

Monograph series  
Number 8

**1995 National Health Survey  
ACT results for the SF-36**



**Chris Gordon**  
Health Status Monitoring, Epidemiology Unit  
Population Health Division  
ACT Department of Health and Community Care

**May 1999**

## Contents

<b>INTRODUCTION</b>	<b>3</b>
Cause and effect	4
Statistical significance	4
How to read an SF-36 graph	4
<b>SF-36 PROFILES FOR AGE AND SEX</b>	<b>5</b>
Age	5
Sex	6
<b>SF-36 PROFILES FOR HEALTH RISK FACTORS</b>	<b>6</b>
Smoking	6
Exercise	7
Body mass index	7
<b>SF-36 PROFILES FOR CONDITIONS AND SELF-ASSESSED HEALTH</b>	<b>8</b>
Serious physical conditions	8
Self-assessed health	9
<b>SF-36 PROFILES FOR SOCIOECONOMIC FACTORS</b>	<b>10</b>
Income	10
Employment	11
Occupation	11
Index of relative socio-economic disadvantage	13
<b>APPENDIX</b>	<b>14</b>
Age standardisation	14
Standard errors	14
<b>REFERENCES</b>	<b>14</b>

## Introduction

The SF-36 (short form, 36 questions) is a survey questionnaire on health-related quality of life. It was developed in the U.S.A and is widely used internationally.

It was used by the Australian Bureau of Statistics in the National Health Survey<sup>1</sup> (NHS) in 1995 and a confidentialised unit record file (CURF) was produced from that survey. The CURF contains SF-36 data on 19301 Australian respondents aged 18 years and over, of which 1750 are from the ACT. This monograph aims to present SF-36 profiles for the ACT by selected population sub-groups defined according to health risk factors, number of serious illness conditions, and measures of socio-economic status. Similar results for Australia as a whole are presented in an ABS publication<sup>1</sup>.

The results from the 36 questions undergo a complex coding process to provide each survey respondent with a score (from 0 to 100) for each of 8 dimensions of health (see Table 1). Respondents can be grouped into population sub-groups and mean scores for particular scales can be compared between the groups.

Two summary measures can also be created from the SF-36 data (see Table 2)

More information about the SF-36 can be obtained from the SF-36 website<sup>2</sup> and manuals<sup>3</sup>

**Table 1: Summary information on the eight SF-36 scales**

Scales (dimensions)	Number of items which contribute to the scale	Number of levels possible	Definition of lowest possible score (=0)	Definition of highest possible score (=100)
Physical Functioning (PF)	10	21	Very limited in performing all physical activities including bathing or dressing	Performs all types of physical activities including the most vigorous without limitations due to health
Role- Physical (RP)	4	5	Problems with work or other daily activities as a result of physical health	No problems with work or other daily activities
Bodily Pain (BP)	2	11	Very severe and extremely limiting pain	No pain or limitations due to pain
General Health (GH)	5	21	Evaluates personal health as poor and believes it is likely to get worse	Evaluates personal health as excellent
Vitality (VT)	4	21	Feels tired and worn out all of the time	Feels full of pep and energy all of the time
Social Functioning (SF)	2	9	Extreme and frequent interference with normal social activities due to physical and emotional problems	Performs normal social activities without interference due to physical or emotional problems
Role- Emotional (RE)	3	4	Problems with work or other daily activities as a result of emotional problems	No problems with work or other daily activities
Mental Health (MH)	5	26	Feelings of nervousness and depression all of the time	Feels peaceful, happy, and calm all of the time

Source: website <http://www.sf36.com/general/sf36.html> accessed 11/5/99 and Ware JE, Kosinski M, Keller SD. SF-36 Physical and Mental Summary Scales: A User's Manual. Boston, MA: The Health Institute, 1994.

**Table 2 : Summary information on the Physical and Mental Component Summary Measures (PCS and MCS)**

Scales	Number of items	Number of levels	Definition of lowest possible score	Definition of highest possible score
Physical Component Summary (PCS)	35	567 <sup>(a)</sup>	Limitations in self- care, physical, social, and role activities, severe bodily pain, frequent tiredness, health rated "poor"	No physical limitations, disabilities, or decrements in well- being, high energy level, health rated "excellent"
Mental Component Summary (MCS)	35	493 <sup>(a)</sup>	Frequent psychological distress, social and role disability due to emotional problems, health rated "poor"	Frequent positive affect, absence of psychological distress and limitations in usual social/ role activities due to emotional problems, health rated "excellent"

(a) number of levels from survey of US general population (n=2474), scores rounded to first decimal place.

Source: website <http://www.sf36.com/general/sf36.html> accessed 11/5/99 and

Ware JE, Kosinski M, Keller SD. SF-36 Physical and Mental Summary Scales: A User's Manual. Boston, MA: The Health Institute, 1994.

### **Cause and effect**

Because the National Health Survey is a cross-sectional survey, it is not possible to make any conclusions regarding the cause of the differences apparent in the mean SF-36 score profile for different population sub-groups. For example it is clear that people with lower incomes score lower on all SF-36 scales. It might be inferred that low income causes poor health, however the reverse is also possible, that people with poor health earn less income because of their poor health. In reality, many factors may be involved and it is not possible to separate their effects using this data. However, recent work by Professor Michael Marmot and others summarised in a WHO publication <sup>4</sup> does support the view that social determinants are very important in explaining differences in health status.

