8 Statistical analysis

Introduction

Two sets of analyses have been undertaken to illustrate the extent of association between areas with low socioeconomic status and poor health. Correlation coefficients have been produced to indicate interdependence between the measures of socioeconomic status, health status and use of health services. Cluster analysis has been undertaken to indicate the extent to which areas display significantly similar characteristics from among the chosen measures of socioeconomic status, health status and use of health services.

Inequalities in health have traditionally been indicated by an approximation to social class, frequently based on a categorisation of occupations. The other major indicators traditionally used have included income, education, ethnicity and employment status (which allows for the inclusion of unemployed people and those not in the labour force). Measures of socioeconomic status included in this analysis include income, education, occupation, labour force status and Aboriginality.

Correlation analysis

Description

Correlation is the degree to which one variable is statistically associated with another. The correlation coefficient is a measure of the strength of this association. When high values for one variable are matched by high values for the other (or when low values are matched by low values), then they are positively correlated. Where the interdependence is inverse (ie. high values for one are matched by low values for the other), the two variables are negatively correlated.

Methods

The Pearson product-moment correlation (r) has been used in this analysis to indicate the degree of correlation between pairs of variables. Pearson correlation coefficients range from +1 (complete positive correlation) through 0 (complete lack of correlation) to –1 (complete negative correlation). As a general rule, correlations of plus or minus 0.5 or above are considered to be of meaningful statistical significance. Correlations of plus or minus 0.71 or above are of substantial statistical significance, because this higher value represents at least 50 per cent shared variation (r^2 greater than or equal to 0.5).

Correlation coefficients were calculated by comparing the value (expressed as a percentage, or as a standardised ratio) for each variable in each SLA with the value of each of the other variables. Correlation coefficients are generally referred to as being, for example, 'a correlation of low income families with the *paired* variable of hospital admissions of females'. However, to promote ease of reading where many correlation coefficients are quoted in the text, the word 'paired' has been omitted. For similar reasons the symbol used to indicate a correlation coefficient (r) has been omitted.

Two measures of socioeconomic status included in the analysis in this section have not been mapped. They are families receiving an income of $52,000 or more per annum and people in occupations classified as 'managers and administrators' and 'professionals'. These two measures were included as they indicate high socioeconomic status, in contrast to most other measures, which were chosen because they indicate low socioeconomic status.

The results of the correlation analysis, which was undertaken separately for **Hobart** (**Table 8.1**) and the rest of the State (**Tables 8.2** and **8.3**), are shown in the following tables: coefficients of from 0.5 to 0.7 and from 0.71 to 1 (both positive and negative) are highlighted in the tables, and are referred to in the individual map commentaries, as appropriate.

The different years for which the data is available, and changes in boundaries between those periods, have meant that there are two correlation matrices for the non-metropolitan areas of Tasmania. The first matrix for these areas (**Table 8.2**) comprises the 1996 Census data in Chapter 3, the income support data in Chapter 4, the health service use data from Chapter 6 and the population per GP data from Chapter 7. The second matrix (**Table 8.3**) comprises the re-calculated Census data and the health status data from Chapter 5.

When discussing the results of the correlation analysis in the text, mention is often made of 'the indicators of socioeconomic disadvantage'. This reference is to variables such as those for single parent families, the unemployed, the Indigenous population and housing authority rented dwellings. References to 'high socioeconomic status' reflect the variables for high income families, female labour force participation and managers and administrators, and professionals.

The associations discussed in the text are, in general, limited to associations between the variable under discussion and the indicators of socioeconomic status from Chapter 3. The extent of any association with the other variables analysed can be ascertained from an examination of the correlation matrices (**Tables 8.1**, **8.2** and **8.3**).

Results

Hobart

Caution should be exercised in using the results of this analysis, as there are only seven SLAs in **Hobart**, and a correlation would not normally be undertaken with such a small number of cases.

There were correlations of substantial significance at the SLA level in **Hobart** between the measures of socioeconomic disadvantage and the variables for people reporting their health as fair or poor (as opposed to those reporting their health as being excellent, very good, or good); the Physical Component Summary (PCS, a measure of physical health); and the handicap status of the population (**Table 8.1**).

There were also correlations of meaningful significance between some of the measures of socioeconomic disadvantage and the variables for premature deaths of males and females: these were the variables for low income families, unskilled and semi-skilled workers, early school leavers.

Similarly, strong associations were also evident in the correlation analysis with the health service use variables of admissions to hospital (total admissions and admissions to public acute hospitals), as well as admissions for lung cancer, circulatory system diseases, ischaemic heart disease, surgical procedures, hysterectomy.

