA		0	0	0	0
	Total		180	180	225	210
Quintile 4	Walking		90	70	105	120
	Moderate PA		0	0	0	0
	Vigorous PA		0	0	0	0
	Total		185	180	240	210
Quintile 5	Walking		75	75	90	90
	Moderate PA		0	0	0	0
	Vigorous PA		0	0	0	0
	Total		180	150	210	181

All estimates weighted and standardized to 2005 age + sex distribution. PA=Physical activity; n=NSW total sample size: 'don't know' and 'refused' responses are excluded in the analyses.

^aQuintile 1=least disadvantaged; Quintile 5=most disadvantaged

Table 5. Median weekly minutes spent in physical activity by geographic remoteness and Area Health Services (AHS) of residence in NSW, 1998-2005

Variable	Median weekly minutes (IQR)	Year of Survey				
		1998 (n=17,494)	2002 (n=12,622)	2003 (n=13,008)	2004 (n=9786)	2005 (n=11,435)
Geographic remoteness						
Major cities	Walking		90	90	120	120
	Moderate PA		0	0	0	0
	Vigorous PA		0	0	0	0
	Total		200	180	240	210
Inner regional	Walking		80	75	90	120
	Moderate PA		0	0	0	0
	Vigorous PA		0	0	0	0
	Total		195	180	240	210
Outer regional to Very remote	Walking		90	60	120	105
	Moderate PA		0	0	0	0
	Vigorous PA		0	0	0	0
	Total		180	145	240	210
AHS of residence						
Sydney South West	Walking	100	90	90	120	100
	Moderate PA	0	0	0	0	0
	Vigorous PA	0	0	0	0	0
	Total	180	180	180	210	210
South Eastern Sydney Illawarra	Walking	90	105	90	120	120
	Moderate PA	0	0	0	0	0
	Vigorous PA	0	0	0	0	0
	Total	210	240	210	290	240
Sydney West	Walking	75	70	90	90	120
	Moderate PA	0	0	0	0	0
	Vigorous PA	0	0	0	0	0
	Total	180	160	150	180	200
Northern Sydney Central Coast	Walking	90	100	90	120	120
	Moderate PA	0	0	0	0	0
	Vigorous PA	0	0	0	0	0
	Total	210	200	210	270	240
Hunter New England	Walking	90	90	70	90	105
	Moderate PA	0	0	0	0	0
	Vigorous PA	0	0	0	0	0
	Total	180	210	180	210	210
North Coast	Walking	70	90	90	120	100
	Moderate PA	0	0	0	0	0
	Vigorous PA	0	0	0	0	0
	Total	210	210	180	250	225
Greater Southern	Walking	90	90	70	90	120
	Moderate PA	0	0	0	0	0
	Vigorous PA	0	0	0	0	0
	Total	195	194	165	240	210
Greater Western	Walking	75	80	60	90	90
	Moderate PA	0	0	0	0	0
	Vigorous PA	0	0	0	0	0
	Total	180	180	150	210	210

All estimates weighted and standardized to 2005 age + sex distribution. PA=Physical activity; n=NSW total sample size: 'don't know' and 'refused' responses are excluded in the analyses.

5 NSW compared with other states and Australia

In order to contextualise the physical activity trends in NSW, comparisons were made with surveillance data from national monitoring bodies and from other states. In the past, NSW has been found to have a lower population prevalence of participation in physical activity and higher proportions of people classified as sedentary compared with other states and territories. It is interesting to explore whether those differences still exist.

5.1 National Health Surveys 2001 and 2004-2005

The Australian Bureau of Statistics (ABS) conducted National Health Surveys in 2001 and 2004-2005.^{20 21} Data were reported for adults who were sedentary or did no exercise; i.e. did not do any exercise, sport, recreation or fitness activity in the past two weeks.

In 2001, NSW had the highest proportion of persons 18 years and over who did no exercise (32.9%) compared to all other states and the Australian population. The proportion of people in NSW having a moderate exercise level (doing 1600-3200 minutes in the past two weeks with less than two hours of vigorous exercise) was also lower than most states and than the country as a whole (23.8%). In 2001, 6.4% of adults in NSW had a high exercise level (exceeding 3200 minutes of physical activity in the past two weeks of which at least two hours were vigorous exercise), which was the same as the national prevalence.

In 2004-2005, the National Health Survey found that the proportion of adults in NSW who did no exercise increased slightly to 35.1%, again a higher prevalence than other states except Queensland, where 35.9% of adults did no exercise. The proportion of people in NSW having a moderate and vigorous exercise level remained steady in 2004-2005 at 22.7% and 5.9% respectively, lower levels than most states and the national prevalence.

Thus, according to the National Health Survey, the prevalence in NSW of moderate and vigorous fitness and leisure exercise has not changed between 2001 and 2004. Furthermore, based on these data, NSW appears to still have a lower moderate physical activity prevalence than most other states and a higher prevalence of people who did no exercise.

5.2 Exercise, Recreation and Sport Survey

The Exercise, Recreation and Sport Survey (ERASS), a joint initiative of the Australian Sports Commission and the state and territory departments of sport and recreation, has been conducted annually since 2001.²²⁻²⁴ The ERASS asks respondents whether they have participated in any physical activities for exercise, recreation or sport in the past 12 months. After respondents name activities (if any) in which they participate, the ERASS further asks how many hours during the last 12 months they participated in each of the activities that they name.

Table 6 shows that participation in exercise, recreation and sport in the past 12 months increased steadily from 2001 to 2004 in NSW. Upward trends were also observed in other states and territories. NSW participation rates were generally lower than most states and territories, consistent with other surveys.