### **Statistical significance**

In general, the differences in SF-36 mean (average) scores between groups shown in this publication are not statistically significant because of the relatively small sample size for the ACT. However the sample size was not insignificant so this does not mean that the differences are not meaningful. On the contrary, it is clear that the very same differences in SF-36 mean scores for different sub-groups that one can observe in Australian data<sup>1</sup> (which are highly statistically significant) can be seen in the results for the ACT. Large differences in health-related quality of life can be observed between groups defined by health risk factors, number of serious illness condition, and measures of socio-economic status in the ACT.

### **How to read an SF-36 graph**

It is common for the SF-36 profile for a population sub-group to be presented in the form of line graphs where mean scores for different scales are joined by a line. The scales are usually arranged in a standard order from those which mostly reflect physical health (on the left side of the graph) to those which mostly reflect mental health (on the right side of the graph). Each scale however, is constructed in a different way so scores are not comparable across scales. Instead we compare

scores on a particular scale across population groups. For example, the Vitality scale is constructed quite differently to the Social Function scale.

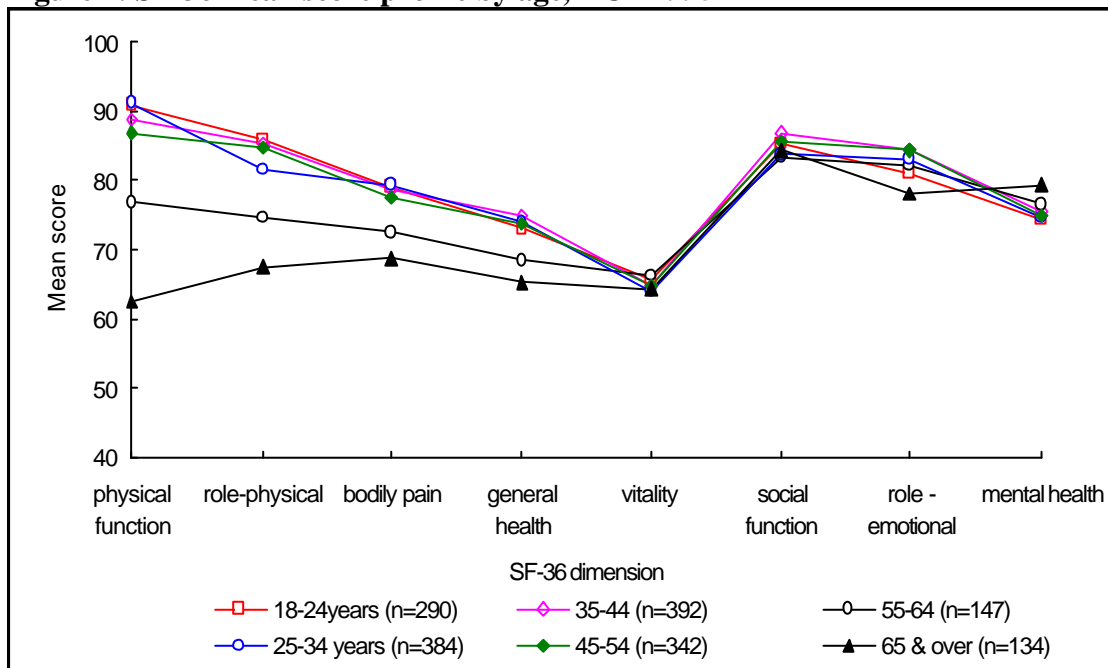
The mean score for Vitality is usually less than the mean score for Social Function leading to a characteristic dip in the graph at the Vitality scale. It is not correct to compare the Vitality scores with the scores for Social Function.

## SF-36 profiles for age and sex

### Age

Age affects SF-36 scores to a large degree (see Figure 1). While there were only small differences in SF-36 mean scores between age groups in the 18 to 55 year age range, those aged 55 to 64 years, and 65 years and over had substantially lower scores for the SF-36 scales which mostly reflect physical health. No substantial differences were apparent for the scales which mostly reflect mental health. The effect of age can be controlled by using direct standardisation which allows more valid comparisons between population sub-groups of differing age-structures.