Non-metropolitan areas

SLAs in the non-metropolitan areas range in size from an estimated 29 square kilometres in Meander Valley [Part A] to 9,547 in West Coast. They also range from sparsely populated rural and remote areas to large country towns. Despite these wide variations, the correlation analysis has been produced and the results presented in **Table 8.2** (correlations between the indicators of socioeconomic disadvantage and the majority of the health status variables) and **8.3** (correlations between the indicators of socioeconomic disadvantage, the health service utilisation variables and the health status variables of fair/poor health status and the Physical Component Summary). These separate analyses were necessary because the data for deaths and the Total Fertility Rate were coded to older (1991 to 1994) boundaries than was the other data.

It is clear from the matrix of correlation coefficients that there are fewer correlations of significance at the SLA level in the non-metropolitan areas of Tasmania than was the case in **Hobart**. This is, in part, a result of the number of areas with relatively small numbers of cases (population, deaths, hospital admissions, etc.) which reduces the strength of the analysis.

However a number of variables are highly correlated with each other: these are the variables for single parent families, low income families, unemployed people, dwellings rented from the State housing authority and dwellings without a vehicle.

Various sub-sets of these are correlated with measures of health status and use of health services. The strongest correlations with the measures of socioeconomic disadvantage were with the variables for people reporting their health as fair or poor, and the PCS. Although generally weaker, there was a consistent association between socioeconomic disadvantage and the variables for deaths of males; admissions of males; and admissions for circulatory system diseases; the external causes of accidents, poisonings and violence; and surgical procedures.

Table 8.1: Correlation matrix for SLAs in Hobart

Refer to file: ch8 correlation matrices

Table 8.1: Correlation matrix for SLAs in Hobart ...*cont*

Refer to file: ch8 correlation matrices

Table 8.2: Correlation matrix for selected variables for SLAs in non-metropolitan areas of Tasmania

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Table 8.3: Correlation matrix for selected variables for SLAs in non-metropolitan areas of Tasmania

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Table 8.3: Correlation matrix for selected variables for SLAs in non-metropolitan areas of Tasmania ...*cont*

Refer to file: ch8 correlation matrices

Cluster analysis

Description

The intention of the cluster analysis is to produce summary measures of socioeconomic status, health status and health service use at the SLA level. It is useful to have this information, as the SLA is an important administrative and planning unit. However, the production of clusters at this level is problematic, as SLAs are often large, heterogeneous areas, and their average values sometimes disguise a wide range of sub-area variation in the values of the population characteristics under analysis.

It should also be noted that cluster analysis is an exploratory technique and, as with all such techniques, the real test of a solution is whether it makes any sense. Decisions as to the variables to be used, or the number of clusters in a solution, all impact on the final result.

The results of the cluster analysis, therefore, represent indicative groupings of areas with broadly similar characteristics among the variables analysed in each set. They will be a useful tool for some purposes: on other occasions, however, the individual variables on which they are based may also be relevant.

Methods

Cluster analysis (using the squared Euclidean measure) was undertaken by the Ward's method. This (hierarchic) clustering method seeks to partition a set of objects (eg. postcodes or, in this case, SLAs) into a set of non-overlapping groups so as to maximise some external criterion of 'goodness of clustering', typically the extent to which the within-cluster inter-object similarities are maximised and the between-cluster similarities minimised.

In cluster analysis, 10 records (ie. SLAs) per variable is considered desirable, with an absolute minimum of five. Had all the datasets been used in the analysis there would have been many fewer than this. A variety of techniques was used to attempt to overcome this problem, including applying a factor analysis or undertaking an experimental fit of the full data set, and using the results to reduce the number of variables included in the final analysis.

Table 8.4 lists the variables used in the analysis. The analysis was undertaken separately for **Hobart** and the rest of the State. The datasets used in the cluster analysis (based on boundaries in existence from 1991 to 1997) were aggregated to a common set of boundaries (1996). Where the areas differ from the 1996 boundaries, the variations are noted in the text.