Table 6. ERASS sports and physical activities participation rates (%) by states and territories for all persons, 2001-2004

	2001	2002	2003	2004
ACT	83.2	85.9	88.7	88.2
NSW	77.9	76.0	81.5	82.0
NT	80.5	78.9	83.1	82.8
Qld	77.3	78.0	80.1	81.2
SA	74.7	77.8	82.5	80.1
Tas	77.2	75.9	80.7	81.4
Vic	77.4	78.5	84.6	85.1
WA	81.0	81.0	84.4	84.8
Australia	77.8	77.8	82.5	82.8

The upward trends in exercise, recreation and sport found by ERASS differ from the generally stable pattern of moderate and vigorous activity found in the National Health Surveys. These differences are likely to stem from the fact that the ERASS measures participation in exercise and sports in the past 12 months, while the National Health Survey records activity in the past two weeks.

6 NSW compared with other states using Active Australia criteria

For further comparisons of physical activity between NSW and other states, data were obtained from several other jurisdictions which have used the Active Australia instrument for monitoring their population levels of physical activity. Slightly different definitions of sufficient physical activity have been used across the states. NSW, Victoria and Queensland defined sufficient physical activity according to the Active Australia time and sessions criteria; that is, achieving a total of 150 minutes per week over at least five separate occasions.^{11 25 26} South Australia and Western Australia used the Active Australia time criteria; that is accumulating at least 150 minutes of activity per week.^{27 28} Nevertheless, the use of the same definition of sufficient physical activity within each state over time allows comparisons of trends to be made across the states.

Figure 2. Trends in the proportion of people achieving sufficient physical activity in NSW, Vic, Qld, SA and WA, 1998-2005

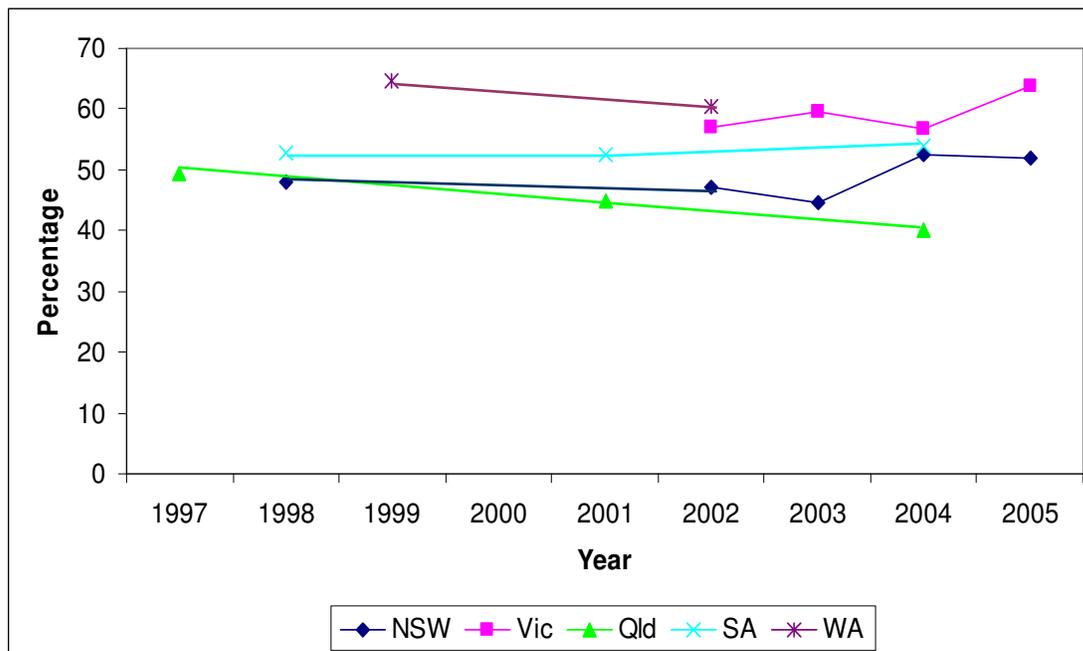


Figure 2 shows that NSW and Victoria are the only states showing an upward trend in participation in sufficient physical activity. The proportion of Victorians achieving sufficient physical activity levels was roughly stable between 2002, 2003 and 2004 at 57.0%, 59.5% and 56.8%, respectively; and increased in 2005 to 63.8%. The prevalence of sufficient physical activity among Queenslanders declined from 49.4% in 1997 to 45.0% in 2001 and decreased further to 40.2% in 2004. Among South Australians, the prevalence of sufficient physical activity was stable – 52.7% in 1998, 52.5% in 2001 and 53.9% in 2004. The proportion of sufficiently active Western Australians also remained steady with a non-significant decline from 64.5% in 1999 to 60.5% in 2002. However, there is little data from 2005 from other states, and it may be that any trends occurring in NSW may occur in other states subsequent to the survey estimates currently available.

Overall, a greater proportion of people in NSW and Victoria are achieving sufficient amounts of physical activity. NSW showed a significant increase in sufficient physical activity levels in 2004, which was maintained in 2005; while Victoria exhibited an increase in 2005 and it remains to be seen whether this increase is maintained. Fewer Queenslanders are sufficiently active and South Australians and Western Australians are showing little change in their sufficient physical activity levels.

7 Possible causes of the change in sufficient physical activity in NSW

In a national environment of stable or declining trends in physical activity, the countervailing trends in NSW are unexpected and warrant further examination. This section explores possible reasons for which the prevalence of sufficient physical activity has changed in NSW. Possible explanations include:

- change in the survey methods and questions
- changes in fitness and sports participation
- weather and seasonal variation
- social desirability of participating in physical activity
- change in media coverage of physical activity-related issues
- change in transport behaviour
- physical activity promotion in NSW

7.1 Changes in survey methods and questions

Between 1998 and 2005, the NSW Population Health Survey has utilised the same sampling methods, sample frame, interviewer training, interview procedures and order of questions. However, changes have occurred in AHS boundaries, target sample size, response rates, and some aspects of the physical activity measures.