**Figure 1: SF-36 mean score profile by age, ACT 1995**

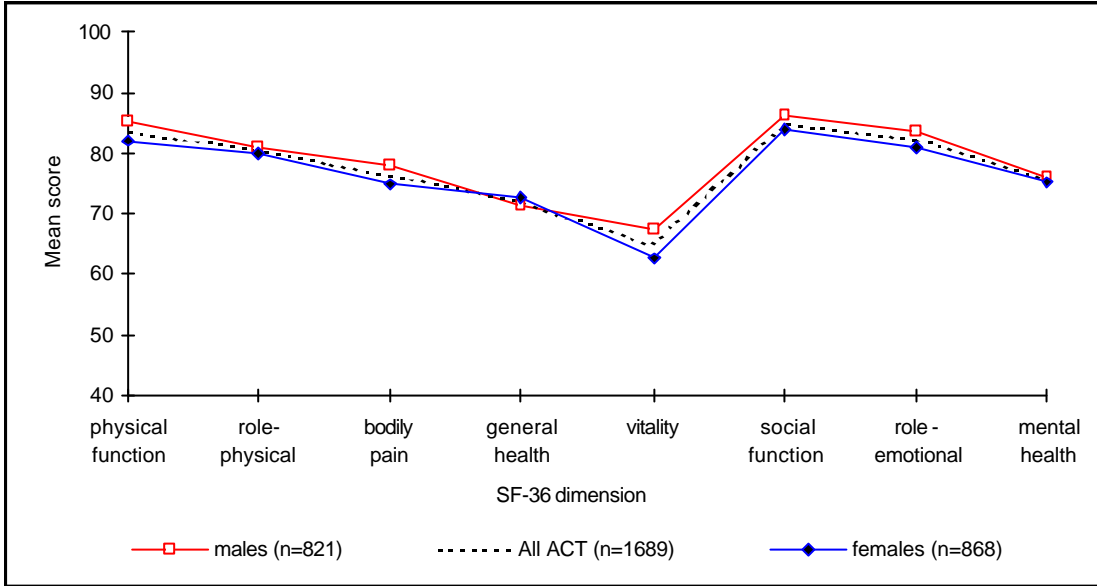


Source: ABS, National Health Survey 1995, Confidentialised Unit Record File.

## Sex

ACT females had lower mean scores than males on all SF-36 scales except for general health (see Figure 2). This pattern was similar to the pattern for all Australia.

**Figure 2: Age-standardised SF-36 mean score profiles by sex, ACT 1995**



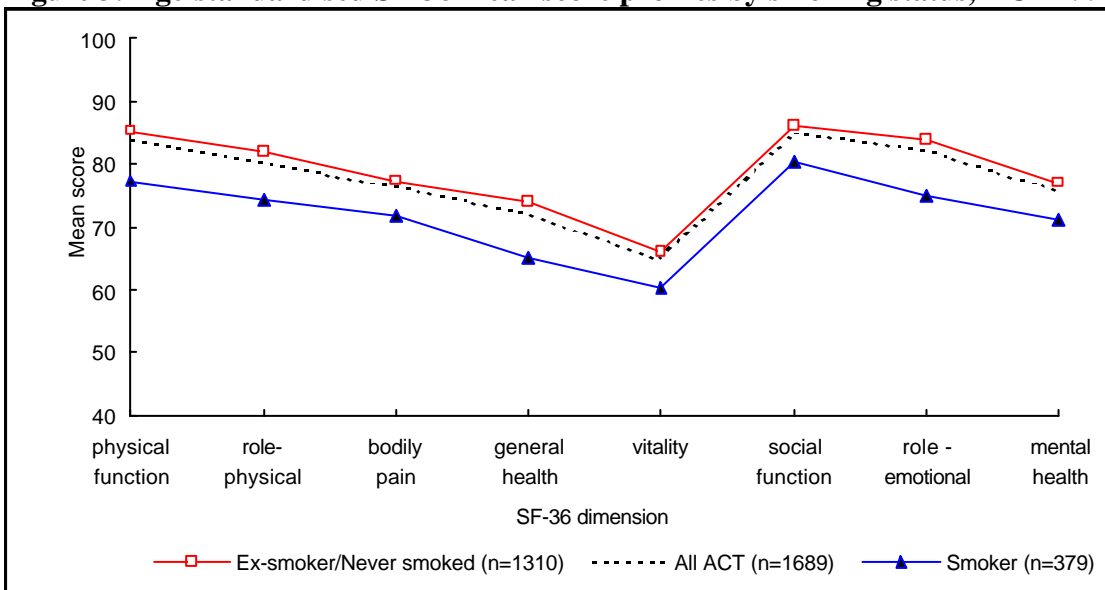
Source: ABS, National Health Survey 1995, Confidentialised Unit Record File.

## SF-36 profiles for health risk factors

### Smoking

The SF-36 mean score profile for smokers was substantially lower than that for ex-smokers or those who have never smoked (see Figure 3).

**Figure 3: Age-standardised SF-36 mean score profiles by smoking status, ACT 1995**

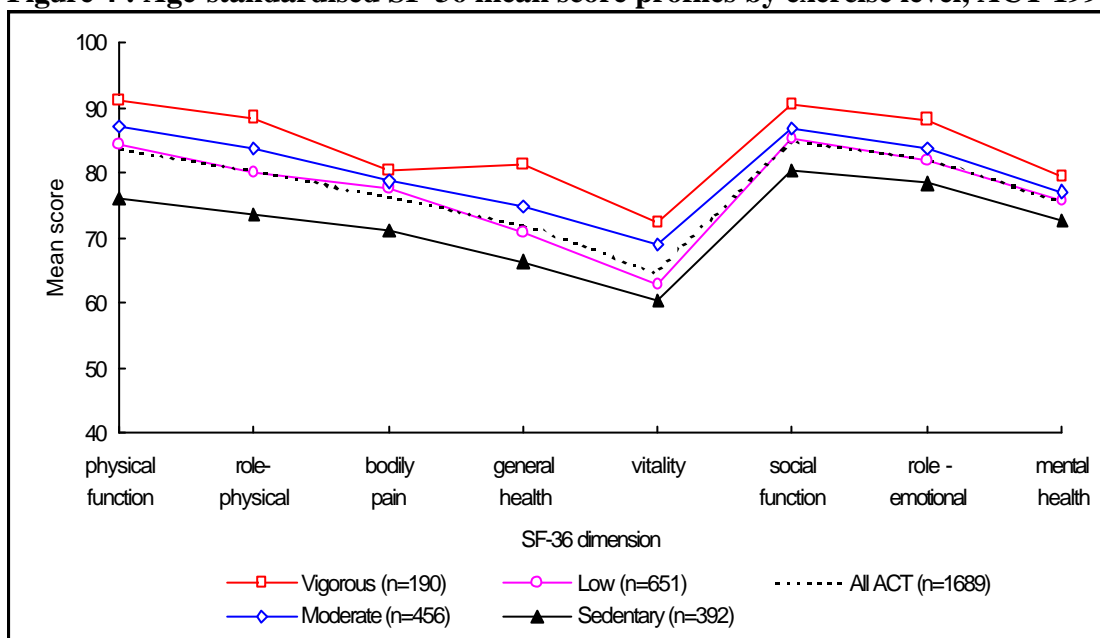


Source: ABS, National Health Survey 1995, Confidentialised Unit Record File.