Table 8.4: Variables used in cluster analysis

Socioeconomic status
- % single parent families
- % low income families
- % unskilled or semi-skilled workers
- % unemployed
- % female labour force participation
- People who left school at age 15 or earlier, or who did not attend school (Standardised Ratio)
- % Aboriginal & Torres Strait Islander people
- % Housing authority rented dwellings
- % Dwellings without a motor vehicle

Health status
- ***Self-reported health status***
- ***Physical Component Summary score[SF-36]***
- ***Disability and handicap status*** (Standardised Ratio)
  - with a disability
  - with a handicap
- ***Deaths*** (Standardised Death Ratio)
- Infant deaths
- Deaths
  - of males aged 15-64 years, from all causes
  - of females aged 15-64 years, from all causes
  - of persons aged 15-64 years
    - from cancer
    - from circulatory system diseases
    - from respiratory system diseases
    - from accidents, poisonings & violence
  - of persons aged 15-24 years
    - from accidents, poisonings & violence
- Years of potential life lost as a result of deaths at ages 15-64 years
- ***Total Fertility Rate***

Utilisation of health services
- ***Hospital admissions*** (Standardised Admission Ratio)
  - to public acute hospitals
  - to private acute & private psychiatric hospitals
  - to public acute & private hospitals, admissions
    - total
    - of males
    - of females
    - for infectious diseases
    - for all cancers
    - for lung cancer
    - for breast cancer for women aged 40 years or more
    - for psychoses
    - for neuroses
    - for circulatory system diseases
    - for ischaemic heart disease
    - for respiratory system diseases
    - for respiratory system diseases in 0 to 4 year old children
    - for bronchitis, emphysema & asthma
    - from accidents, poisonings and violence
    - for all surgical procedures
    - for all surgical procedures as same day admission
    - for tonsillectomy and/or adenoidectomy
    - for myringotomy in children aged 0-9 years
    - for Caesarean sections in women aged 15-44 years
    - for hysterectomy in women aged 30 years and over
    - for hip replacements
    - for lens insertion in people aged 50 years or more
    - for endoscopy
- ***General medical practitioner services*** (Standardised Ratio)
  - for males
  - for females
- ***Children fully immunised at 12 months***

Results

Socioeconomic clusters in Hobart

Variables considered for inclusion were those listed in **Table 8.4** under the heading *Socioeconomic status*. The ABS Index of Relative Socio-Economic Disadvantage (IRSD) was also used in the analysis, as an independent check on the solution.

Although a number of other variables were available for analysis, previous experience (Glover 1996) has shown that the inclusion of variables regarding non-English speaking background is not beneficial to the analysis. The congregation of persons of the same ethnic group does not necessarily indicate a pocket of disadvantage. Although on average we may expect these variables to also show higher levels in disadvantaged areas, their inclusion in the cluster analyses does not assist in the search for viable and sensible solutions. The variables relating to people born in predominantly non-English speaking countries (and their proficiency in English) were accordingly dropped from the analysis.

There are only seven SLAs in **Hobart** (the SLAs of Hobart-Inner and -Remainder were analysed as one), too few records to carry out a cluster analysis. Therefore, after completion of the analysis for the non-metropolitan areas of Tasmania, the SLAs of **Hobart** were allocated to these clusters, using the quick cluster command in SPSS (the Statistical Package for the Social Sciences). This procedure allocates SLAs based on the minimum euclidean distance from each cluster centre. It therefore does not interfere with the formation of clusters in the rest of the state, but can be said to be on the same basis. It was felt that using this approach was warranted as it enabled the cluster analysis to be applied to the SLAs in **Hobart**.

In this case the analysis provided a three cluster solution (see **Table 8.5** and **Map 8.1**). The three clusters have been labelled as High (two SLAs), Medium (two SLAs) and Low (three SLAs) socioeconomic status clusters.

The three cluster solution is supported by a comparison with the ABS Index of Relative Socio-Economic Disadvantage (IRSD) which was also available for the specified SLAs, but was withheld from the analysis and used as an independent check on the solution. This comparison showed that, of the three SLAs with the lowest IRSD scores in **Hobart**, all were classified to the Low socioeconomic status group in this analysis; and that the two SLAs with the highest scores for the IRSD were classified to the High socioeconomic status group.

Table 8.5: Composition of SLA clusters in Hobart

SLA	Socioeconomic status	Health status	Health service utilisation	Social health[1]
Brighton (M)	Low	Poor	High	Low
Clarence (C)	Medium	Medium	Medium	Very high
Glenorchy (C)	Low	Poor	High	Low
Hobart (C)	High	Medium	Medium	High
Kingborough (M) Pt A	High	Good	Low	Very high
New Norfolk (M) Pt A	Low	Poor	Medium	Low
Sorell (M) Pt A	Medium	Poor	Medium	Medium

[1] **Social health 'clusters were produced by a joint analysis of the socioeconomic status and health status variable**

Health status clusters in Hobart

The data variables available for this analysis were the variables of premature death, disability and handicap status, the Total Fertility Rate and the two synthetically predicted estimates from the 1995 National Health Survey (the Physical Component Summary and the measure of fair/poor health).