The number of AHS areas reduced from 17 to eight in 2004. At the same time, the target sample changed from 17,000 (1000 people per AHS) to 12,000 (1500 people per AHS). It is unlikely that the new AHS boundaries and target sample changed the physical activity prevalence, as data were weighted and standardized to the 2005 NSW population to provide consistency. Furthermore, other health risk factors have maintained trends similar to previous years, suggesting that the new AHS boundaries had little effect on risk factors.²⁹ For example, there was little difference in the prevalence of current or occasional smokers between 2003 and 2004 – 22.3% and 20.9% respectively. The proportion of people consuming the recommended daily servings of fruit and vegetables also has not changed since 1997.

As shown in Table 7, the survey response rate decreased somewhat in 2004 and 2005 compared with previous years, and this may have affected the physical activity prevalence that year. However, the stability in the prevalence of tobacco smoking and fruit and vegetable consumption, and the combined increase in prevalence of overweight or obesity in NSW, suggests that there were not higher levels of non-response among those with health risk factors.

Table 7. NSW Population Health Survey response rates 1998-2005

1998	2002	2003	2004	2005
65%	67.6%	67.9%	61.2%	57.7%

A slight variation in the nature of physical activity questions was that in some years (1998, 2002, 2005) respondents were asked to report on household and gardening activity before the moderate and vigorous leisure time questions. In other years (2003, 2004) respondents were simply asked to not report on household and gardening activity

when the moderate and vigorous leisure time questions were asked. While there were differences, household and gardening activity were not included in the calculation of total physical activity in any year. Given that these additional questions were asked in 2005 but not in 2004, and that the prevalence of sufficient physical activity was fairly stable over those years, their omission or inclusion appears to make little difference. In addition, questions about participation in walking were asked first in all survey years. Walking is the main type of activity undertaken and appears to have contributed most to the apparent increase in physical activity in recent years.

7.2 Change in fitness and sports participation in NSW

It was hypothesised that sufficient physical activity levels in NSW increased due to growing participation in fitness and sporting activities. The evidence to support this comes from ERASS, the national sport and recreation surveillance system. According to ERASS, NSW participation rates for exercise, recreation and sport have increased between 2001 and 2004. As walking was the most popular fitness activity in all states and territories in Australia between 2001 and 2004, it is interesting to compare the participation rates for walking in NSW with other states, as shown in Table 8. The data indicate that participation in walking showed steady upward trends in NSW and in all other states and territories over this period. This suggests that changes in participation in fitness activity have not contributed to the trend of increased sufficient activity that has been observed in NSW but not in other jurisdictions. It should be remembered, however, that the ERASS instrument measures any exercise or recreation activity over the past 12 months, and may not be sensitive to changes in physical activity that is undertaken on a regular basis.

Table 8. ERASS Walking participation rates (%) for all persons, 2001-2004

	2001	2002	2003	2004
ACT	31.4	33.8	41.6	44.8
NSW	26.8	29.0	36.0	37.2
NT	24.1	25.8	35.3	35.2
Qld	32.6	32.7	35.5	38.5
SA	28.2	32.5	40.7	40.6
Tas	30.3	29.7	40.3	41.5
Vic	27.5	30.7	40.5	39.9
WA	32.5	33.0	39.1	41.5
Australia	28.8	30.8	37.9	39.0

7.3 Weather and seasonal variation

It is possible that drought conditions affecting large parts of NSW from 2002 to 2005 played a role in changes in the population prevalence of physical activity. Information on the weather over this period was accessed via the Bureau of Meteorology (NB information was available for the Sydney region only, data were not available for 1998). The Bureau of Meteorology reported that 2004 and 2005 were the equal warmest years on record (since 1859) for Sydney.^{30 31} The average maximum temperature for the Sydney region was 23.4 degrees in both 2004 and 2005 and the mean temperature was 19.1 degrees for both years. Despite similar average annual rainfall over the period from

2002 to 2005, the years 2004 and 2005 had fewer days of rain compared to other years in that period, 107 and 113 days respectively compared to 119 days in 2002³² and 135 days in 2003³³. Furthermore, above average hours of daily sunshine were recorded for the Sydney region in 2004 (7.6 hours) and 2005 (7.7 hours). In particular, 2005 was the sunniest year since 1980 in Sydney, with 0.5 hours more of daily average sunshine than the historic average.

Studies examining the relationship between physical activity and seasonal variation, which includes daylight hours, rain, humidity, temperature and wind, have reported mixed findings. In the US, cross sectional studies have found that adults participate in more physical activity in spring and summer, and that more adults meet physical activity recommendations during those months.^{34 35} However, a review of 19 quantitative studies (of which six were Australian) examining environmental factors associated with adult physical activity participation, poor weather or a lack of good weather were found to have no association with participation in physical activity.³⁶ Furthermore, a cross sectional population based mail survey of Victorian adults found that weather as a barrier to physical activity was not associated with self-reported physical activity participation.³⁷ This evidence, together with the relatively mild seasonal variations in temperature in Australia compared with the northern hemisphere, suggest that recent variations in climate are unlikely to explain the significantly higher proportion of people achieving sufficient physical activity levels in those years.