## Exercise

Exercise levels were derived from the frequency, duration and intensity of exercise. Those reporting sedentary exercise levels reported lower SF-36 scores across all the 8 scales. A gradient was established, where higher levels of exercise were associated with higher SF-36 scores (see Figure 4).

**Figure 4 : Age-standardised SF-36 mean score profiles by exercise level, ACT 1995**

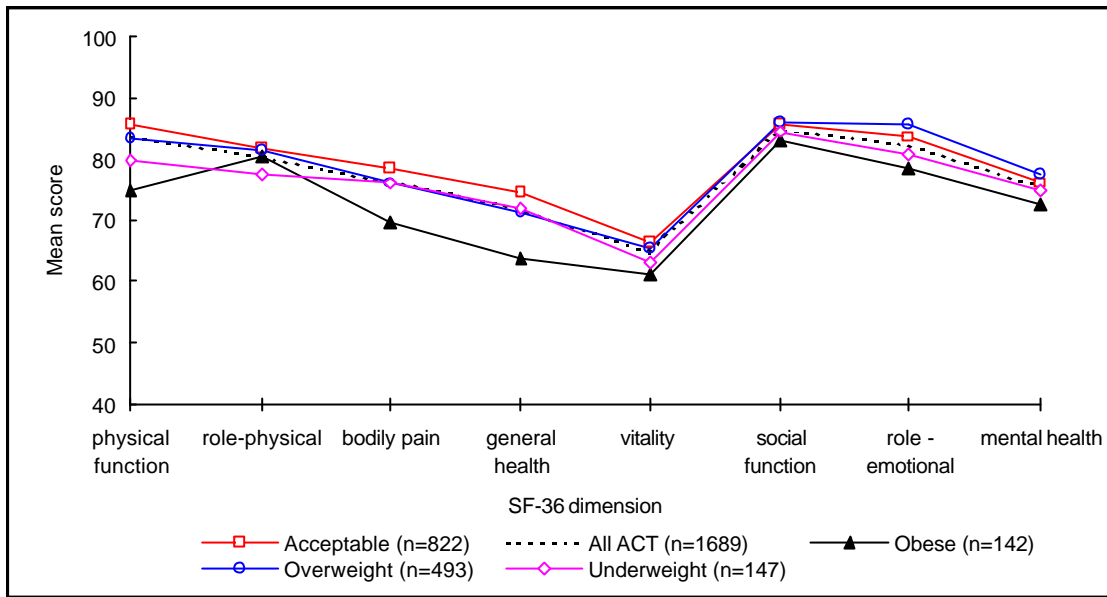


Source: ABS, National Health Survey 1995, Confidentialised Unit Record File.

## Body mass index

Respondents were divided into groups based on their body mass index (weight in kg divided by the square of height in cm, all self-reported). An index score of less than 20 is underweight, 20-25 is acceptable, from over 25 to 30 is overweight, and over 30 is obese. Respondents in the obese category had lower mean scores on most scales than all other respondents (see Figure 5).

**Figure 5: Age-standardised SF-36 mean score profiles by body mass index, ACT 1995**



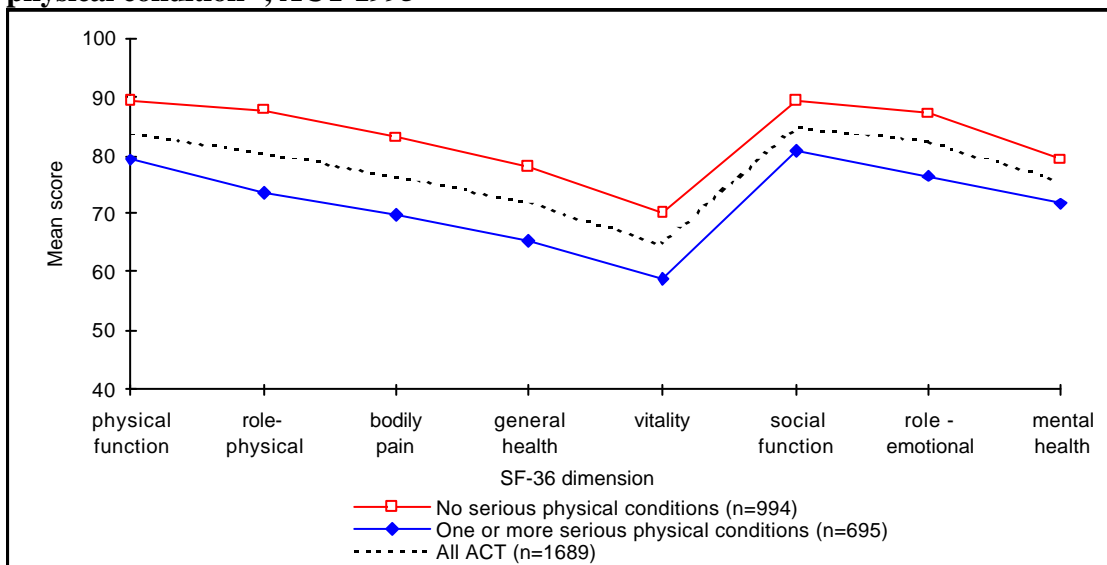
Source: ABS, National Health Survey 1995, Confidentialised Unit Record File.