With the exception of the Infant Death Rate (shown as the number of deaths per 1,000 live births), all of the variables were represented by age-sex standardised ratios. Missing data values (where there were fewer than five cases for any SLA and a standardised ratio was not calculated) were substituted by zero. Legitimate zero coded values remained as zero.

After completion of the analysis for the non-metropolitan areas of Tasmania the SLAs in **Hobart** were again allocated to the clusters generated in the rest of State as discussed above.

This resulted in the SLA of Kingborough [Part A] being allocated to the Good health status cluster, the City of Hobart and Clarence being grouped into the Medium health status cluster and the SLAs of Brighton, Glenorchy, New Norfolk [Part A] and Sorell [Part A] forming a Poor health status group (**Table 8.5** and **Map 8.2**).

The IRSD was again used as an independent check on the solution. It was found that, of the bottom four SLAs for **Hobart** as classified by the IRSD, all were classified to the Poor health status group in this analysis. The top SLA under the IRSD was not classified to the Good health status group.

Health service utilisation clusters in Sydney

All but one of the variables in this data set were represented by age-sex standardised ratios: the immunisation variable is of the proportion of children fully immunised at one year of age. Missing data values (SLAs where fewer than five admissions were predicted from the Australian rates) were substituted by zero. Legitimate zero coded values remained as zero.

After completion of the analysis for the non-metropolitan areas of Tasmania, the SLAs in **Hobart** were allocated to the clusters generated in the rest of State as discussed above.

This resulted in the SLAs of Brighton and Glenorchy being grouped into the High health service use cluster; with Kingborough [Part A] being allocated to the Low health service use cluster: the four remaining SLAs were allocated to the Medium health service use cluster (**Table 8.5** and **Map 8.3**).

This solution was checked with the IRSD which showed that, of the bottom two SLAs for **Hobart** as classified by the IRSD, one was classified to the High health service use group in this analysis. The top SLA under the IRSD was not classified to the Low health service use group.

Social health status clusters in Hobart

The cluster analysis technique has also been applied to a combination of the socioeconomic status and health status datasets. The results of the cluster analysis for the combination of these datasets may be useful as a summary indicator of the 'social health' status of the population of each grouping of SLAs.

Data considered for inclusion were the demographic variables in the final model for SLAs in **Hobart**, used to examine socioeconomic status, and the health status variables used in the final health status model. The variables excluded from the health status model because of missing data were excluded from this model also.

After completion of the analysis for the non-metropolitan areas of Tasmania, the SLAs in **Hobart** were allocated to the clusters generated in the rest of State as discussed above under *Socioeconomic clusters in Hobart*.

