**Socioeconomic Characteristics of NSW Hospital Users in 1998-99**

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Abstract

With the ever increasing cost of providing hospital and other health services, it is vital to have an accurate understanding of the different health needs of various categories of hospital users – for example the rich versus the poor, or city versus bush dwellers. For this study we started with a 1998-99 person-based NSW hospitals dataset, and imputed onto this dataset from the 1996 Census, at the Collection District level, socioeconomic variables such as equivalent family income and an area-based index of socioeconomic disadvantage.

In this paper we report on unique evidence from this combined dataset regarding the socioeconomic, demographic, distributional, health and spatial characteristics of those NSW residents who used NSW private or public hospital services in 1998-99. Questions addressed in the paper include: who benefited most/least that year from government funding to NSW hospitals – across socioeconomic classes, age, sex and geographic regions.

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1 Introduction

This paper presents preliminary results from a project designed to develop a microsimulation model of the NSW health system. The project has been initiated through a partnership formed between the National Centre for Social and Economic Modelling (NATSEM) at the University of Canberra, the NSW Health Department, the Productivity Commission and the Health Insurance Commission. The project has been awarded a Strategic Partnership with Industry in Research and Training grant by the Australian Research Council.

The objective of this project is to develop a model that will allow the distributional impacts of health policies to be more accurately modelled and facilitate the exploration of the relationships between socioeconomic characteristics, health needs and the use of hospital services and broader health services.

Government policies on the financing of health care and hospital services have an important impact on the distribution of resources within Australian society (Harding et al., 2000; Harding, 1995). Schofield (1998) has previously analysed the redistributive effects of in-kind benefits provided through the Medicare arrangements, as they apply to public hospitals. Government policies impacting on private hospital provision will also have important distributional impacts, and these will have changed with developments over recent years in the regulation and subsidy of private health insurance.

It is envisaged that in the long run the microsimulation model developed through this project will be able to be used to analyse the redistributive impact of state policies and budget decisions related to hospital services, as well as the broad national settings for the hospital sector in Australia. The interest in better understanding these aspects of government policies reflects the acknowledgement that broader social inequalities impact on health status and the health system itself impacts on these broader inequalities.

The NSW Health Department has had a long-standing interest in estimating variation in the need for hospital services by various geographic groupings of the population. Research on this issue has extended over 14 years, particularly in conjunction with the Health Services Research Group at the University of Newcastle. The results of this research are used in the Department’s Resource Distribution Formula, which is used to guide funding allocations to the regional Area Health Services in NSW. Through this current project NSW Health is seeking to improve its understanding of how socioeconomic factors impact on health needs and consequently the use of hospital services.
The results presented in this paper reflect the use of new and unique information on socioeconomic characteristics derived through a special analysis of the 1996 Census undertaken for this project. The results also reflect the use of more detailed data on the costs of hospital services derived from the NSW Health hospital cost data collection.

2 Data sources

Two key data sources are used in this project: patient based administrative hospitals data from NSW Health and Australian Bureau of Statistics (ABS) data from the 1996 Census.

2.1 NSW hospitals patient-based dataset (1998-99)

An important part of the project was to construct a unit record hospitals administrative dataset. Another aim was to bring together in that dataset a broad range of variables needed for policy relevant analyses - such as the demographic and health characteristics of patients, the hospital services they used and the costs associated with such services. Complexities arose because the desired dataset had to be brought together from two distinct NSW Health collections: in-patients and costings. NSW Health's Inpatient Statistics Collection is a census of all admitted patient services provided by New South Wales Public Hospitals, Public Psychiatric Hospitals, Public Multi-Purpose Services, Private Hospitals and Private Day Procedures Centres.

Additional complexities arose because data from both collections had to be at the level of the individual patient, rather than the traditional 'per separation' format. Whilst the data provided for this project was de-identified, a code was included that allowed activity for persons to be analysed across separations within the year. The code was an arbitrary number assigned by NSW Health prior to the release of data, based on Departmental analysis that de-duplicated the Inpatient Statistical Collection using probabilistic matching techniques. A final aim was to make that dataset amenable, at the level of individual patients, to imputation of socioeconomic status (refer to Section 3). The information contained in the collection is provided by the patient, the health service provider and the hospital's administration.

1998-99 was selected because the data for this year was of better quality than for previous years and 1998-99 was reasonably close to the previous Census (in 1996) from which socioeconomic indexes and population-wide data at the CD level were available.
The dataset initially compiled by NSW Health comprised 1,916,765 records with 71 variables. Each record represents a separation from a NSW medical facility for the 1998-99 financial year. A record is submitted for each episode of care (service category or care type) within a stay in hospital. The data have been examined extensively for obvious errors and missing variables have been imputed where necessary.

The number of individual patients recorded in the dataset is 1,161,504 (28 per cent of patients had more than one separation). The variables included are in the general categories of: patient characteristics, geographical information, medical facility characteristics, utilisation, cost and hospital usage details. Also included is the source of referral to the service, service referred to on separation, diagnoses, procedures, and external cause of injury. A ‘medical facility’ is defined to include public hospitals, public psychiatric hospitals, public nursing homes, private hospitals, private day procedure centres and private sleep disorder centres.

In this analysis we refer to government expenditure per patient for public hospitals only (private hospitals are excluded from the cost analysis). This is the proportion of the cost for each separation borne by the government (Commonwealth or NSW Government) summed per patient. This does not account for costs borne by private health insurance or direct from the patient’s pocket.

In future research, more precise information on whether patients that were treated as public (non-chargeable) or one of several possible private patient categories will be used to develop more precise estimates of the cost to government of each separation. This will improve on the approach used for this report which assumes a standard proportion of costs is met by government across all categories of patient. Information will also be used to estimate the contribution by government to the cost of private hospital separations.

The ‘cost’ variable on the NSW Health Patient Data represents the total gross cost of providing the hospital service by the medical facility (whether or not the expenditure was funded by revenue from the Commonwealth, NSW Government, patient, Medicare or insurers). To calculate the cost to government (government expenditure) we discounted the gross cost for each separation by the proportion of total expenditure from private sector sources for that public hospital type in NSW in 1998-99.¹

¹ AIHW, Bulletin No. 17, Table B3: Total Health Expenditure, Current Prices, New South Wales, by Areas of Expenditure and Sources of Funds(a), 1998-99. This outlines government and non-government expenditure (health insurance funds, individuals and
Details on how the 1998-99 NSW hospitals dataset was cleansed and a socioeconomic window added are provided in Appendix B.

2.2 Extract from 1996 Census data

CData96 versus special extract for this project

One possible data source considered for this project was the ABS’s publicly available CData96 product. Within this data source the ABS makes considerable Census information available at various levels of geographical aggregation including at the Census Collection District (CD) level (each CD has on average around 225 households). However, this data is restricted to pre-defined cross-tabs known as the Basic Community Profile that are not amenable to imputing an equivalent family income onto the NSW Health Patient Data.

An alternative source of data was a custom data extract from the 1996 Census that used only those variables that are required for our purposes. Due to a number of assumptions that would have been made if CData96 had been used and the highly complex imputation process associated with this, we chose to obtain a custom data extract from the 1996 Census.

The 1996 Census extract

While it is not unusual to obtain custom data extracts from the ABS, because data was required at the CD level the issue of confidentiality became crucial in specifying the parameters for the data request. This is due to legislative requirements that prevent the ABS from releasing any data that would allow an individual to be identified. As a result, any cell of a cross-tab that has a very small count is "randomly perturbed" to maintain confidentiality.²

other sources including workers compensation, compulsory third party insurers and other sources of income such as interest earned) for each of the two hospital types; included in this analysis public, and psychiatric. The gross cost of services provided was discounted by 5.6 per cent for public hospitals, and 6.6 per cent for psychiatric hospitals to arrive at a government only cost. Private hospitals are excluded from the cost analysis in this paper.