7.4 Social desirability of participating in physical activity

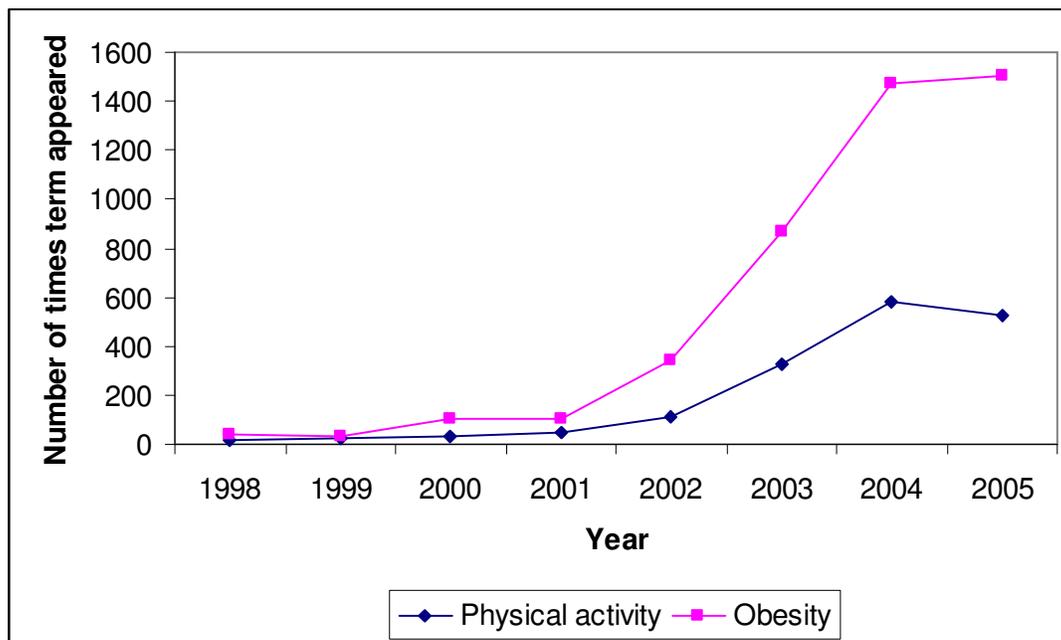
As validated measures were used, the data collected on physical activity participation among NSW adults provides a good representation of current physical activity levels in the adult population. Nonetheless, the potential of social desirability bias leading to greater over-reporting of physical activity in recent years can not be eliminated definitively. However, the prevalence of overweight or obese people in NSW has grown steadily between 1997 and 2004 (from 41.8% to 48.4%, respectively) according to NSW survey data,⁹ suggesting that social desirability is not influencing the reporting of body weight.

7.5 Change in media coverage of physical activity-related issues

It was also hypothesised that increased media coverage of physical activity-related issues, namely obesity, might have influenced people's physical activity levels by acting as a motivating factor. Based on a search of the *Factiva* media database, it appears that the number of times "physical activity" appeared in Australian publications increased from 1998 to 2005. The number of times "obesity" appeared in the media mirrored the trend for "physical activity" over this period, but the increases were even more dramatic. Figure 3 highlights the steep upward trend between 2001 and 2004 in the number of times that physical activity and obesity were mentioned in the Australian media.

It is possible that increased media coverage given to physical activity and obesity in recent years may have played a role in encouraging greater participation in physical activity in NSW, particularly among early adopters; that is those with the greatest readiness to change their behaviour in order to improve their health status.

Figure 3. Number of times “physical activity” and “obesity” appeared in Australian news and business publications, 1998-2005.



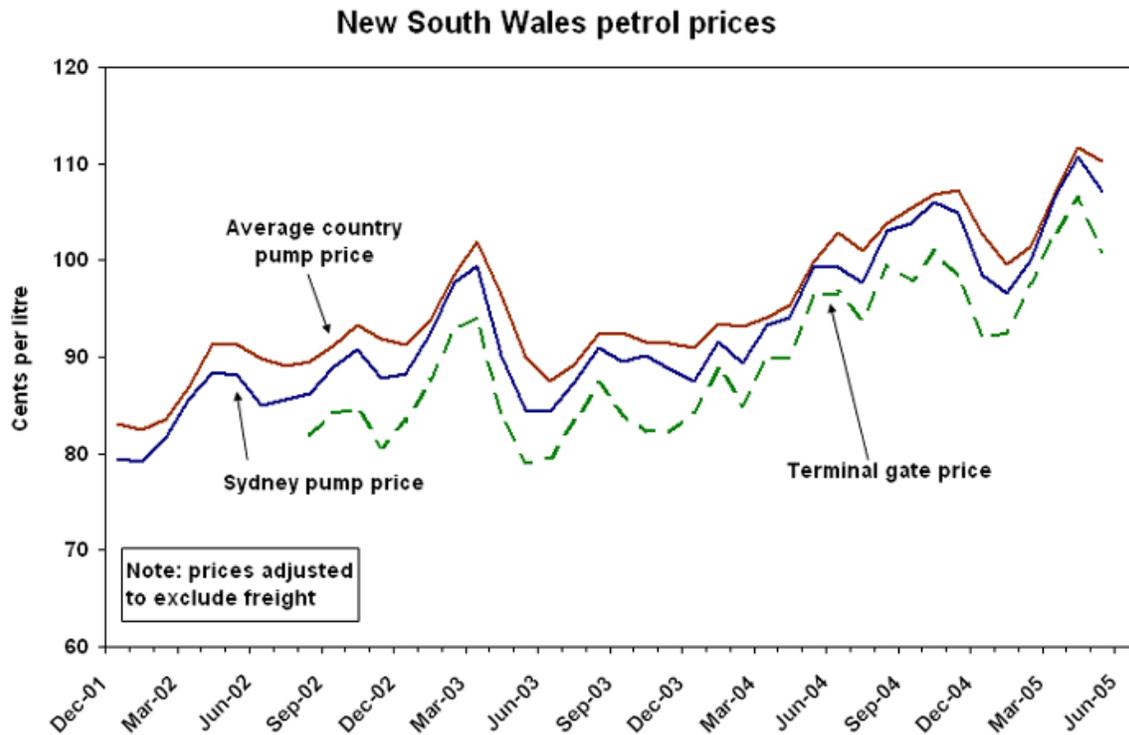
Source: Factiva

7.6 Change in transport behaviour

Since 2003, NSW has experienced steady upward trends in petrol prices, as shown in Figure 4.³⁸ There is some evidence to suggest that increasing petrol prices may be starting to have an impact on motorists’ behaviours. Recent stories in the media (e.g. “Petrol prices hit car sales”, Sydney Morning Herald, May 23 2006)³⁹ have reported that motorists are changing their behaviours in response to the increase in cost of fuel. That is, motorists are driving less, buying fewer cars and switching away from high fuel consumption vehicles.