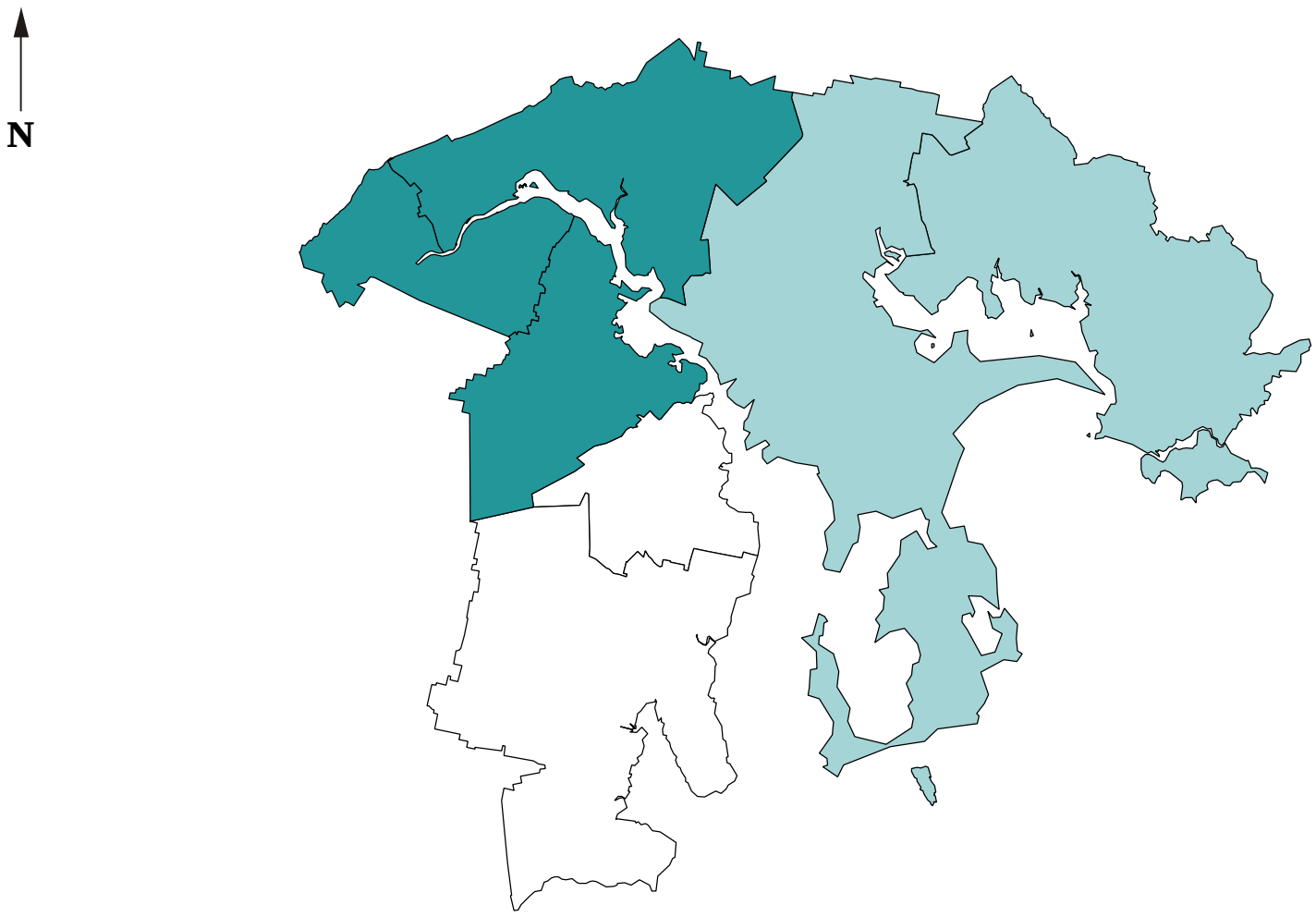
This analysis produced four groupings, with the SLAs of Clarence and Kingborough [Part A] being classified to the Very high social health status cluster and Brighton, Glenorchy and New Norfolk [Part A] being classified to the Low social health status cluster (**Table 8.5** and **Map 8.4**). The remaining SLAs of Hobart and Sorell were allocated to the High and Medium social health status clusters, respectively.

The IRSD was also available for the specified SLAs, and was used as an independent check on the solution. It was found that, of the bottom three SLAs for **Hobart** as classified by the IRSD, all were classified to the Low social health status group in this analysis. Further, of the top two SLAs under the IRSD, one was classified to the Very high social health status group and one to the High social health status group.