As a result considerable time was spent working with the ABS to find a specification for the extract that was sufficiently disaggregated to allow us to accurately impute data onto the NSW Health Patient Data without contaminating the extract with untrue data (that is, the randomly perturbed cells). A successful compromise was reached that primarily involved the ABS generating two new variables from the 1996 Census and using a SAS program developed by NATSEM to perform calculations on the unit record 1996 Census data. In this way, an extract was created based on actual census responses without ABS breaching their confidentiality requirements.

The variables provided in the ABS extract include sex, ten year age groups (from 0-9 years of age up to 60-69 years of age and then 70 years of age and over), equivalent family income (EFI) quintiles and a cell count for each sex-age-EFI quintile combination at the CD level. These cell counts were subject to confidentialisation as outlined above. However, once the extract had been received we found that only 10 per cent of the total NSW population fell into confidentialised cells. This suggests that the socioeconomic distribution in the extract is of high quality (ie 90 per cent are exact).

In preparing the extract, the ABS first created two new variables – the number of adults in the family and the number of children under 14 in the family. The individual income for each family member was then computed based on the median gross weekly income for the appropriate 1996 Census income range. Within each 1996 Census income range, this median value was estimated by the ABS from the incomes reported in its Survey of Income and Housing Costs (taken around the time of the 1996 Census). Family income was then computed as the sum of the individual incomes of each family member.

The ABS then used a SAS program developed by NATSEM for computing equivalent family income directly from its unit record census data. Because of the creation of the two new variables, equivalent family income could be obtained using the modified OECD scale – with equivalence scale factors (ESF) being the sum of 1.0

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3 CD of enumeration was used rather than the CD of residence, as the lowest level of geographic aggregation in the latter case is Statistical Level Area (SLA).
4 For some years now there have been concerns that, when filling ABS forms, respondents in the lower income groups (especially in the lowest decile) tended to under-report their income (see for example Johnson, Manning and Hellwig 1995 and Bradbury 1996). In our exercise we tried to overcome this problem by considering quintiles rather than deciles. The reason for this was that we expected people in the lowest decile to still fall into the lowest quintile, regardless of whether they had under-reported their income or not.
for the first adult, 0.5 for the second adult and 0.3 for each dependent child (Mejer and Siermann, 2000). The equation for the equivalent family income (EFI) is:

\[ EFI = \frac{\text{Gross Family Income}}{\text{ESF}} \]

These family-based EFI values were then assigned to each family member and the observations were ranked into EFI quintiles for NSW.

The full specification of the extract is in Appendix A. The way the data from the extract was used to impute income-based socioeconomic status to individual patients in the NSW hospitals dataset is described in Section 3.2.

**Validation of extract**

A number of validation checks were performed on the data extract. First, the aggregate NSW population implied by the extract was found to be only 430 higher than the state based population count published by the ABS as at Census night. This is an error of only 0.007 per cent between the aggregate extract population count and the true population. Second, the population in the extract represented by non-randomised cells (i.e., those with a cell count of four or more) was 90 per cent of the NSW population. This implies that only 10 per cent of the NSW population fell into a cell that was subject to random perturbation.

Third, the CD populations implied by the extract were compared to the CD populations based on a Basic Community Profile table that was not subject to randomisation with only negligible differences found. Fourth, a number of CDs from the extract were selected at random with the sex-age counts in each cell compared to the sex-age counts in the Basic Community Profile and, again, only a minimal number of minor discrepancies were identified.

On balance it was felt that the data extract was of a high quality with only minor differences at aggregate population levels and in the distribution of sex-age counts by CD.

The reason the analysis is being undertaken at the CD level is because we expected income groupings to be much more homogeneous within a CD than at higher levels of geographic aggregation. On the other hand, traditional measures of

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5 Table B02 – State by Usual Residence on Census Night by Sex, ABS 1997.
6 Table B03 – Age by Sex, ABS 1997.
socioeconomic status such as the ABS Socioeconomic Indexes for Areas (SEIFA) only provide a single number for the CD, producing an averaging effect across residents in the CD.

The value in obtaining an EFI ranking for each sex-age combination at the CD level is clearly demonstrated in Table 1, where a high proportion of age-sex permutations for CDs in NSW have person counts concentrated into two or three income groupings (quintiles). For example, the right hand column in Table 1 shows that in almost 70 per cent of all NSW CDs, at least 60 per cent of the population within that CD fall into only one or two income quintiles. When considering any specific sex and ten year age grouping, there are no CDs in NSW in which 60 per cent of the population fall into any more than three EFI quintiles. The middle column in Table 1 provides a more stringent definition of concentration, showing the percentage of CDs where at least 90 per cent of the population fall into the specified number of income quintiles. It suggests that about one-third of NSW CDs have more than 90 per cent of the population concentrated in only three income quintiles, while almost four-fifths have more than 90 per cent of their populations contained within four income quintiles.

The potential richness of this distribution is lost when using a single index for an entire CD or when modelling socioeconomic characteristics at higher levels of spatial aggregation. Furthermore, it should be note that the quintile groupings shown in Table 1 are not consecutive ranks. For example, if a sex-age combination falls across two quintiles, it could be quintile ranking 1 and 2 or quintile ranking 1 and 5 or quintile ranking 4 and 5 etc. At the unit record level at which we are operating this detail is not lost and this adds to the accuracy with which we can model — particularly in instances where a CD may be relatively polarised in terms of the socioeconomic status of its residents or where the effect of a change in policy may be sensitive to the socioeconomic status of a person.

<table>
<thead>
<tr>
<th>Number of quintiles (for each CD-sex-age permutation)</th>
<th>CDs with &gt;= 90% of population located in:</th>
<th>CDs with &gt;= 60% of population located in:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Quintile</td>
<td>3.1%</td>
<td>11.2%</td>
</tr>
<tr>
<td>2 Quintiles</td>
<td>8.0%</td>
<td>55.8%</td>
</tr>
<tr>
<td>3 Quintiles</td>
<td>21.0%</td>
<td>33.0%</td>
</tr>
<tr>
<td>4 Quintiles</td>
<td>46.3%</td>
<td>0.0%</td>
</tr>
<tr>
<td>5 Quintiles</td>
<td>21.6%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

*Note:* Quintiles and population calculated for each CD-sex-age permutation in NSW. *Source:* 1996 Census extract.
3 Imputing socioeconomic information

3.1 Socioeconomic indexes for areas (SEIFA)

As an outcome of conducting a census, the ABS has for some time computed various geographically based Socioeconomic Indexes for Areas (SEIFA) at the CD level (ABS 1998a). These have been used in numerous studies to indicate individuals' socioeconomic status based on their area of residence (Glover, Harris and Tennant, 1999 and World Health Organisation 2000). In this project we used the ABS SEIFA Index of Relative Socioeconomic Disadvantage (IRSED).

The variables underlying the IRSED are indicators of relative socioeconomic well-being (namely high income, tertiary education, skilled occupations). High scores on the IRSED occur when the area has few families of low income and few people with little training and in unskilled occupations. Low scores on the index occur when the area has many low income families and people with little training and in unskilled occupations (ABS 1998b).