## SF-36 profiles for conditions and self-assessed health

### Serious physical conditions

In the NHS, information on long-term and recent conditions was obtained. A subset of conditions was defined to include for example, cancer, diabetes mellitus, all forms of heart disease, bronchitis/emphysema, asthma, and arthritis amongst other conditions<sup>5</sup>. SF-36 mean scores were substantially lower for those with one or more of these serious physical conditions, than for those without serious conditions.

**Figure 6: Age-standardised SF-36 mean score profiles by whether have serious physical condition<sup>(a)</sup>, ACT 1995**



Source: ABS, National Health Survey 1995, Confidentialised Unit Record File.

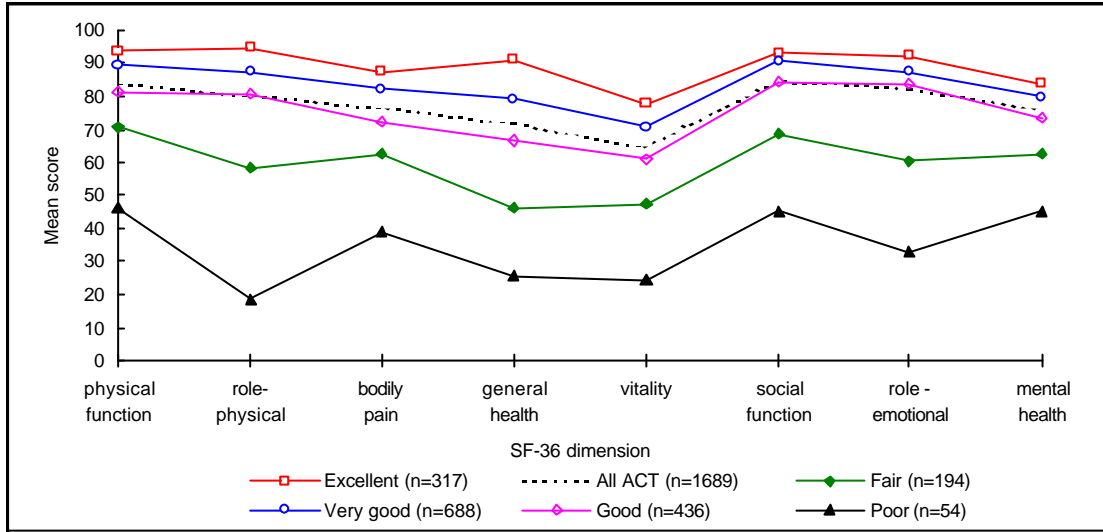
(a) ABS, National Health Survey, SF-36 Population norms, Australia, 1995. Catalogue no. 4399.0, page 37



## Self-assessed health

The single question on self-assessed health (In general, would you say that your health is: excellent, very good, good, fair, or poor?) is one of the questions which make up the SF-36. It contributes to the score for the General Health scale. Respondents who rated their health highly on this question tended to score higher on all scales of the SF-36, not just General Health. A clear gradient was established where respondents who assessed their health lower scored lower on all SF-36 scales (see Figure 7)

**Figure 7: Age-standardised SF-36 mean score profiles by self-assessed health status, ACT 1995**



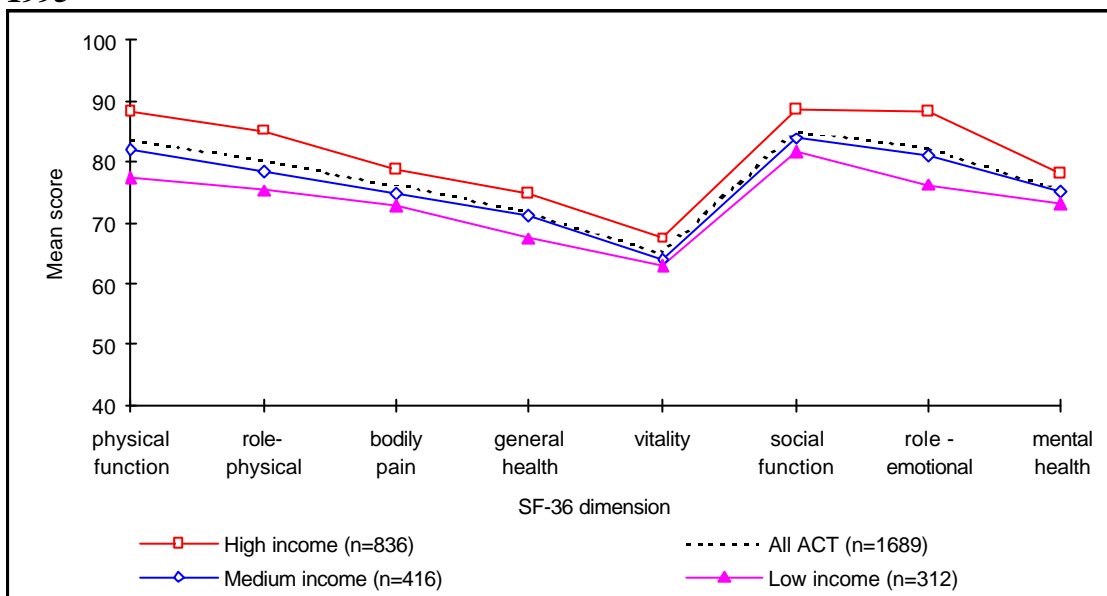
Source: ABS, National Health Survey 1995, Confidentialised Unit Record File.

