

4. Per capita health expenditure by income and Indigenous origin

Our estimate of per capita health expenditure for Indigenous people living in non-sparsely settled areas is \$2734, which is around \$500 higher than the estimate of \$2277 for non-Indigenous people. However, the estimates of per capita health expenditure are quite variable, particularly for the Indigenous population, for whom the standard error on the estimate of per capita expenditure is \$334. While the estimates for the non-Indigenous population are also variable, the standard errors are smaller (\$50). This means that the estimate of per capita health expenditure on Indigenous people is not statistically different from the estimate for the non-Indigenous population (at the 95 per cent confidence level).

The high standard errors, particularly for the Indigenous population, result primarily from the unreliability of hospital data in the 1995 NHS. The relative rarity of hospital visits means that very few Indigenous respondents reported using a hospital in the two weeks before the survey. Consequently, standard errors on the hospital expenditure are very high, and estimates of health expenditure including hospital expenditure are unreliable.

When hospital usage is excluded, per capita health expenditure on Indigenous people is estimated to be much lower than the non-Indigenous average (\$930 and \$1351 respectively). The standard errors are much smaller—\$64 and \$11 for the Indigenous and non-Indigenous populations respectively—and there is statistical evidence that Indigenous health expenditure is significantly lower than that for other Australians, at least for some categories of expenditure.

High variability in hospital utilisation rates, combined with the fact that hospital visits are, on average, much more expensive than other medical services, means that this category of expenditure makes up a high proportion of total health expenditure. The high degree of variability in the hospital expenditure is a function of the fact that a very small proportion of the sample had visited a hospital for health-related reasons in the two weeks prior to interview. Some insight into this issue can be gained by looking at the numbers of the sample with health expenditure of more than \$1000 in the two weeks prior to the survey. For the Indigenous population in the income quintiles two to five, there are 13 respondents who had health expenditure of more than \$1000 in the two weeks prior to the survey, and a maximum health expenditure of \$9147. There is a similar pattern for the non-Indigenous sample, although the larger sample size means that the problem is much less severe. Detailed information on the distribution of health expenditure by equivalent income is presented in Appendix B.

Table 4.1, which presents the estimates of per capita expenditure by equivalent income quintile for the non-Indigenous population, highlights a number of important issues.¹⁵ First, there is a large amount of variation in estimated per capita health expenditure across the different measures of equivalent income. For example, the estimates of expenditure for the lowest quintile vary between \$2735 using the raw family income, \$2500 using the new OECD scale, \$2316 using the Henderson equivalence scale, and \$1892 using the per

capita income scale. This dramatic variation in the estimates of expenditure by equivalent income for the different equivalence scales highlights the importance of the equivalence scale used and the need to conduct a sensitivity analysis for this type of analysis.

In general, the point estimates of per capita health expenditure show that expenditure has a negative relationship with equivalent income. For example, using the new OECD equivalence scale, for the lowest income quintile (quintile one) per capita expenditure is estimated to be \$2500. It is \$1982 for quintile two, \$1678 for quintile three, \$1511 for quintile four, and \$1467 for quintile five. While expenditure is estimated to be larger for lower equivalent incomes for all of the equivalence scales, the standard errors are high, meaning that care needs to be exercised when interpreting these results.

Whether there are statistically significant differences in health expenditure between income groups can be formally tested using the following:

$$\text{test statistic} = \frac{E_1 - E_2}{\sqrt{SE(E_1)^2 + SE(E_2)^2}}$$

where E_1 and E_2 are the estimated expenditure of income groups one and two respectively and $SE(E_1)$ and $SE(E_2)$ are the standard errors of the estimates of E_1 and E_2 . The denominator is simply the standard error of the difference between two random variables from simple random sample (see Appendix D). In conventional hypothesis tests, the 95 per cent confidence interval of an estimate is the point estimate plus or minus 1.96 times the standard error. Therefore, in order for there to be statistically significant differences in estimated per capita expenditure, the absolute value of the test statistic must be greater than 1.96.