The method for imputing socioeconomic status to patients in the NSW hospitals dataset was originally envisaged as involving the geocoding of patients' addresses by NSW Health to obtain the CD of the patient’s residence, and then NATSEM merging the most appropriate SEIFA index onto the NSW hospitals data at CD level from the 1996 Census. Operating at the CD level was considered particularly important, because at that low level of geographical grouping (some 225 households - eg street level), the socioeconomic characteristics of families were likely to be similar. Thus, the CD level SEIFA index was expected to be a reasonable proxy for patients' actual socioeconomic status.

A method of this kind is commonly used in Australian and international studies, especially those analysing differences in mortality patterns across the socioeconomic spectrum (Glover et al, 1999 and World Health Organization, 2000). However, the method has the disadvantage of allocating the same SEIFA quintile to all persons residing in a particular CD, and thus possibly underestimating the extent of health inequalities across socioeconomic groupings (Walker 2001).

3.2 Imputing equivalent family income

Being able to obtain a special ABS data extract, rather than relying on the tabulations available in CData96 (Section 2.2) had important advantages. For example, we were
able to measure income much more accurately - because equivalent gross family income could be estimated by the ABS at the unit-record level (within the full population Census dataset), rather than at the group levels available in CData96. Also, complex imputations, the related necessary assumptions, and the associated decline in data quality could be avoided.

Through the ABS extract we obtained for NSW - by CD, sex and age group - the proportion of the population within each quintile of EFI. The next task then was to impute a socioeconomic status, based on the EFI quintiles, to each patient in the NSW hospitals population.

This was accomplished by first totalling the number of people in each CD-sex-age combination. The proportion of people in this CD-sex-age combination in each EFI quintile was then calculated. These proportions can be interpreted as the probability that a person living in a given CD and of a given sex and age will be in a particular EFI quintile. Each CD-sex-age combination was then sorted by EFI quintile and the cumulative proportion of people in the CD-sex-age combination was summated from quintile 1 to quintile 5. This can be interpreted as the cumulative probability of a person from a particular CD and of a particular sex and age having a particular EFI quintile ranking (by construction, the cumulative proportions sum to one).

Each patient was then allocated a random number \( z \) where \( z \sim U[0, 1] \). Each patient in the NSW Hospitals Data Set was then compared to the matching CD-sex-age combination from the 1996 Census data extract. The random number \( z \) was then progressively compared to the EFI quintile cumulative probabilities for quintiles one to four. The first time \( z \) was less than the cumulative probability being compared to the patient was assigned this EFI quintile. If, however, \( z \) is greater than the cumulative probability for EFI quintile 4, then EFI quintile 5 is assigned to that patient. This EFI quintile is then assigned to all other separations by the same patient in the NSW hospitals dataset.

It should be noted that this method has one unavoidable limitation, which is that it is assumed that those who actually utilise hospitals within a particular CD are perfectly represented by the sex-age-EFI quintile characteristics of people living in that CD. For example, suppose that the NSW Health Patient Data contains four 0-19 year old males from a particular CD. Suppose further that the 1996 Census extract shows that there are actually twenty 0-19 year old males living in that CD, half of whom are in the second EFI quintile and half of whom are in the fifth EFI quintile. Our methodology then may have resulted in two of the 0-19 year old males from that CD who entered hospital were from the second EFI quintile and that the remaining two were from the fifth EFI quintile. In practice, there may be systematic links between health status, hospital admission and family income that cannot be captured by this
methodology. Thus, it may be that all four of the 0-19 year old males were from the second EFI quintile and that none were from the fifth EFI quintile. Despite this limitation, the modelling is able to capture more detail than the SEIFA index under which, for example, all four of the 0-19 year old males would be placed in the same SEIFA quintile, despite the differences in their family income.

The following hypothetical example demonstrates the application of this approach:

**1996 Census Data Extract:**

<table>
<thead>
<tr>
<th>CD</th>
<th>Sex</th>
<th>Age</th>
<th>EFI Quintile</th>
<th>Number of People</th>
<th>Probability^</th>
<th>Cumulative Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1251405</td>
<td>Male</td>
<td>0-19</td>
<td>1</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>1251405</td>
<td>Male</td>
<td>0-19</td>
<td>2</td>
<td>10</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>1251405</td>
<td>Male</td>
<td>0-19</td>
<td>3</td>
<td>0</td>
<td>0.0</td>
<td>0.5</td>
</tr>
<tr>
<td>1251405</td>
<td>Male</td>
<td>0-19</td>
<td>4</td>
<td>0</td>
<td>0.0</td>
<td>0.5</td>
</tr>
<tr>
<td>1251405</td>
<td>Male</td>
<td>0-19</td>
<td>5</td>
<td>10</td>
<td>0.5</td>
<td>1.0</td>
</tr>
</tbody>
</table>

^ Where ‘Probability’ refers to the proportion of people in that CD-sex-age-EFI quintile cell.

**NSW Health Hospitals Data:**

<table>
<thead>
<tr>
<th>CD</th>
<th>Person ID</th>
<th>Sex</th>
<th>Age</th>
<th>z#</th>
<th>EFI Quintile Assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>1251405</td>
<td>356897</td>
<td>Male</td>
<td>0-19</td>
<td>0.4986</td>
<td>2</td>
</tr>
<tr>
<td>1251405</td>
<td>56897</td>
<td>Male</td>
<td>0-19</td>
<td>0.5877</td>
<td>5</td>
</tr>
<tr>
<td>1251405</td>
<td>219873</td>
<td>Male</td>
<td>0-19</td>
<td>0.8242</td>
<td>5</td>
</tr>
<tr>
<td>1251405</td>
<td>1856421</td>
<td>Male</td>
<td>0-19</td>
<td>0.2654</td>
<td>2</td>
</tr>
</tbody>
</table>

# Where \( z \sim \text{U}[0,1] \).

### 3.3 SEIFA versus equivalent family income

We hoped that more accurate estimates of the extent of health inequalities across socioeconomic groupings could be obtained if information on income at the level of the family could be used - rather than an index based on patients' geographic area of residence. In the literature family income was found to be a good single proxy for socioeconomic disadvantage (Walker and Abello, 2000, Section 2.4).
The advantages of income-based indicators are that they can be applied to individuals, while the SEIFA applies to all people residing in a particular geographical area. Thus households in a particular area – in our case a Collection District – will all have the same SEIFA quintile attached to them, even though families from a range of income quintiles may reside within there. Also, since a ‘per person’ indicator cannot be obtained from the SEIFA index, it is not possible to distinguish between large and small families with the SEIFA. For example, a two person couple family with an annual income of $50,000 a year residing in a particular area will have the same SEIFA quintile as a couple with three dependent children, living in the same area on the same income. By comparison, with an income index it is common practice to use the ‘equivalent family income’ measure - which can be thought of as being a ‘needs adjusted’ indicator of family income.

A priori, one would hope that equivalent income might be a more appropriate and precise indicator of socioeconomic status than the geographically based SEIFA index. This is because family income reflects the purchasing power of the particular family being studied, and not just the collective wealth of the geographic area in which that family happens to reside.

However, one disadvantage of the income-based indicator is that it takes no account of assets. In a life cycle context many people start out by being ‘cash poor and asset poor’, then progress to a ‘cash rich - asset poor’ status, ending their lives as being ‘cash poor and asset rich’. This means that the income measure will tend to class older Australians into the lower socioeconomic status groups which, for a significant proportion, may not be consistent with their true socioeconomic status (in terms of larger houses, expensive cars, overseas holidays, etc). By comparison the SEIFA index has the advantage of taking some account of - albeit indirectly - characteristics that tend to be stable over the life cycle (such as education). In addition, it is also possible to debate whether income by itself provides a satisfactory index of socioeconomic status.