## SF-36 profiles for socioeconomic factors

### Income

In the National Health Survey a measure of “equivalent income “ was derived which uses the Henderson Simplified Equivalence Scales to take into account differences in household types (eg number of children) and their income requirements so that more valid comparisons of incomes may be made. Respondents in the high income group (highest 3 deciles of equivalent income) had higher SF-36 scores than those in the middle income group (middle 4 deciles) or low income group (lowest 3 deciles) (see Figure 8).

**Figure 8: Age-standardised SF-36 mean score profiles by equivalent income, ACT 1995**

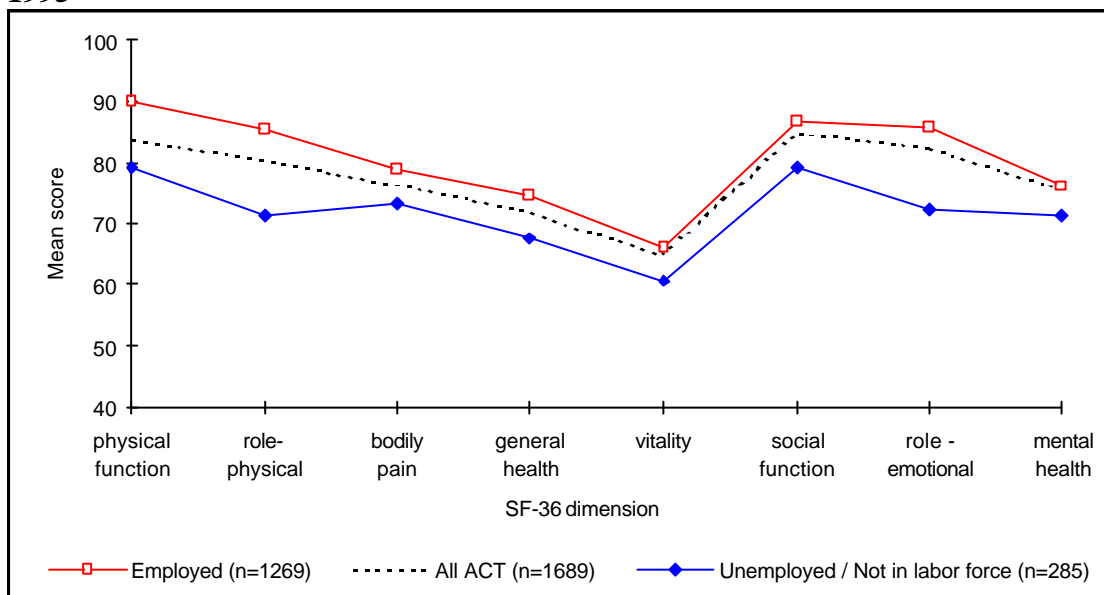


Source: ABS, National Health Survey 1995, Confidentialised Unit Record File.

## Employment

Researchers often find that employed persons are healthier than others- the so called “healthy worker effect”. The ACT results show the same pattern (see Figure 9). Persons outside the work force may include people with disabilities and chronic illnesses who are not able to work because of their health, so it is not surprising that this group of people scores less for all SF-36 scales.

**Figure 9: Age-standardised SF-36 mean score profiles by employment status, ACT 1995**



Source: ABS, National Health Survey 1995, Confidentialised Unit Record File.