Map 8.1

Socioeconomic status clusters based on Statistical Local Areas, Hobart, 1996

clusters of SLAs with generally similar socioeconomic status characteristics



Socioeconomic status clusters

- *Low*
- *Medium*
- *High*

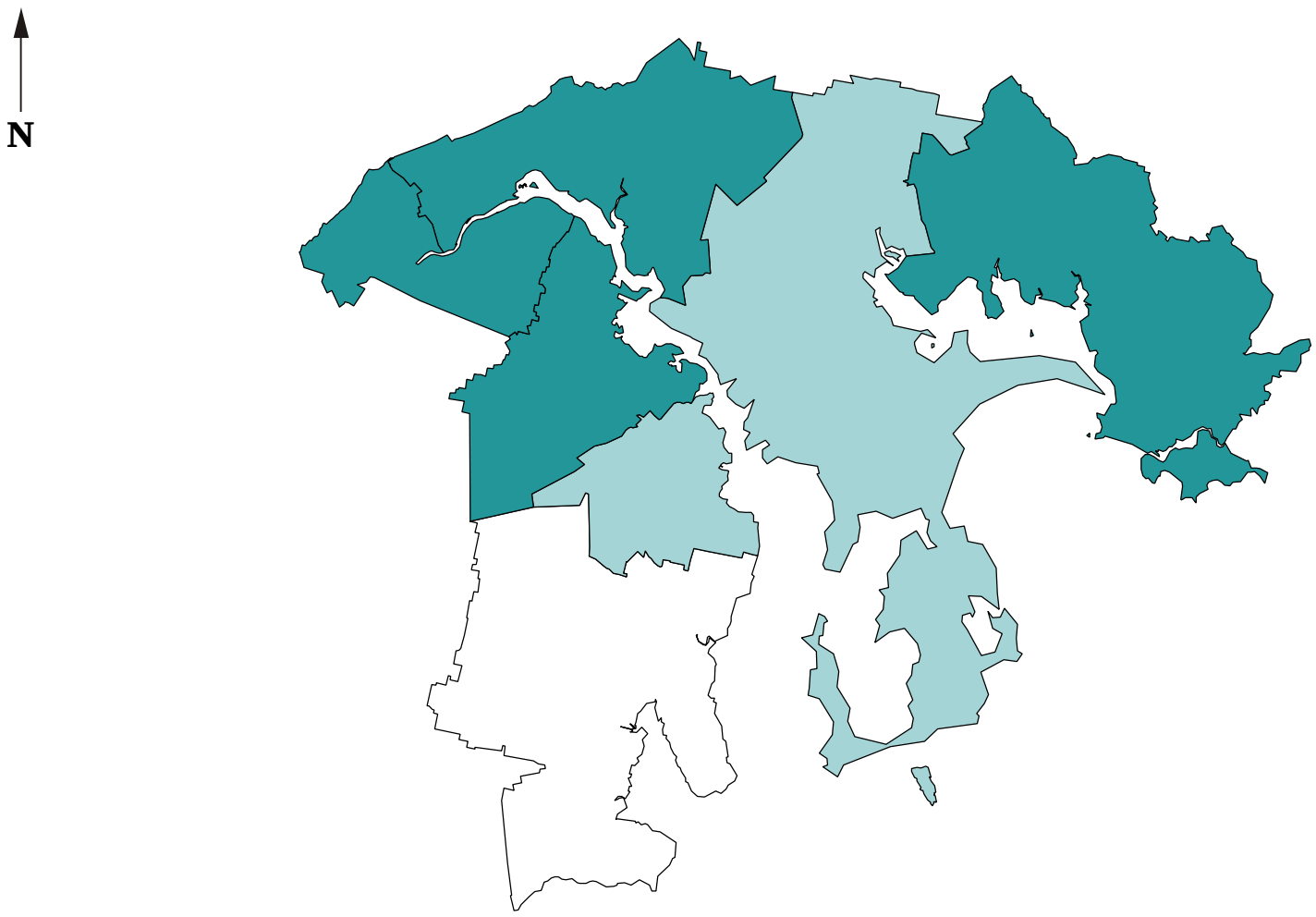
Source: Calculated on data from ABS 1996 Census