**Comparison of the two indexes**

Interestingly, and importantly for any analysis of the distributional impact of hospital spending, the SEIFA index and the EFI index are very differently distributed across the NSW population by age as shown in Figure 1. Taking the EFI quintiles and the youngest 0-19 year old group first, the results show that about half of all 0-19 year olds live in families with incomes in the bottom two quintiles, while only 13 per cent live in families whose incomes place them in the highest income quintile. Not surprisingly, the picture is very different for individuals in their prime working years, with almost one-third of all 20-39 year olds living in families whose incomes place them in the highest income quintile, and only 16 per cent being placed in the
bottom income quintile. The pattern changes again with retirement, with those aged 60 or more being more likely to live in families whose equivalent income puts them in the bottom two income quintiles. For example, about two-thirds of those aged 70 years and over are in the bottom two income quintiles. Thus, even though we are using an equivalent income measure that takes account of the number of mouths each family has to feed, older NSW residents tend to cluster in the lower income quintiles. As noted at the beginning of Section 3.3, the cash poor but asset rich status of older Australians may provide some explanation for this pattern.

Figure 1: NSW population numbers by age and EFI or SEIFA quintiles
The profile for the SEIFA quintiles is remarkably different. As expected (first part of Section 3), the SEIFA quintiles produce a profile of much greater equality within each age group than do the EFI quintiles. For example, looking again at 0-19 year olds, almost exactly one-fifth are in each SEIFA quintile whereas, when using the EFI quintiles, they were more likely to be found in the lower income quintiles. Similarly, for the 70 years and over age group, 23 per cent are in the SEIFA bottom quintile, whereas 32 per cent where in the EFI bottom quintile. Overall, we found that use of the SEIFA index flattens the profile of inequality not only within different age groups but also geographic areas.

In Figure 2 we compare the apparent degree of inequality indicated by the SEIFA and the EFI indexes across the 1998-99 NSW hospital patient base. We operate on exactly the same dataset, but compare the inequality patterns produced by the two different indicators of socioeconomic status.

Use of the geographically-based SEIFA index once again resulted in a ‘flattening’ of the inequality gradient compared with the individual/family based EFI indicator (top panel in Figure 2). With the SEIFA index, 18 per cent of the NSW hospital population was allocated to the least disadvantaged group (quintile 5) and 21 per cent to the most disadvantaged group (quintile 1) – a difference of 3 percentage points in the proportions across these two extreme quintiles. By comparison, the corresponding figures for the EFI index were 18 and 22 per cent – a difference of 4 percentage points in the proportions across these two extreme quintiles. These findings are in line with earlier research, where a similar pattern was found using the ABS 1998 Disability Survey as the common population base (Walker 2002).

Furthermore, classifying patients’ socioeconomic status with the SEIFA index suggests that only 42 per cent of patients are from the two most disadvantaged quintiles, whereas the EFI indicator identifies 44 per cent of patients as belonging to these income groups. This represents a difference in the user population of two per cent.

The top panel in Figure 2 is the profile of hospital usage for all hospitals in NSW, both public and private. The bottom panel in Figure 2 compares the EFI and SEIFA profiles for public hospital patients only. Interestingly, there is much greater dispersion in the usage patterns between the EFI and SEIFA quintiles for public hospital usage only than for hospital usage overall. For reasons that we have not yet fully investigated, the top 20 per cent of individuals ranked by SEIFA are very much less likely to use public hospitals than the top 20 per cent of individuals ranked by equivalent family income. Given that there was much less difference between the usage patterns for both public and private hospital users, this suggests that the top 20 per cent of individuals ranked by SEIFA are somewhat less likely to use hospitals — but much more likely to enter private hospitals when they do use hospitals.
These observations are consistent with the hypotheses that more advantaged groups have lower needs for hospital services and further that more advantaged groups tend to have a greater take up of private health insurance and consequently tend to use private hospitals when they need care. Furthermore the supply of private hospitals tends to closely reflect these socioeconomic effects.

For the remainder of this paper, we have concentrated on the EFI as a measure of socioeconomic status and confined the analysis to public hospitals only. This is in part because below we examine the distribution of costs to government by income quintile. Because only a small proportion of private hospital costs are borne by government (with the rest being borne primarily by patients or private health
insurance), leaving private hospitals in the analysis would have muddied the distributinal waters.

4 Hospitalisation rates and government costs

4.1 Hospitalisation counts and rates

The total number of hospital users by age and EFI quintile is shown in Figure 3. A steep negative inequality gradient is revealed for both the very young and the old, with those in the two lowest income quintiles representing a much higher proportion of public hospital users than those in the higher income quintiles within these age groups. However, similar to the pattern for the total population (Figure 1), the inequality gradient becomes positive for those between 20 and 59 years of age, with individuals whose family incomes are in the top quintile making up a greater slice of the public hospital user population.

Figure 3: Estimated NSW public hospital users by age group and EFI quintile, 1998-99

Figure 3 can, however, provide a misleading impression of the distributional impact of hospital funding, as it takes no account of the number of people within each age and quintile grouping within the NSW population. Thus, for example, one reason why so many 20-39 year olds using NSW public hospitals are in the top NSW income quintile is because more 20-39 year olds in NSW live in families in the highest income quintile than in any of the remaining four income quintiles, simply because
so many of this age group are in their peak working years and without children. To better understand the likelihood of hospitalisation within each age group and the associated socioeconomic profile, the proportion of the population within each age-sex EFI quintile that had been admitted to a NSW public hospital at least once in 1998-99 is shown in Figure 4. These proportions indicate the extent to which the various groups were at risk of hospitalisation that year.

As expected, Figure 4 confirms that after age 60 the rate of hospitalisation increases rapidly. Also, as expected, there is a significantly higher rate of hospitalisation among 20-39 year old females than among 20-39 year old males. This is due to women having babies in hospital.

**Figure 4: Estimated proportion of NSW population using public hospitals by sex, age group and EFI quintile, 1998-99**
From a distributional perspective, the risk of using hospitals varies systematically with income. With the exception of the 70 years and over age group, for every age group shown in Figure 4 individuals in the two lowest income quintiles face a greater risk of using public hospitals than those in the higher income quintiles. For example, for males aged 0-19 years living in families whose incomes placed them in the lowest quintile, about 13 out of every 100 entered NSW public hospitals in 1998-99, compared with only 10 out of every 100 males of the same age living in the most affluent equivalent family income quintile. This means that such males from the lowest income quintile were about one-third more likely to use public hospitals in 1998-99 than comparable males from the top income quintile.

These statistics cannot be directly used to conclude that those from lower income families are sicker than those from higher income families, as we have only looked here at entry to public hospitals and, particularly for those on higher incomes, a substantial proportion might use private rather than public hospitals.

Similar patterns are found for the other age groups (refer to Figure 4 and Table C.1 in Appendix C). For example, for 40-59 year old women, the hospital usage rate for those in the bottom quintile was about one-fifth higher than for those in the top quintile. The comparable gap for 60-69 year old females was about 17 per cent. However, the usage profile was remarkably different for those aged 70 and over and in the top income quintile. For both men and women, those in the top income quintile and aged 70 or over were more likely to enter public hospitals than those of the same age but in the remaining lower income quintiles. In other words, better off older Australians were more likely to use public hospitals than their less well off peers.\footnote{We checked that this was not due to too small numbers in the cells. We found that in each cell there were at least 6000 male patients, and at least 10,000 female patients.}

\section*{4.2 Costs to government}

Figure 5 shows that, across all socioeconomic status quintiles, a higher proportion of total NSW hospital expenditures accrued to females than to males. The Figure also shows that patients in the two lower quintiles benefited considerably more from such expenditures than quintile 5 patients ($360 million to men and $460 million to women in quintile 1, compared with $240 million and $222 million respectively for quintile 5 patients). This pattern is similar to that reported by Schofield (2000). More
detailed results on total government expenditure by age, sex and socioeconomic status are provided in Table C.2.