Active commuting data collected in the NSW Population Health Survey show that the proportion of people in NSW using non-active forms of transport to work (car, motorbike, truck or taxi) has been stable between 2002 and 2005 (76.3% and 76.2% respectively). At the same time, the proportions of people walking to work and cycling to work increased slightly between 2001 and 2005 (from 6.5% to 7.5% for walking and from 1.4% to 1.8% for cycling, respectively). In contrast, the proportion of people using public transport to work declined between 2002 and 2005 from 17.9% to 16.0%, respectively. Although non-significant, these small changes may be indicative of emerging trends. The slightly higher prevalence of active commuting to work may have made a contribution, albeit small, to the rise in total physical activity in NSW. Further application of population-based approaches in examining data from the NSW Transport Data Collection may help to corroborate or refute the contribution of walking as a form of transport for all purposes in contributing to the overall physical activity trends in NSW.

Figure 4. Petrol prices in NSW, December 2001 – June 2005



7.7 Physical activity promotion in NSW

Another possible explanation relates to the intensive work around promoting physical activity that occurred in the late 1990s. It is worth noting that there was more effort put into promoting physical activity in NSW than in other states and territories. Initial work in implementing the Active Australia mass media campaign were most developed in NSW, and achieved greater impact on awareness and understanding of the moderate physical activity message in NSW, compared to other states.⁴⁰ The coordinated effects of an integrated Premier's Physical Activity Task Force may also have contributed, as this whole of government entity was best developed in NSW, certainly until the West Australian Physical Activity Task Force, which started in since 2001.

8 Conclusion

This report indicates that participation in sufficient physical activity has increased significantly between 1998 and 2005 among people aged 16 years and over in NSW. Specifically, the proportion of people achieving sufficient levels of physical activity was steady between 1998 and 2002, declined between 2002 and 2003, increased significantly between 2003 and 2004, and remained at the higher level between 2004 and 2005. Further examination of median weekly minutes spent doing different activity types suggested that the change in physical activity levels may be mostly due to an increase in walking since 2004. The increase in sufficient physical activity levels was found for males and females, in the 35-44 and 45-54 age groups, across BMI categories, in the third and fourth socioeconomic status quintiles, in major cities and in three AHS areas of residence (Sydney South West, Sydney West, and Northern Sydney Central Coast).

Examination of population trends in sufficient physical activity from other states using the Active Australia Survey indicate that NSW was the first state to show an upward trend. Victoria showed an increase in the proportion of sufficiently active people in 2005 and it remains to be seen whether this change is maintained. These data also show that fewer Victorians and Queenslanders are achieving sufficient physical activity, while the proportions of sufficiently active South Australians and Western Australians have remained stable.

In order to determine whether the change in sufficient physical activity prevalence from 2004 was indeed a real change, several possibilities were explored.

There was a change in AHS boundaries and target sample size in 2004, but it is unlikely that these changes affected the prevalence of sufficient physical activity because data were reweighted according to the new areas before analyses were carried out. There was also a drop in response rate in 2004, but data about other health risk factors, such as tobacco smoking and fruit and vegetable intake, suggest that the lower response rate did not affect respondents' reports of their health behaviours.

The inclusion of household and gardening questions at three-year intervals was also considered as a possible influence on respondents' reporting of their activity. However, the changes in the prevalence of sufficient physical activity did not coincide with the inclusion and omission of household and gardening questions in the NSW Health Survey. In addition, walking, which was the domain of activity that showed the greatest change, was measured first in all surveys and cannot have been affected by differences in the latter questions in the physical activity module.

NSW and other states and territories all showed upward trends in overall exercise, sport and recreation participation and in walking participation between 2001 and 2004 according to ERASS. Since these trends were not reflected in state-level sufficient physical activity trends (except NSW), it is unlikely that increased sport participation contributed to changes in sufficient physical activity prevalence in NSW.

Environmental influences were also considered, but it is not likely that weather and seasonal variation affected people's participation in physical activity in the Sydney region. The weather data for the Sydney region and literature on environmental

influences and seasonal variation suggest that the weather had little effect on participation in sufficient physical activity in NSW during 2004 and 2005.

Despite the use of validated measures of physical activity, it can not be ruled out conclusively that social desirability had no affect on NSW adults' reporting of physical activity participation over time. Furthermore, the media coverage of physical activity and obesity has increased sharply between 2001 and 2004, suggesting that these issues have become increasingly salient for the NSW public. It is possible that the greater media focus on physical activity and obesity may have helped to motivate more people in NSW to participate in more physical activity in recent years.

There have been media reports that motorists are modifying their transport behaviour in response to rising petrol prices. Despite the lack of change in non-active transport use, there is some evidence to suggest that people's active commuting behaviours to work have changed. The prevalence of walking to work has increased, again adding to the likelihood that greater participation in walking activity has influenced sufficient physical activity levels.

Intensive physical activity promotion in NSW in the late 1990s resulted in NSW achieving a greater awareness and understanding of the Active Australia moderate physical activity message compared to other states. It is possible that increased knowledge and awareness of physical activity along with the coordinated effects of an integrated Premier's Physical Activity Task Force have also contributed to the rise in prevalence of sufficient physical activity in NSW.

In conclusion, it is likely that NSW has seen a real increase in the prevalence of sufficient physical activity. Furthermore, it is likely that the increased prevalence may be due to greater participation in walking in particular. It is encouraging to see that more people are now sufficiently active in NSW than in previous years and it suggests that previous policy initiatives, such as *Simply Active Everyday* and *Healthy People 2005*, may have helped to advance physical activity participation in the state.

Nonetheless, close to half the NSW population is still insufficiently active, indicating that physical activity promotion efforts need to continue in NSW for further and sustainable improvements. Further surveillance, especially in other states, is required to ascertain if these trends are maintained and whether they are confined to NSW; this will provide ongoing evidence for both trends in physical activity in Australia, and evidence regarding their relative increases in NSW compared to other parts of Australia.