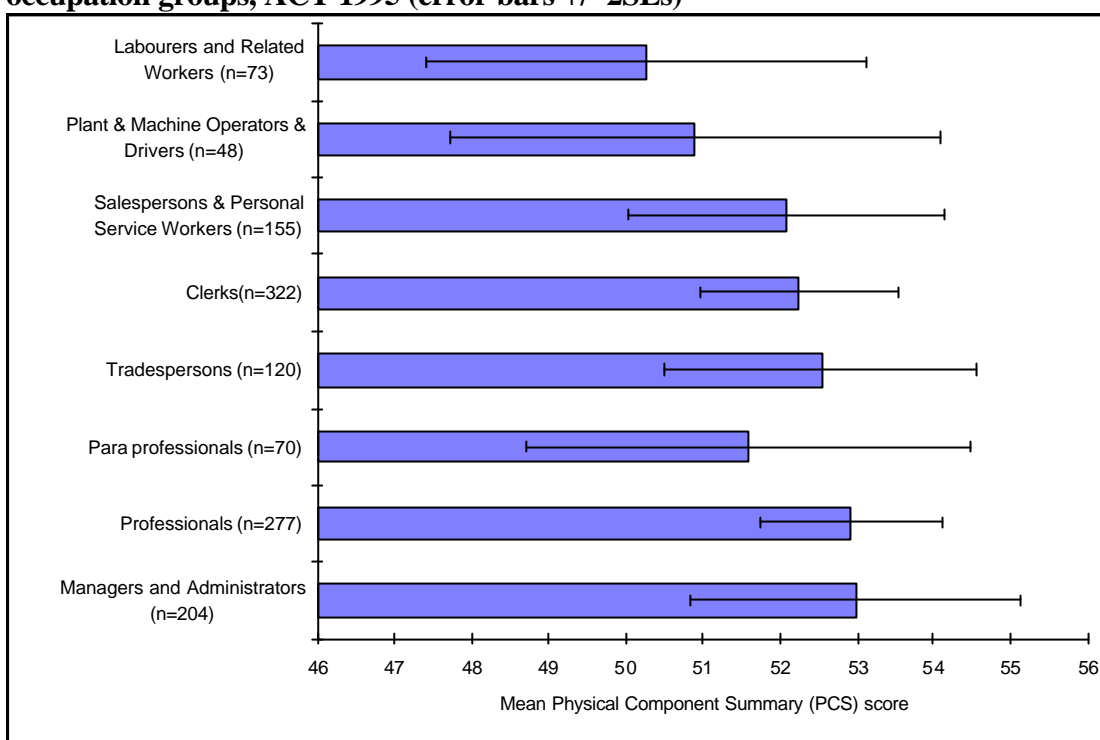
## Occupation

Some interesting differences can be seen when mean Physical Component Summary (PCS) scores are shown for different occupation groups, although because of the small sample, the differences are not statistically significant. The width of the error bars showing 2 standard errors in each direction shows that these results are highly variable. Managers, Administrators and Professionals have the highest scores while Labourers and Related workers and Plant & Machine Operators and Drivers have the lowest (see

Figure 10)A different picture emerges for the mean Mental Component Summary (MCS) scores. Salespersons and Personal Service workers and Clerks have the lowest MCS scores (see Figure 12).

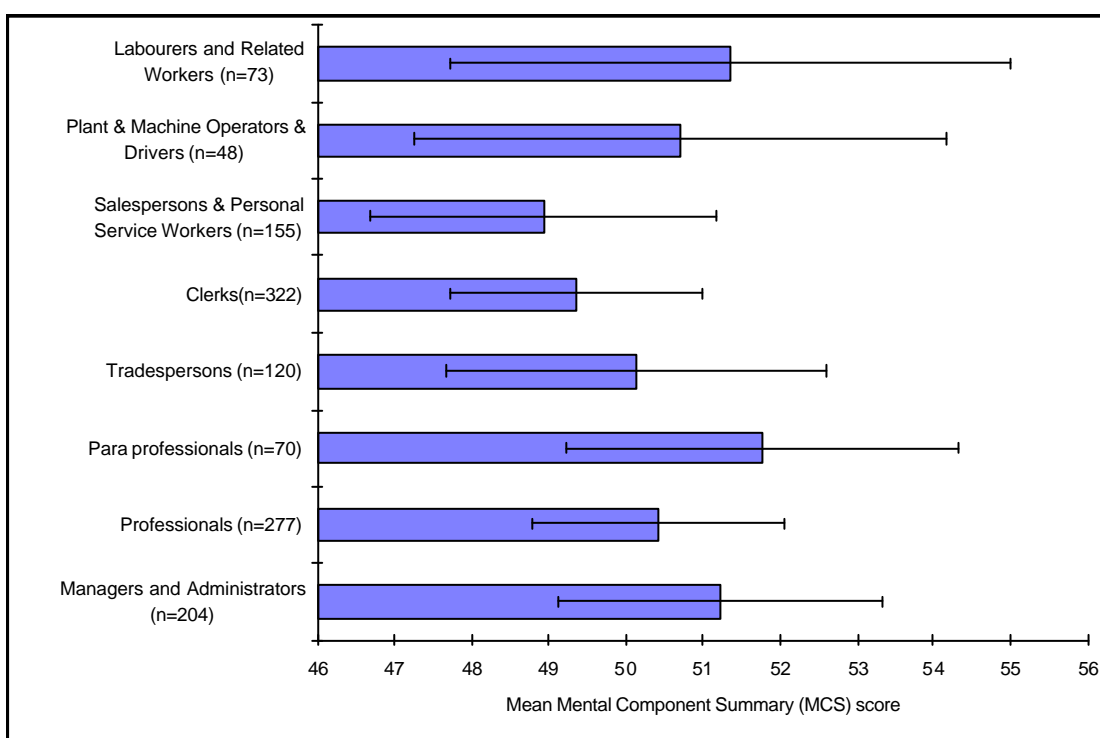
While it is not possible to make any strong conclusions about these results it is interesting to note that the pattern obtained for MCS mean scores by occupation groups is quite different to that obtained for PCS mean scores.

**Figure 10: Age-standardised mean Physical Component Summary (PCS) scores by occupation groups, ACT 1995 (error bars +/- 2SEs)**



Source: ABS, National Health Survey 1995, Confidentialised Unit Record File.

**Figure 11: Age-standardised mean Mental Component Summary (MCS) scores by occupation groups, ACT 1995 (error bars +/- 2SEs)**