**Figure 5: Estimated total government expenditure for public hospital services by EFI quintile and sex, 1998-99**

The differences in total government expenditure between males and females could have occurred as a result of more women being hospitalised, women generally living longer than men, or a higher per person hospital cost, on average, for women. To disentangle this issue, Figure 6 presents hospital expenditures per patient by sex. Figure 6, while still maintaining a relatively steady gradient across income quintiles, now indicates a considerably higher average cost of hospitalisation for men than for women. For example, in EFI quintile one, females have an average hospital cost of $4,413 whereas for males it is only $4,719 representing a difference of $306 in average cost per patient. Comparable results disaggregated by age are reported in Appendix C (Table C.3).

While the results in Figures 5 and 6 by sex are interesting – and they were also only possible because the NSW hospitals data had been arranged on a patient basis – probably the most striking finding from these charts is that the more disadvantaged a patient, the higher the hospital cost to government. For example, for females in the bottom income quintile, the average cost to government of public hospital usage is $4,413. In contrast, for females in the highest income quintile, the average cost to government is $3,402. That is, females in the lowest income quintile on average cost 30 per cent more than females in the highest income quintile.
The results in Figure 6 still do not tell us the entire story, as the results are not age-standardised and, as shown earlier, those in older age groups tend to cost more. This is partially examined in Figure 7, which plots total government expenditure by age and quintile. Figure 7 indicates that age is a much more important explanatory factor of government expenditures on hospitals than socioeconomic status. As in some of our earlier analysis, the total amount of government funds expended on public hospital services is skewed towards lower income groups for the young and the old, but towards higher income groups for those of workforce age. This is particularly true for patients over 70 years of age, where the lower two quintiles account for two-thirds of total government expenditure for that age group. This contrasts with the lower two quintiles in the 20-39 and 40-59 age groups which both account for less than a third of government expenditure within their age group.

As noted earlier, higher shares of total spending may be the product of high utilisation rates or high spending per patient — or both. Figure 8 examines estimated spending on each public hospital patient by EFI quintile and age — and suggests that once age is accounted for there is remarkably little variation in per patient spending by quintile (the underlying figures are presented in Table C.3). For example, looking just at 20-39 year olds, average per patient spending varies from a low of $2782 for the third quintile to a high of $2887 for the top quintile. An interesting finding is that, when comparing Figures 4 and 8, while the less well off are more likely to go to hospital, the average per patient government expenditure is virtually unchanged with socioeconomic status.
4.3 Per capita outlays

As noted earlier, the total government expenditures pattern shown in Figure 7 may give a misleading picture of the progressivity of government outlays, because it does not capture, for example, the fact that the aged tend to be concentrated in lower...
income groups (and vice versa for those of working age). As an initial step in this direction, Figure 9 traces the per capita government expenditure for two different measures. The first is per capita spending on public hospitals only by EFI quintile. The results suggest that public hospital spending is clearly progressive (pro-poor), with per capita government expenditure on public hospitals declining from $680 for quintile one and $687 for quintile two to only $382 for quintile five (see Table C.4).

Figure 9: Per capita government expenditure on public hospitals by EFI or SEIFA quintile

![Graph showing per capita government expenditure on public hospitals by EFI or SEIFA quintile.]

Given that much previous research has used the ABS SEIFA indexes rather than the EFI quintiles, we have also presented in Figure 9 comparable results by SEIFA quintile. At first glance it appears that usage of the EFI quintiles suggests a slightly more pro-poor distribution of public hospital outlays than does the SEIFA quintiles. For example, using the EFI measure of socioeconomic status 50.6 per cent of total outlays are directed towards the two lowest quintiles, in comparison to 48.9 per cent of total outlays for the two lowest SEIFA quintiles. Similarly, while 16.0 per cent of total outlays are directed towards the top EFI quintile, 18.6 per cent of total outlays are directed towards the top SEIFA quintile.

How do these results compare with those of earlier studies? Previous studies have been for all of Australia rather than just NSW. Schofield found that expenditure on the bottom income quintile was five times greater than that of the top income quintile, while the ABS found that expenditure on the bottom quintile was about 2.7 times greater than that of the top quintile (Schofield, 1998, p. 22). Clearly, both of

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8 EFI is the measure that we have been concentrating on in the immediately preceding sections.
these studies suggest much greater progressivity in public hospital outlays than found here. However, we believe that this is due to the use of gross income quintiles in the earlier studies, rather than equivalent gross income quintiles as in this study. Because most older Australians have low total incomes, they tend overwhelmingly to be ranked into the lowest gross income quintiles. Because of the strong link between public hospital usage and age shown earlier, this results in large quantities of public hospital spending being directed towards the lower income quintiles. To some extent, however, while older Australians have lower incomes, they also typically have fewer people to support on that income. Using equivalent income, which takes fuller account of the relative needs of different types of households, results in older Australians being less concentrated in the two lower income quintiles. Accordingly, the distribution of public hospital expenditure is also then less concentrated on lower income deciles.

Figure 10 presents our final results on per capita government expenditure on public hospitals, after controlling for differences in size of each age and quintile grouping among the total NSW population. For ages under 70 years, there is a clear pattern of greater expenditure among the lower income quintiles of any given age group. Taking 20-39 year olds as an example, average government public hospital expenditure is $356 for every 20-39 year old in the lowest family income quintile, with this average amount declining smoothly to settle at only $273 for every 20-39 year old in the highest family income quintile. Thus, on average, government is spending 30 per cent more per person for 20-39 year olds in the lowest income quintile relative to the highest income quintile.

**Figure 10: Per capita government expenditure by EFI quintile and age**
This general pattern is true for all of the age ranges except for individuals aged 70 or more. In this age group there is a striking reversal of the pattern for the highest income quintile, with per capita spending on 70 years and older in the highest income quintile spiking to $2338 per person. This compares with only $1901 for those 70 years of age and older in quintile 4. Further examination showed that the pattern of higher expenditure was slightly more pronounced for women than for men. Full results are reported in Appendix C Table C.5.

Figure 10 also confirms again that higher hospital expenditures accrue to older people, even after taking full account of their representation in the total population of NSW and their quintile. That is, for this segment of the population, there is a higher propensity to require hospitalisation allied with hospital services that are on average of a higher cost.

4.4 Socioeconomic status and geographic region

All of the previous results have drawn upon the new database created with NSW Health but have not exploited the spatial capacity of the data. There is insufficient space here to fully explore many of these issues but, as a first step, Figure 11 presents results for per patient government public hospital expenditure, with patients allocated to one of three geographic categories.

Figure 11: Estimated per patient government expenditure for public hospital services by EFI quintile and broad geographic region, 1998-99
A general caveat to be observed in relation to these analyses is that some patterns may be due to variations across regions in the quality of the probabilistic linkage of records. The probabilistic linkage process is much more accurate for separations occurring within the same hospitals than for separations occurring at different hospitals. Rural settings are characterised by much larger numbers of hospitals, and a commensurate increase in the likelihood that a patient may be treated at more than one hospital. This will tend to inflate the estimated number of persons using hospital in rural regions, but deflate the estimate of the level of use per patient.