Details of map boundaries are in Appendix 1.2

National Social Health Atlas Project, 1999

Map 8.2
Health status clusters based on Statistical Local Areas, Hobart, 1996

clusters of SLAs with generally similar health status characteristics



Health status clusters

- *High*
- *Medium*
- *Low*

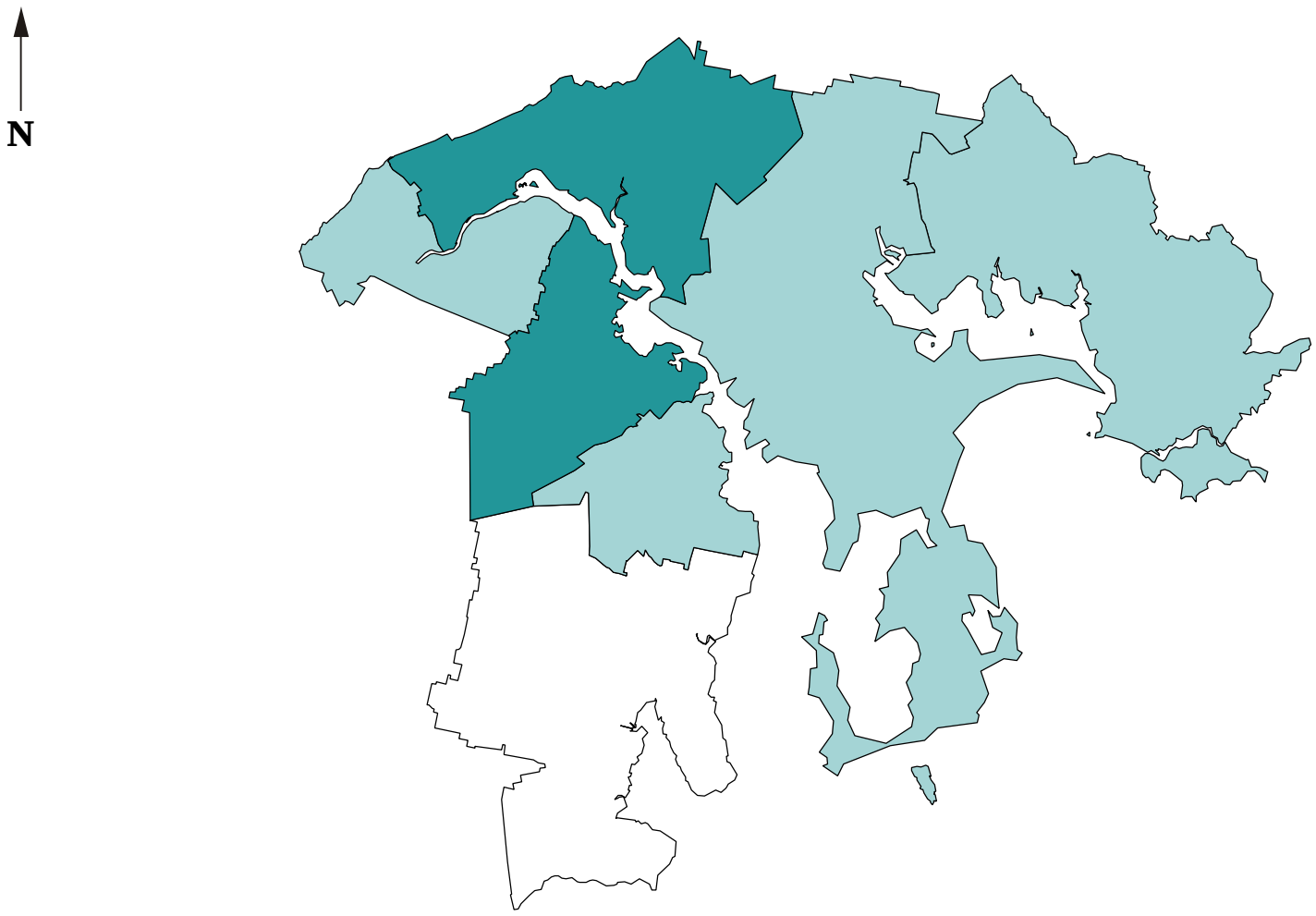
Source: Calculated on data from ABS 1996 Census

Details of map boundaries are in Appendix 1.2

National Social Health Atlas Project, 1999

Map 8.3
Health service utilisation clusters based on Statistical Local Areas, Hobart, 1996

clusters of SLAs with generally similar health service utilisation characteristics