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10 Appendix A

Table A1. Proportion of people in NSW (with confidence intervals) achieving sufficient levels of physical activity by demographic characteristics, 1998-2005

Variable	Year of survey				
	1998 (n=17,494) % (95% CI)	2002 (n=12,622) % (95% CI)	2003 (n=13,008) % (95% CI)	2004 (n=9786) % (95% CI)	2005 (n=11,435) % (95% CI)
Sex					
Male	52.4 (51.4-53.5)	50.2 (49.0-51.5)	49.3 (48.0-50.5)	55.0 (53.6-56.4)	55.9 (54.6-57.2)
Female	43.0 (42.0-44.0)	42.8 (41.6-44.1)	40.3 (39.1-41.4)	46.1 (44.7-47.5)	46.9 (45.6-48.2)
Total	47.6 (46.9-48.4)	46.5 (45.6-47.3)	44.7 (43.8-45.5)	50.5 (49.5-51.4)	51.3 (50.4-52.2)
Age group					
16-24 years	64.9 (63.1-66.7)	59.2 (57.0-61.4)	60.3 (58.2-62.5)	62.6 (60.2-65.1)	63.9 (61.6-66.1)
25-34 years	51.1 (49.4-52.8)	47.5 (45.4-49.5)	46.8 (44.8-48.7)	54.2 (52.0-56.5)	55.3 (53.2-57.4)
35-44 years	45.7 (44.1-47.4)	46.5 (44.5-48.5)	41.8 (39.9-43.7)	50.8 (48.6-53.1)	51.5 (49.4-53.6)
45-54 years	46.1 (44.3-47.9)	44.7 (42.6-46.8)	42.9 (40.8-44.9)	48.3 (45.9-50.7)	50.2 (48.0-52.4)
55-64 years	43.1 (41.1-45.2)	43.8 (41.4-46.2)	43.7 (41.3-46.0)	47.0 (44.3-49.8)	46.8 (44.2-49.3)
65-74 years	40.1 (37.7-42.6)	41.8 (38.9-44.7)	39.8 (37.0-42.7)	45.5 (42.2-48.8)	45.5 (42.5-48.6)
75 years & over	28.6 (26.2-31.1)	32.1 (29.0-35.1)	26.5 (23.7-29.2)	31.8 (28.4-35.2)	32.4 (29.2-35.5)
BMI category					
Not overweight/obese	51.6 (50.6-52.6)	49.6 (48.4-50.8)	48.8 (47.5-50.0)	56.2 (54.8-57.6)	54.2 (52.9-55.5)
Overweight	46.7 (45.4-48.1)	46.4 (44.9-48.0)	43.9 (42.4-45.5)	53.0 (51.3-54.8)	52.8 (51.1-54.4)
Obese	38.3 (36.2-40.4)	39.7 (37.4-42.0)	34.5 (32.4-36.5)	42.7 (40.1-45.3)	42.2 (40.0-44.5)
Socioeconomic status quintiles^a					
Quintile 1		51.7 (49.4-53.9)	49.8 (47.6-52.1)	53.5 (51.4-55.6)	56.0 (54.0-58.0)
Quintile 2		50.9 (48.8-53.0)	51.4 (49.4-53.4)	51.7 (49.7-53.7)	52.5 (50.5-54.5)
Quintile 3		44.9 (43.0-46.8)	42.7 (40.9-44.5)	50.0 (47.7-52.3)	50.6 (48.5-52.7)
Quintile 4		44.3 (42.6-46.0)	41.5 (39.8-43.2)	50.1 (47.7-52.5)	49.6 (47.4-51.8)
Quintile 5		43.0 (41.1-44.9)	40.8 (38.9-42.7)	46.5 (44.1-48.9)	46.5 (44.4-48.6)
Geographic remoteness					
Major cities		47.4 (46.5-48.4)	45.8 (44.9-46.7)	50.8 (49.5-52.1)	52.1 (50.9-53.2)
Inner regional		46.6 (44.2-49.0)	43.2 (40.8-45.5)	50.0 (47.8-52.1)	49.5 (47.6-51.4)
Outer regional to Very remote		49.8 (44.8-54.8)	39.7 (35.0-44.5)	50.3 (47.9-52.8)	50.0 (47.4-52.6)
Area Health Services of residence					
Sydney South West	48.1 (46.4-49.8)	44.8 (42.8-46.8)	45.4 (43.4-47.3)	51.4 (49.2-53.7)	50.0 (47.9-52.1)
South Eastern Sydney	51.2 (49.4-52.9)	53.0 (50.9-55.1)	48.0 (46.0-50.1)	54.6 (52.3-57.0)	54.9 (52.8-57.1)
Illawarra					
Sydney West	43.8 (41.9-45.7)	39.6 (37.4-41.8)	40.9 (38.7-43.0)	44.5 (42.0-47.0)	48.5 (46.2-50.8)
Northern Sydney	50.0 (48.2-51.8)	47.1 (45.0-49.2)	47.8 (45.7-49.9)	53.5 (51.1-55.9)	54.3 (52.1-56.5)
Central Coast					
Hunter New England	45.2 (43.1-47.3)	46.1 (43.6-48.6)	42.7 (40.2-45.1)	46.9 (44.1-49.7)	49.8 (47.1-52.4)
North Coast	47.5 (44.6-50.3)	48.8 (45.4-52.1)	43.4 (40.2-46.7)	54.2 (50.4-57.9)	50.0 (46.5-53.5)
Greater Southern	46.9 (44.0-49.7)	48.3 (44.9-51.6)	42.2 (38.9-45.4)	48.4 (44.5-52.2)	49.7 (46.1-53.2)
Greater Western	43.2 (39.8-46.6)	43.5 (39.4-47.6)	41.1 (37.1-45.1)	46.2 (41.5-50.9)	49.6 (45.2-54.0)

All estimates weighted and standardized to 2005 age + sex distribution.

PA=Physical activity, Sufficiently active=Total five sessions and 150 minutes of PA per week (PA of at least 10 mins; vigorous minutes x 2)

n=NSW total sample size: 'don't know' and 'refused' responses are excluded in the analyses.