Figure 11 shows that per patient government expenditures on public hospitals are significantly higher for patients living in major urban areas ($4,396) than for patients in other areas of the state. People living in rural areas were found to have the lowest hospital expenditures on a per patient basis, at $3782, while those in other urban areas were placed in the middle, with per patient expenditures of $4004. Interestingly, this per patient measure shows average cost per patient once a patient actually enters hospital, so it does not directly capture possible lower utilisation rates for those living in rural areas. The reasons why rural patients receive a lower per patient expenditure than those living in urban areas requires further investigation. A possible explanation to be explored are the considerations outlined above related to the impact of the quality of linkage of records.

Equally striking is that, while Figure 8 suggested that within particular age groups there was relatively little variation between per patient expenditure by income quintile, Figure 11 generally traces a strong relationship between average per patient expenditure by broad geographic region and quintile. For example, for residents of major urban areas, per patient expenditure on those in the lowest income quintile is 25 per cent higher than for those in the highest income quintile ($4837 and $3863 respectively). Yet this pattern changes for rural residents, with the per patient expenditure for those in the highest income quintile being as high as for those in the two lower income quintiles. Full results can be found in Table C.6.

5 Detailed Spatial Perspective

The preceding analysis has generally been undertaken for NSW as a whole. However, because the new database is at a Collection District level, it is possible to undertake spatial analysis down to that level. In the following section we illustrate

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9 CDs were allocated a status of ‘Major Urban’, ‘Other Urban’ or ‘Rural’ based on the Section of State code in the ABS (1999)
just two of the potential applications of the NSW hospitals dataset at the Statistical Local Area (SLA) level.

Figure 12 looks at the percentage of private hospital users within the population of those who entered hospitals in NSW in 1998-99. The darker shaded areas pinpoint Statistical Local Areas where 52 to 80 per cent of the patient population were private hospital users. The darker shadings are concentrated in the more affluent areas of NSW – namely Sydney\(^{10}\) and a band along the eastern seaboard. In the more remote areas of NSW private hospital usage falls.

Figure 12: Percentage of private hospitals users in patient population, 1998-99 (SLA based)

Figure 13 plots average per capita government public hospital expenditure, for only those members of the NSW population aged 70 years and over (so that the results are not biased by variations in the proportion of older residents within each SLA). Interestingly, the results suggest that the highest per capita outlays do not occur in metropolitan Sydney. Instead, the higher per capita outlays on those aged 70 or

\(^{10}\) As indicated by a similar map we prepared for Sydney at SLA level.
more appear to occur nearer the larger non-metropolitan hospitals. Once again, the lowest per capita expenditures are for those in the remotest areas of NSW.

Figure 13: Average government public hospital expenditure per capita for those aged 70 years and over, 1998-99 (SLA based)

6 Conclusions

This paper utilised a new database established by combining NSW Health administrative data with 1996 Census data. The database has been used to explore a range of issues associated with hospital utilisation, costs, and redistributive impact. The major results were that:

- a unique measure of socioeconomic status (equivalent family income quintiles) was developed and used to analyse various distributional effects of hospital services utilised. A comparison of this new measure to a geographically based ABS SEIFA revealed that the more traditional SEIFA measure of socioeconomic status flattened the inequality gradient across the hospital user population.
• hospital utilisation rates were higher in childhood than during the peak working years, subsequently rising sharply again in old age (Figure 4);
• for most age groups, individuals from lower income families were more likely to use hospitals than those from higher income families. The main exception to this was for those aged 70 years and over, where those from the most affluent quintile were more likely than other quintiles to use public hospitals (Figure 4);
• once in public hospitals, average costs per patient rose consistently with age. However, there was relatively little variation by quintile within each age group with, for example, the average per patient costs for those in the bottom quintile being much the same as for those in the top quintile within each particular age group (Figure 8);
• the per capita results (which captured the impact of different utilisation rates, different per patient costs once in hospital, and the relative size of each age and quintile grouping within the population) suggested that, within each age group, public hospital outlays were pro-poor in impact - with those from lower income quintiles generally receiving higher per capita hospital outlays than those from higher income quintiles (Figure 10). The only exception to this was again for those aged 70 or more, where the highest income quintile received higher per capita payments than any of the other income quintiles;
• patients from urban areas had a consistently higher per patient cost of treatment once in hospital than those from rural areas (Figure 11); and
• this and the results in Section 5 suggested that there will be major spatial variations in hospital utilisation, costs, and treatment patterns, but we have only begun to tap the many potential possibilities for analysis that the new database offers.

With respect to these last two points, caution is required in reaching these conclusions given the general caveat mentioned above regarding the potential for the variable accuracy of probabilistic linkage across regions.

These results thus confirm again that public hospital expenditure plays an important redistributive role in our society, as also found in earlier research (Schofield, 1998, Harding, 1995, Harding et al, 2000, Johnson et al, 1995, ABS 2002). The provision of free public hospital services, financed from taxation, is a powerful force for redistribution from affluent to less affluent Australians, both at a particular time and across the lifecycle of individuals.
Appendixes

A Specification of the ABS 1996 Census Extract

A.1 Overview

A data extract from the 1996 Census was obtained from the Australian Bureau of Statistics that provided details on the number of people in each CD by Sex, Age and Equivalent Family Income Quintile. The extract was for NSW only.

A.2 Variable Definition

CD refers to Census Collection Districts as defined for the 1996 Census. Only NSW CDs are included in the extract.

Sex is defined as either male or female.

Age is defined in ten year groups from 0-9 years old up to 60-69 years old and then all people aged 70 years and over included in one group.

Equivalent family income (EFI) was defined as the sum of family income divided by an equivalent scale factor (ESF) where:

- ‘Family’ is interpreted as income units (ie both ‘Family Households’ and ‘Non-Family Households’) - as defined in ABS, 1996 Census Dictionary, p.37 (Cat No 2901.0)

- Individual income for each family member is the median gross weekly income for the Census income ranges. This median value was estimated by the ABS from the individual income ranges reported in the ABS Survey of Income and Housing Costs taken around the time of the 1996 Census.

- Family income is computed as the sum of individual incomes for each member of the family.
ESF is the sum of factors for each family member computed using the OECD method whereby:

- the first adult in family is given a weight of 1;
- subsequent adults in the family are given a weight of 0.5; and
- dependent children are each given a weight of 0.3.\textsuperscript{11}

The equivalent family income so calculated is then assigned to each member of the same family.

A.3 Assigning Quintiles

Once the equivalent family income has been calculated every person is sorted in ascending order and assigned an equivalent family income quintile.

Note that while this procedure could possibly lead to members of the same family being allocated across two quintiles, the maximum number of families affected would be four (on a population base of over six million people). The alternative of allocating EFI quintiles based on a sort of families (rather than individuals) would have led to unequal sub-populations in each quintile. This is because the EFI is in part based on the composition of the family so while the number of families in each quintile would be even, the number of people they represent would not.

A.4 Final Cell Count

The basic level of spatial disaggregation is at the CD level. Therefore, the maximum number of sex-age-EFI quintiles per CD (the maximum cell count per CD) is 80 i.e:

\[
\text{Sex by Age by EFI Quintile} = 2 \times 8 \times 5 = 80 \text{ cells per CD}
\]

A.5 Description of the Index of Relative Socioeconomic Disadvantage (SEIFA)

The Index of Relative Socioeconomic Disadvantage covers all areas in Australia and the variables underlying the index are indicators of relative socioeconomic well-being (e.g., high income, tertiary education, skilled occupations) and are derived from attributes such as low income, low educational attainment, high unemployment and jobs in relatively unskilled occupations (for further details see ABS 1998a).