For example, the new OECD scale expenditure estimates for income quintiles three and five respectively are \$1678 and \$1467, a difference of \$211. The test statistic is 2.76, which is greater than the critical value of 1.96, and therefore we can conclude that there is a statistically significant difference at the 95 per cent confidence level. Similarly for the raw family income, the Henderson measure and per capita income, expenditure for income quintile three is significantly higher than for income quintile five with test statistics of 5.38, 1.97 and 8.08 respectively. Note that there are only three pair-wise comparisons in Table 4.1 for which income was not significantly negatively related to health expenditure: the differences between the fourth and fifth quintiles of Henderson and OECD income measures, and the difference between the first and second quintiles of the per capita income distribution.

Table 4.1 Per capita health expenditure (\$ p.a.) by equivalent income, non-Indigenous population

	Raw family income	Henderson	New OECD	Per capita income
Income quintile				
1	2735 (148)	2316 (133)	2500 (124)	1892 (96)
2	1930 (62)	1808 (69)	1982 (69)	2085 (57)
3	1627 (50)	1749 (64)	1678 (58)	1916 (50)
4	1552 (44)	1665 (41)	1511 (45)	1861 (49)
5	1261 (46)	1598 (42)	1467 (49)	1374 (45)

Note: The standard errors of the estimates of expenditure are presented in parentheses.

Given the relatively small numbers of Indigenous respondents in the top income quintiles, the estimates need to be further aggregated to allow comparisons between Indigenous and other Australians. Table 4.2 presents estimates of per capita health expenditure by equivalent income for the Indigenous and non-Indigenous populations for two income groups: the first income quintile, and income quintiles two to five combined. By grouping quintiles two to five together, the number of Indigenous respondents in the income groups was increased to an acceptable level.

Table 4.2 Per capita health expenditure (including hospital expenditure) by broad income group and Indigenous origin

	Raw family income	Henderson	New OECD	Per capita income
Income quintile				
Indigenous expenditure (\$ p.a.)				
1	3029 (786)	2404 (521)	2656 (627)	2114 (396)
2 to 5	2212 (406)	2434 (533)	2280 (443)	2689 (643)
Non-Indigenous expenditure (\$ p.a.)				
1	2735 (148)	2316 (133)	2500 (124)	1892 (96)
2 to 5	1597 (51)	1704 (54)	1660 (56)	1808 (51)

Note: The standard errors of the estimates of expenditure are presented in parentheses. The per capita health expenditure is calculated across the same range of medical services as used in Table 4.1. The qualification that it includes hospital expenditure is made to distinguish it from the next table, which excludes such expenditure.

Unfortunately, the standard errors are still large for the Indigenous population, and it is not possible to draw any conclusions about the relationship between income and per capita expenditure. As with the overall estimates of Indigenous health expenditure, there is too much variability within income groups to identify whether genuine differences exist between the income groups.

The standard errors for the non-Indigenous estimates are also quite large. However, it is possible to conclude that for the raw family income, Henderson and new OECD equivalence scales, expenditure is higher for the lowest income quintile than for higher income groups (quintiles two to five). There is no statistically significant difference between income groups for the per capita equivalence scale. On the surface, this differs from the overall results for the more disaggregated income breakdown, which found that expenditure fell for all of the equivalence scales. This is an important point because it means that the aggregation of income groupings may hide underlying differences in expenditure by equivalent income.

In Table 4.3, further estimates of per capita health expenditure for low and high-income Indigenous and non-Indigenous Australians are shown, but this time excluding hospital expenditure.¹⁶ The standard errors are now much lower. Health expenditure is substantially less for the Indigenous population than for the non-Indigenous population. The finding that non-Indigenous health expenditure (excluding hospital expenditure) is higher than for the Indigenous population is consistent with findings from another analysis of NHS data, which shows that Indigenous people are more likely to visit hospitals (outpatients and day clinics in particular) than to go to a GP or specialist (ABS/AIHW 1999: 74).