^aQuintile 1=least disadvantaged; Quintile 5=most disadvantaged

11 Appendix B

Table A2. Median weekly minutes (with interquartile range, 25th-75th) spent in physical activity by sex and age in NSW, 1998-2005

Variable	Median weekly minutes (IQR)	Year of survey				
		1998 (n=17,494)	2002 (n=12,622)	2003 (n=13,008)	2004 (n=9786)	2005 (n=11,435)
Sex						
Male	Walking	90 (20-210)	90 (15-210)	90 (0-210)	120 (30-240)	120 (30-240)
	Moderate PA	0 (0-40)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA	0 (0-100)	0 (0-105)	0 (0-120)	0 (0-150)	0 (0-125)
	Total	240 (70-600)	240 (60-580)	240 (60-540)	300 (90-720)	300 (90-720)
Female	Walking	90 (25-180)	90 (30-210)	90 (20-203)	120 (30-210)	105 (30-210)
	Moderate PA	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA	0 (0-30)	0 (0-30)	0 (0-30)	0 (0-60)	0 (0-60)
	Total	150 (50-360)	160 (50-360)	150 (45-360)	180 (60-420)	180 (60-420)
Total	Walking	90 (20-210)	90 (20-210)	90 (15-210)	120 (30-240)	120 (30-240)
	Moderate PA	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA	0 (0-60)	0 (0-60)	0 (0-60)	0 (0-105)	0 (0-90)
	Total	190 (60-450)	200 (60-450)	180 (60-420)	240 (60-540)	210 (60-510)
Age group						
16-24 years	Walking	105 (45-210)	105 (35-180)	90 (40-210)	120 (40-240)	120 (60-240)
	Moderate PA	0 (0-60)	0 (0-0)	0 (0-0)	0 (0-15)	0 (0-0)
	Vigorous PA	60 (0-210)	45 (0-180)	60 (0-180)	80 (0-210)	60 (0-180)
	Total	330 (135-740)	300 (120-610)	300 (120-615)	360 (140-760)	330 (120-720)
25-34 years	Walking	90 (30-200)	90 (25-210)	90 (15-200)	120 (30-240)	120 (40-240)
	Moderate PA	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA	0 (0-120)	0 (0-120)	0 (0-120)	20 (0-180)	0 (0-120)
	Total	210 (80-500)	200 (60-510)	210 (60-480)	280 (90-660)	240 (90-605)
35-44 years	Walking	80 (20-200)	90 (30-210)	80 (10-180)	100 (30-240)	120 (30-240)
	Moderate PA	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA	0 (0-60)	0 (0-80)	0 (0-60)	0 (0-120)	0 (0-90)
	Total	180 (60-420)	180 (60-480)	170 (60-420)	240 (60-540)	210 (70-480)
45-54 years	Walking	90 (20-210)	90 (15-210)	90 (10-210)	105 (30-240)	120 (30-240)
	Moderate PA	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA	0 (0-20)	0 (0-30)	0 (0-30)	0 (0-60)	0 (0-60)
	Total	180 (60-420)	180 (50-390)	180 (60-420)	210 (60-480)	210 (60-480)
55-64 years	Walking	90 (20-210)	90 (20-240)	90 (10-210)	120 (20-240)	120 (30-210)
	Moderate PA	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-15)	0 (0-0)
	Total	160 (45-400)	180 (40-420)	180 (45-420)	200 (60-420)	180 (60-420)
65-74 years	Walking	80 (10-210)	90 (10-210)	90 (0-210)	120 (15-220)	120 (20-210)
	Moderate PA	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Total	150 (30-370)	180 (45-420)	150 (30-390)	210 (60-420)	180 (45-420)
75 years & over	Walking	50 (0-150)	60 (0-180)	40 (0-140)	60 (0-180)	60 (0-180)
	Moderate PA	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Total	70 (0-240)	100 (0-240)	72 (0-210)	90 (0-300)	90 (0-240)

All estimates weighted and standardized to 2005 age + sex distribution. PA=Physical activity; n=NSW total sample size: 'don't know' and 'refused' responses are excluded in the analyses.

12 Appendix C

Table A3. Median weekly minutes (with interquartile range, 25th-75th) spent in physical activity by Body Mass Index (BMI) category and socio-economic status quintiles in NSW, 1998-2005

Variable	Median weekly minutes (IQR)	Year of survey				
		1998 (n=17494)	2002 (n=12622)	2003 (n=13008)	2004 (n=9786)	2005 (n=11435)
BMI category						
Not overweight/obese	Walking	90 (30-210)	90 (30-210)	90 (25-210)	120 (30-240)	120 (30-240)
	Moderate PA	0 (0-10)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA	0 (0-90)	0 (0-90)	0 (0-90)	0 (0-120)	0 (0-120)
	Total	210 (70-480)	210 (60-480)	210 (60-480)	270 (90-600)	240 (90-540)
Overweight	Walking	90 (20-210)	90 (20-210)	90 (0-210)	120 (30-240)	120 (30-240)
	Moderate PA	0 (0-8)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA	0 (0-60)	0 (0-60)	0 (0-60)	0 (0-90)	0 (0-120)
	Total	200 (60-480)	210 (60-480)	180 (60-420)	240 (70-540)	240 (70-600)
Obese	Walking	60 (10-180)	75 (20-210)	60 (0-180)	70 (0-210)	90 (20-210)
	Moderate PA	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-60)	0 (0-40)
	Total	130 (30-360)	140 (30-380)	120 (20-330)	150 (30-420)	165 (40-420)
Socioeconomic status quintiles^a						
Quintile 1	Walking		120 (35-210)	90 (30-210)	120 (40-260)	120 (40-240)
	Moderate PA		0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA		0 (0-90)	0 (0-90)	0 (0-120)	0 (0-120)
	Total		230 (85-520)	220 (80-450)	285 (80-600)	270 (100-540)
Quintile 2	Walking		105 (30-210)	90 (30-210)	120 (30-240)	120 (30-210)
	Moderate PA		0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA		0 (0-90)	0 (0-90)	0 (0-120)	0 (0-90)
	Total		210 (60-500)	210 (80-510)	240 (90-570)	210 (60-500)
Quintile 3	Walking		90 (20-210)	90 (10-210)	90 (20-210)	120 (30-240)
	Moderate PA		0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA		0 (0-60)	0 (0-60)	0 (0-70)	0 (0-90)
	Total		180 (50-420)	180 (50-420)	225 (60-509)	210 (60-490)
Quintile 4	Walking		90 (20-210)	70 (0-180)	105 (10-240)	120 (30-240)
	Moderate PA		0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA		0 (0-60)	0 (0-60)	0 (0-90)	0 (0-60)
	Total		185 (60-450)	180 (40-420)	240 (60-540)	210 (60-520)
Quintile 5	Walking		75 (10-210)	75 (0-180)	90 (20-210)	90 (15-210)
	Moderate PA		0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA		0 (0-30)	0 (0-30)	0 (0-90)	0 (0-60)
	Total		180 (40-420)	150 (30-420)	210 (60-480)	181 (60-480)