The higher an area's index value for the Index of Relative Disadvantage, the less disadvantaged that area is compared with other areas. High scores on the Index of Relative Disadvantage occur when the area has few families of low income and few people with little training and in unskilled occupations. Low scores on the index occur when the area has many low income families and people with little training and in unskilled occupations.
B Cleansing the 1998-99 NSW Hospitals Dataset and Adding a Socioeconomic Window

The source data source used to construct the dataset used for this study was a database of 1,916,765 records representing individual separations from a medical facility in New South Wales in 1998-99. The number of individual patients recorded in the dataset is 1,161,504 (28 per cent of patients had more than one separation). This data source contained 71 variables drawn from the NSW Health Inpatient Statistics Collection and information on the cost of services provided for each separation. An overview of the dataset is provided in Section 2.1.

The dataset was first examined to identify the frequency and range of responses for each of the variables in the dataset. This analysis enabled an initial assessment of the validity of each of the variables, the quality of data completion and the extent of outlier separations across the state.

While the overall quality of the data was high there were nevertheless a number of records for which key variables had missing values or where erroneous values had been recorded. To cleanse the dataset two processes were undertaken. First, where possible missing variables were imputed based on other known values. Second, certain records were deleted so as not to form part of the ongoing analysis or foundation of future modelling.

While individual patients cannot be identified, there is a unique identifier attached to each record. For some missing variables the value could therefore be imputed based on other separations from a medical facility by the same person in the dataset. The dataset was therefore sorted by patient ID and the first instance of the variable was assigned to any subsequent records for the same patient where the variable was missing. This procedure was applied to the following variables: marital status, Area Health Service of usual residence, sex, whether born overseas, whether English is usually spoken at home and Census Collection District (CD).

A number of records were also coded with either an invalid or unknown CD or Statistical Local Area (SLA). These records were first amended based on the process outlined above whereby valid values for the same patient where imputed if they had more than one separation in the year. Records still not having a valid CD or SLA were then assigned the CD or SLA of the medical facility in which they were treated.

Following this imputation process certain records were removed from the dataset. First any separations relating to nursing homes or mothercraft were removed based on advice from NSW Health. While it is possible that some separations remaining in
the dataset relate to nursing home or mothercraft type services, there is no other way to definitively identify them in the dataset.

Finally, all patients that were coded as living either interstate or from overseas were removed from the dataset. This was to keep the focus of analysis on NSW residents only.

This process reduced the number of separations to 1,895,798 and the number of patients to 1,134,193.

Two socioeconomic status variables were then merged onto the dataset. The first was the 1996 Census SEIFA Index of Relative Socioeconomic Disadvantage that was merged by CD. The second was the EFI quintile obtained from the 1996 Census data extract as described in Section 3.2.
C Detailed Results of Selected Cross Tabulations

Table C.1: Estimated proportion of NSW population using hospitals by age group, sex and EFI quintile

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<th>Quintile</th>
<th>All quintiles</th>
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<tbody>
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<tr>
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<td><strong>All ages</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–19 years</td>
<td>126,237</td>
<td>111,352</td>
</tr>
<tr>
<td>20–39 years</td>
<td>103,379</td>
<td>99,024</td>
</tr>
<tr>
<td>40–59 years</td>
<td>100,964</td>
<td>104,485</td>
</tr>
<tr>
<td>60-69 years</td>
<td>119,661</td>
<td>144,715</td>
</tr>
<tr>
<td>70 and over</td>
<td>373,312</td>
<td>370,173</td>
</tr>
<tr>
<td>All</td>
<td>823,553</td>
<td>829,750</td>
</tr>
</tbody>
</table>
Table C.3: Per patient government public hospital expenditure on public hospitals by age group sex and socioeconomic status (EFI)

<table>
<thead>
<tr>
<th>Quintile</th>
<th>Low income group</th>
<th>All quintiles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

### Males

#### 0–19 years
- $2,516
- $2,522
- $2,613
- $2,558
- $2,611
- $2,519
- $2,556

#### 20–39 years
- $3,563
- $3,384
- $3,335
- $3,297
- $3,510
- $3,469
- $3,411

#### 40–59 years
- $4,690
- $4,474
- $4,457
- $4,485
- $4,679
- $4,578
- $4,559

#### 60-69 years
- $6,352
- $6,177
- $6,474
- $6,348
- $6,305
- $6,252
- $6,316

#### 70 and over
- $7,716
- $7,552
- $7,585
- $7,777
- $7,675
- $7,622
- $7,635

#### All
- $4,719
- $4,955
- $4,438
- $4,175
- $4,322
- $4,843
- $4,558

### Females

#### 0–19 years
- $2,463
- $2,465
- $2,499
- $2,547
- $2,603
- $2,464
- $2,501

#### 20–39 years
- $2,627
- $2,567
- $2,516
- $2,572
- $2,549
- $2,598
- $2,566

#### 40–59 years
- $3,742
- $3,768
- $3,644
- $3,646
- $3,768
- $3,755
- $3,712

#### 60-69 years
- $5,527
- $5,380
- $5,733
- $5,606
- $5,664
- $5,448
- $5,537

#### 70 and over
- $7,259
- $7,032
- $7,330
- $7,474
- $7,450
- $7,157
- $7,233

#### All
- $4,413
- $4,256
- $3,774
- $3,536
- $3,402
- $4,337
- $3,945

### All ages

#### 0–19 years
- $2,492
- $2,496
- $2,560
- $2,553
- $2,607
- $2,493
- $2,531

#### 20–39 years
- $2,872
- $2,806
- $2,782
- $2,816
- $2,887
- $2,839
- $2,833

#### 40–59 years
- $4,164
- $4,087
- $4,032
- $4,058
- $4,239
- $4,124
- $4,118

#### 60-69 years
- $5,923
- $5,786
- $6,140
- $6,037
- $6,064
- $5,847
- $5,950

#### 70 and over
- $7,427
- $7,285
- $7,451
- $7,608
- $7,559
- $7,356
- $7,410

#### All
- $4,540
- $4,577
- $4,079
- $3,826
- $3,825
- $4,559
- $4,219
Table C.4: **Per capita government public hospital expenditure by socioeconomic status (EFI or SEIFA)**

<table>
<thead>
<tr>
<th>Quintile</th>
<th>All quintiles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$</td>
</tr>
<tr>
<td>2</td>
<td>$</td>
</tr>
<tr>
<td>3</td>
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</tr>
<tr>
<td>4</td>
<td>$</td>
</tr>
<tr>
<td>5</td>
<td>$</td>
</tr>
</tbody>
</table>

EFI

| 680 | 687 | 517 | 433 | 382 | 540 |

SEIFA

| 688 | 630 | 540 | 507 | 363 | 540 |

Table C.5: **Per capita government public hospital expenditure by age group, sex and socioeconomic status (EFI)**

<table>
<thead>
<tr>
<th>Quintile</th>
<th>All quintiles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$</td>
</tr>
<tr>
<td>2</td>
<td>$</td>
</tr>
<tr>
<td>3</td>
<td>$</td>
</tr>
<tr>
<td>4</td>
<td>$</td>
</tr>
<tr>
<td>5</td>
<td>$</td>
</tr>
</tbody>
</table>