For the non-Indigenous population, expenditure is estimated to be significantly lower for the higher equivalent income groups when using the OECD, Henderson and raw family income equivalence scales. As in Table 4.2, there is no significant difference in expenditure across income groups for the per capita equivalence scale. This is probably driven by the fact that per capita scale changes the composition of families within the various quintiles. If large families have substantial economies of scale in health provision (i.e. they do not require as many services or as much health expenditure), then the fact that per capita scales tend to reclassify such families as low-income will depress the expenditure in the bottom quintile relative to the other income groups. This hypothesis is supported by the observation that expenditure on Indigenous people in the bottom quintile of per capita income is actually lower than for other Indigenous people, albeit not significantly lower.

In spite of the fact that estimates of health expenditure on Indigenous people are generally lower for high income groups, there is no statistically significant difference for any of the equivalence scales. However, the standard errors for the Indigenous estimates are still relatively large, and one should be careful that the results presented in Table 4.3 are not interpreted to mean that in reality there are no differences. Notwithstanding, if the focus is on the Henderson scale (as it was for Deeble et al. 1998), increasing the sample size is unlikely to render the difference significant, given that there is very little difference in expenditure between income groups. Also the fact that health expenditure is actually greatest in the high (Henderson) income group means that any significant statistic may not necessarily support Deeble et al.'s hypothesis of the relationship between Indigenous income and expenditure.

Table 4.3 Per capita health expenditure (excluding hospital expenditure) by broad income group and Indigenous origin

	Raw family income	Henderson	New OECD	Per capita income
Income quintile				
	Indigenous expenditure (\$ p.a.)			
1	1409 (185)	1175 (108)	1254 (147)	1021 (100)
2 to 5	1171 (112)	1197 (121)	1164 (106)	1249 (142)
	Non-Indigenous expenditure (\$ p.a.)			
1	2527 (104)	2148 (92)	2283 (91)	1747 (72)
2 to 5	1494 (46)	1585 (49)	1526 (49)	1708 (48)

Note: The standard errors of the estimates of expenditure are presented in parentheses. The per capita health expenditure excludes hospital expenditure to distinguish it from the previous two tables, which include such expenditure.

A re-examination of Table 4.2 reveals there is no significant difference between Indigenous and non-Indigenous health expenditure in the respective income quintiles (e.g. comparing people in the bottom and higher quintiles separately). However, if poor quality hospital data are excluded in an attempt to reduce standard errors, then health expenditure on low-income Indigenous people is much lower than the expenditure on low-income non-Indigenous people, and these differences are statistically significant (Table 4.3). For example, using the Henderson scale the per capita expenditure on Indigenous people in the first quintile is estimated to be \$1175 dollars, which is around \$973 dollars less than the estimate of \$2148 for non-Indigenous people in the same income group. The expenditure on higher-income Indigenous people is also uniformly lower than the expenditure on higher-income non-Indigenous people.

Therefore, by excluding hospital data from the calculation, we find that the difference in health expenditure between high and low income groups for Indigenous people is less substantial than the expenditure differential between Indigenous and other Australians. Income appears to add little to the analysis of health expenditure, either because income is poorly measured or because improvements in income are a relatively recent phenomenon among Indigenous people. In addition to the probable lags in improvements in health, and hence health expenditure, another aspect of the latter is that the experience of rapid upward social mobility may have greater pathological impact for Indigenous Australians (Sibthorpe 1988). Notwithstanding the limitations of income as an instrument to measure overall health expenditure, Deeble's (1998: ix) emphasis on analysing the relationship between public expenditure and income remains valid, given that many government payments are means tested.

On balance, it appears that there is little or no difference in Indigenous expenditure across income groups. This result is in stark contrast to the non-Indigenous results for whom high income groups tend to have lower health expenditure. One obvious explanation for this difference between Indigenous and non-Indigenous populations is that, while high-income Indigenous families appear to be as unhealthy as poorer Indigenous families

(Hunter 1999), there is a strong relationship between income and health outcomes amongst other Australian families (NHS 1992). The penultimate section of this paper returns to this theme by exploring the evidence in the 1995 NHS on the relationship between income and health for both Indigenous and non-Indigenous Australians.