All estimates weighted and standardized to 2005 age + sex distribution. PA=Physical Activity; n=NSW total sample size: 'don't know' and 'refused' responses are excluded in the analyses.

^aQuintile 1=least disadvantaged; Quintile 5=most disadvantaged

13 Appendix D

Table A4. Median weekly minutes (with interquartile range, 25th-75th) spent in physical activity by geographic remoteness and Area Health Services (AHS) of residence in NSW, 1998-2005

Variable	Median weekly minutes (IQR)	Year of survey				
		1998 (n=17,494)	2002 (n=12,622)	2003 (n=13,008)	2004 (n=9786)	2005 (n=11,435)
Geographic remoteness						
Major cities	Walking		90 (30-210)	90 (15-210)	120 (30-240)	120 (30-240)
	Moderate PA		0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA		0 (0-60)	0 (0-65)	0 (0-120)	0 (0-100)
	Total		200 (60-450)	180 (60-435)	240 (64-540)	210 (75-500)
Inner regional	Walking		80 (10-210)	75 (0-200)	90 (20-230)	120 (30-240)
	Moderate PA		0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA		0 (0-40)	0 (0-45)	0 (0-90)	0 (0-90)
	Total		195 (45-450)	180 (40-420)	240 (60-580)	210 (60-510)
Outer regional to Very remote	Walking		90 (0-210)	60 (0-180)	120 (20-240)	105 (15-240)
	Moderate PA		0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA		0 (0-60)	0 (0-30)	0 (0-90)	0 (0-60)
	Total		180 (45-480)	145 (30-390)	240 (60-540)	210 (60-540)
AHS of residence						
Sydney South West	Walking	100 (30-210)	90 (20-210)	90 (20-210)	120 (30-210)	100 (20-210)
	Moderate PA	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA	0 (0-60)	0 (0-40)	0 (0-60)	0 (0-90)	0 (0-90)
	Total	180 (60-420)	180 (50-420)	180 (60-420)	210 (70-540)	210 (60-480)
South Eastern Sydney Illawarra	Walking	90 (30-210)	105 (30-210)	90 (20-210)	120 (40-260)	120 (40-240)
	Moderate PA	0 (0-30)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA	0 (0-90)	0 (0-100)	0 (0-90)	0 (0-120)	0 (0-120)
	Total	210 (70-500)	240 (60-500)	210 (60-480)	290 (90-600)	240 (90-570)
Sydney West	Walking	75 (15-180)	70 (12-180)	90 (0-180)	90 (20-210)	120 (30-210)
	Moderate PA	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA	0 (0-60)	0 (0-40)	0 (0-60)	0 (0-75)	0 (0-90)
	Total	180 (40-420)	160 (40-390)	150 (40-390)	180 (50-460)	200 (60-480)
Northern Sydney Central Coast	Walking	90 (30-180)	100 (30-210)	90 (20-210)	120 (30-240)	120 (40-240)
	Moderate PA	0 (0-20)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA	0 (0-70)	0 (0-80)	0 (0-90)	0 (0-120)	0 (0-120)
	Total	210 (60-450)	200 (60-480)	210 (70-480)	270 (80-600)	240 (90-510)
Hunter New England	Walking	90 (20-210)	90 (15-210)	70 (0-210)	90 (15-210)	105 (20-240)
	Moderate PA	0 (0-10)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA	0 (0-60)	0 (0-60)	0 (0-60)	0 (0-60)	0 (0-60)
	Total	180 (60-480)	210 (50-480)	180 (30-435)	210 (60-500)	210 (50-480)
North Coast	Walking	70 (10-210)	90 (15-210)	90 (0-210)	120 (20-240)	100 (15-240)
	Moderate PA	0 (0-60)	0 (0-0)	0 (0-0)	0 (0-30)	0 (0-0)
	Vigorous PA	0 (0-60)	0 (0-60)	0 (0-60)	0 (0-90)	0 (0-90)
	Total	210 (60-480)	210 (60-480)	180 (60-420)	250 (80-540)	225 (60-570)
Greater Southern	Walking	90 (25-225)	90 (10-210)	70 (0-180)	90 (10-210)	120 (30-240)
	Moderate PA	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA	0 (0-30)	0 (0-60)	0 (0-60)	0 (0-90)	0 (0-70)
	Total	195 (60-480)	194 (30-500)	165 (40-420)	240 (60-510)	210 (60-570)
Greater Western	Walking	75 (10-210)	80 (0-200)	60 (0-180)	90 (0-240)	90 (15-240)
	Moderate PA	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Vigorous PA	0 (0-60)	0 (0-40)	0 (0-60)	0 (0-80)	0 (0-60)
	Total	180 (40-420)	180 (45-420)	150 (30-390)	210 (45-510)	210 (60-480)

All estimates weighted and standardized to 2005 age + sex distribution. PA=Physical activity; n=NSW total sample size: 'don't know' and 'refused' responses are excluded in the analyses.