**Males**

<table>
<thead>
<tr>
<th>Age group</th>
<th>EFI</th>
<th>SEIFA</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–19 years</td>
<td>323</td>
<td>282</td>
</tr>
<tr>
<td>20–39 years</td>
<td>267</td>
<td>424</td>
</tr>
<tr>
<td>40–59 years</td>
<td>497</td>
<td>443</td>
</tr>
<tr>
<td>60-69 years</td>
<td>1,198</td>
<td>877</td>
</tr>
<tr>
<td>70 and over</td>
<td>2,499</td>
<td>2,041</td>
</tr>
<tr>
<td>All</td>
<td>651</td>
<td>705</td>
</tr>
</tbody>
</table>

**Females**

<table>
<thead>
<tr>
<th>Age group</th>
<th>EFI</th>
<th>SEIFA</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–19 years</td>
<td>315</td>
<td>278</td>
</tr>
<tr>
<td>20–39 years</td>
<td>264</td>
<td>424</td>
</tr>
<tr>
<td>40–59 years</td>
<td>417</td>
<td>434</td>
</tr>
<tr>
<td>60-69 years</td>
<td>1,118</td>
<td>840</td>
</tr>
<tr>
<td>70 and over</td>
<td>2,386</td>
<td>1,997</td>
</tr>
<tr>
<td>All</td>
<td>711</td>
<td>666</td>
</tr>
</tbody>
</table>

**All ages**

<table>
<thead>
<tr>
<th>Age group</th>
<th>EFI</th>
<th>SEIFA</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–19 years</td>
<td>297</td>
<td>265</td>
</tr>
<tr>
<td>20–39 years</td>
<td>349</td>
<td>333</td>
</tr>
<tr>
<td>40–59 years</td>
<td>418</td>
<td>334</td>
</tr>
<tr>
<td>60-69 years</td>
<td>992</td>
<td>834</td>
</tr>
<tr>
<td>70 and over</td>
<td>2,176</td>
<td>2,018</td>
</tr>
<tr>
<td>All</td>
<td>687</td>
<td>705</td>
</tr>
</tbody>
</table>
## Table C.6: Per patient government public hospital expenditure by age group, socioeconomic status (EFI) and geographic location

<table>
<thead>
<tr>
<th>Quadrile</th>
<th>Quintile 1</th>
<th>Quintile 2</th>
<th>Quintile 3</th>
<th>Quintile 4</th>
<th>Quintile 5</th>
<th>Low income group (1 &amp; 2)</th>
<th>All quintiles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Major urban</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–19 years</td>
<td>2,465</td>
<td>2,553</td>
<td>2,616</td>
<td>2,584</td>
<td>2,674</td>
<td>2,505</td>
<td>2,566</td>
</tr>
<tr>
<td>20–39 years</td>
<td>2,987</td>
<td>2,959</td>
<td>2,855</td>
<td>2,906</td>
<td>2,941</td>
<td>2,974</td>
<td>2,927</td>
</tr>
<tr>
<td>40–59 years</td>
<td>4,476</td>
<td>4,452</td>
<td>4,252</td>
<td>4,333</td>
<td>4,429</td>
<td>4,465</td>
<td>4,382</td>
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<tr>
<td>60-69 years</td>
<td>6,304</td>
<td>6,254</td>
<td>6,671</td>
<td>6,443</td>
<td>6,539</td>
<td>6,279</td>
<td>6,409</td>
</tr>
<tr>
<td>70 and over</td>
<td>7,707</td>
<td>7,668</td>
<td>7,775</td>
<td>7,828</td>
<td>7,881</td>
<td>7,689</td>
<td>7,731</td>
</tr>
<tr>
<td>All</td>
<td>4,837</td>
<td>4,865</td>
<td>4,282</td>
<td>3,974</td>
<td>3,863</td>
<td>4,850</td>
<td>4,396</td>
</tr>
<tr>
<td><strong>Other urban</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–19 years</td>
<td>2,523</td>
<td>2,498</td>
<td>2,466</td>
<td>2,461</td>
<td>2,360</td>
<td>2,510</td>
<td>2,483</td>
</tr>
<tr>
<td>20–39 years</td>
<td>2,750</td>
<td>2,656</td>
<td>2,662</td>
<td>2,624</td>
<td>2,739</td>
<td>2,700</td>
<td>2,681</td>
</tr>
<tr>
<td>40–59 years</td>
<td>3,883</td>
<td>3,941</td>
<td>3,849</td>
<td>3,690</td>
<td>3,873</td>
<td>3,916</td>
<td>3,845</td>
</tr>
<tr>
<td>60-69 years</td>
<td>5,339</td>
<td>5,378</td>
<td>5,355</td>
<td>5,464</td>
<td>5,260</td>
<td>5,365</td>
<td>5,367</td>
</tr>
<tr>
<td>70 and over</td>
<td>6,791</td>
<td>6,775</td>
<td>6,899</td>
<td>7,179</td>
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<td>6,781</td>
<td>6,831</td>
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<tr>
<td>All</td>
<td>4,126</td>
<td>4,392</td>
<td>3,832</td>
<td>3,615</td>
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<td>4,275</td>
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<td><strong>Rural</strong></td>
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<td></td>
</tr>
<tr>
<td>0–19 years</td>
<td>2,544</td>
<td>2,303</td>
<td>2,463</td>
<td>2,517</td>
<td>2,492</td>
<td>2,427</td>
<td>2,452</td>
</tr>
<tr>
<td>20–39 years</td>
<td>2,615</td>
<td>2,568</td>
<td>2,668</td>
<td>2,628</td>
<td>2,646</td>
<td>2,590</td>
<td>2,623</td>
</tr>
<tr>
<td>40–59 years</td>
<td>3,543</td>
<td>3,385</td>
<td>3,467</td>
<td>3,370</td>
<td>3,739</td>
<td>3,460</td>
<td>3,499</td>
</tr>
<tr>
<td>60-69 years</td>
<td>5,013</td>
<td>5,200</td>
<td>5,174</td>
<td>4,838</td>
<td>5,225</td>
<td>5,123</td>
<td>5,113</td>
</tr>
<tr>
<td>70 and over</td>
<td>6,937</td>
<td>6,740</td>
<td>6,757</td>
<td>6,992</td>
<td>7,336</td>
<td>6,830</td>
<td>6,890</td>
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<tr>
<td>All</td>
<td>3,927</td>
<td>3,948</td>
<td>3,588</td>
<td>3,355</td>
<td>3,935</td>
<td>3,938</td>
<td>3,782</td>
</tr>
<tr>
<td><strong>All Ages</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–19 years</td>
<td>2,492</td>
<td>2,496</td>
<td>2,560</td>
<td>2,553</td>
<td>2,607</td>
<td>2,493</td>
<td>2,531</td>
</tr>
<tr>
<td>20–39 years</td>
<td>2,872</td>
<td>2,806</td>
<td>2,782</td>
<td>2,816</td>
<td>2,887</td>
<td>2,839</td>
<td>2,833</td>
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<tr>
<td>40–59 years</td>
<td>4,164</td>
<td>4,087</td>
<td>4,032</td>
<td>4,058</td>
<td>4,239</td>
<td>4,124</td>
<td>4,118</td>
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<td>60-69 years</td>
<td>5,923</td>
<td>5,786</td>
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<td>6,037</td>
<td>6,064</td>
<td>5,847</td>
<td>5,950</td>
</tr>
<tr>
<td>70 and over</td>
<td>7,427</td>
<td>7,285</td>
<td>7,451</td>
<td>7,608</td>
<td>7,559</td>
<td>7,356</td>
<td>7,410</td>
</tr>
<tr>
<td>All</td>
<td>4,540</td>
<td>4,577</td>
<td>4,079</td>
<td>3,826</td>
<td>3,825</td>
<td>4,559</td>
<td>4,219</td>
</tr>
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</table>
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