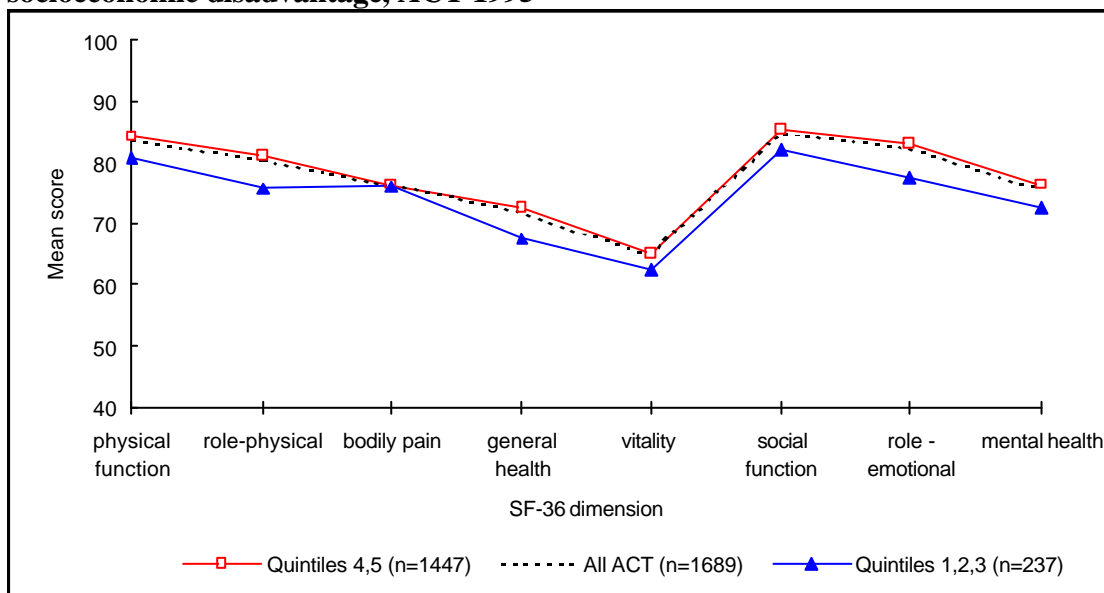


Source: ABS, National Health Survey 1995, Confidentialised Unit Record File.

## Index of relative socio-economic disadvantage

The ABS produces five different indexes which summarise different aspects of the socio-economic conditions of geographical areas, based on data from the census. The index of relative socio-economic disadvantage (IRSED) is one of these indexes and is derived from characteristics like low income, low educational attainment, high unemployment, and unskilled jobs<sup>6</sup>. The lowest geographical level at which these scores are calculated is that of the collection district (CD). Each collection district equates to about 250 households. In the National Health Survey the IRSED scores (from the 1991 census) are organised into quintiles. Each respondents to the NHS was assigned the IRSED quintile score of the area in which they live. Quintiles indicating high scores (eg quintile 5) occur in areas with few families of low income and few people with little training and in unskilled occupations. Quintiles indicating low scores (eg quintile 1) occur in areas with many families of low income and many people with little training and in unskilled occupations. Sf-36 profiles are presented for groups based on these quintiles in Figure 12. From ACT respondents in the SF-36 sample of the NHS, of those with valid scores for all SF-36 scales, most of the respondents lived in areas with higher quintiles (1447 respondents in quintiles 4 and 5) while only a few lived in areas with lower quintile scores for IRSED (237 respondents in quintiles 1,2, or 3). This reflects the higher socioeconomic status of the ACT. Nevertheless the SF-36 profiles do show a difference in health status between the two groups. People in areas of higher socioeconomic disadvantage had lower scores on most scales of the SF-36.

**Figure 12: Age-standardised SF-36 mean score profiles by index of relative socioeconomic disadvantage, ACT 1995**



Source: ABS, National Health Survey 1995, Confidentialised Unit Record File.

## Appendix

### Age standardisation

Age affects SF-36 scores to a large degree (see Figure 1). The effect of age can be controlled for by using direct standardisation which allows more valid comparisons between population sub-groups of differing age-structures. The following standard population was used for age-standardisation (the population of Australian persons 1995 aged 18 and over from weighted estimates from the 1995 National Health Survey)

Age group	standard population used for SF-36 profiles by employment, occupation	standard population used for all other SF-36 profiles
18-24	1911775	1911775
25-34	2843683	2843683
35-44	2740336	2740336
45-54	2231138	2231138
55-64	1507983	1507983
65 & over	-	2154967
Total	11234915	13389882

For SF-36 profiles by occupation and employment the 65 years and over group was excluded from the standardisation process.

The formula used to calculate the age-standardised estimate of the mean for a particular population sub-group was as follows.

$$\sum_i \frac{p_i \times m_i}{P}$$

where

$p_i$  is the population count for the standard population in age group  $i$

$m_i$  is the unstandardised mean score in age group  $i$

$P$  is the total population count for the standard population.

### Standard errors

Standard errors for the age-standardised mean scores were calculated using the same method used in the ABS publication *National Health Survey, SF-36 Population norms, Australia, 1995*. Catalogue no. 4399.0 (see page 28)

## References

<sup>1</sup> ABS, *National Health Survey, SF-36 Population norms, Australia, 1995*. Catalogue no. 4399.0

<sup>2</sup> website <http://www.sf36.com/general/sf36.html>

<sup>3</sup> Ware JE, Kosinski M, Keller SD. *SF-36 Physical and Mental Summary Scales: A User's Manual*. Boston, MA: The Health Institute, 1994. and  
Ware JE, Snow KK, Kosinski M, Gandek, B. *SF-36 Health Survey Manual and Interpretation guide*: Boston, MA: The Health Institute, 1993.

<sup>4</sup> Wilkinson R, Marmot M. *Social determinants of health : the solid facts*. Copenhagen WHO Regional Office for Europe 1998

<sup>5</sup> ABS, *National Health Survey, SF-36 Population norms, Australia, 1995*. Catalogue no. 4399.0, page 37

<sup>6</sup> ABS, *Information paper: 1996 Census of Population and Housing, Socio-economic indexes for areas*. Catalogue no. 2039.0