Health service utilisation clusters

- *Poor*
- *Medium*
- *Good*

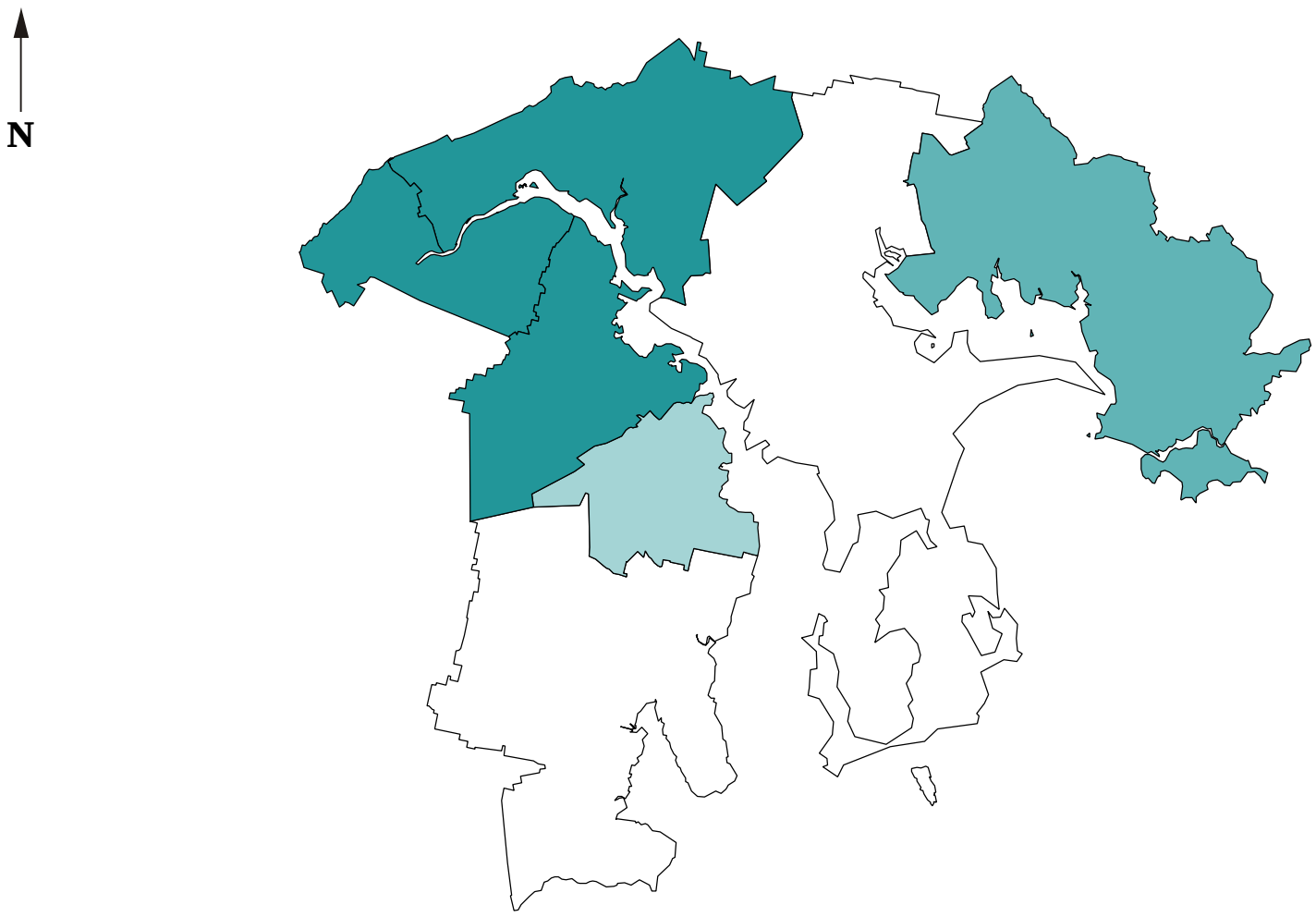
Source: Calculated on data from ABS 1996 Census

Details of map boundaries are in Appendix 1.2

Map 8.4

Social health status clusters based on Statistical Local Areas, Hobart, 1996

clusters of SLAs with generally similar social health status characteristics



Social health status clusters

- *Low*
- *Medium*
- *High*
- *Very High*

Source: Calculated on data from ABS 1996 Census

Details of map boundaries are in Appendix 1.2

National Social Health Atlas Project, 1999

Socioeconomic clusters of SLAs in non-metropolitan areas

The production of clusters at the SLA level in non-metropolitan areas is problematic, with SLAs varying enormously in size and composition. For example, the large urban centre SLAs of Launceston, Devonport and Burnie (population 59,618, 23,814 and 17,200 respectively) stand in contrast to SLAs such as Latrobe [Part B] (689) and Flinders (914). West Coast, the SLA with the largest land area, occupies 14.7 per cent of Tasmania's land mass yet has a population of only 6,334 (1.38 per cent of the State population). Aboriginal people, generally the most disadvantaged population group, are unevenly distributed throughout these SLAs, from as high as 16.0 per cent of the total population in Flinders, 9.5 per cent in Huon Valley and 6.7 per cent in Latrobe [Part B] to less than two per cent Aboriginal population in some eight non-metropolitan SLAs (22.9 per cent of all non-metropolitan SLAs).

There were data for 28 SLAs across Tasmania. These 28 records are not theoretically sufficient o carry out a cluster analysis with the seven input variables (the variable for dwellings rented from the State housing authority was excluded from the analysis because more than five per cent of the SLAs had no cases). A cluster analysis was performed on the available data, and the solution examined before attempting more complicated techniques to find a solution. This analysis provided a relatively clean three cluster solution, with Flinders not grouped.

Several other analyses were undertaken (using fewer input variables, based on the results of a factor analysis) but none produced a superior solution to the original analysis including all input variables. It is therefore accepted, and is reproduced in **Table 8.6** and **Map 8.5**. These clusters have been described as Low (13 SLAs), Medium (11 SLAs) or High (three SLAs) socioeconomic status.

Of the 13 lowest SLAs for the IRSD, 11 (84.6 per cent) were classified to the Low socioeconomic status cluster; and of the top three SLAs for the IRSD, two (66.7 per cent) were classified to the High socioeconomic status cluster.

Health status clusters of SLAs in the non-metropolitan areas

The variables for infant deaths; deaths of 15 to 64 year olds from lung cancer and diseases of the circulatory and respiratory system; and deaths of 15 to 24 year olds from the external causes of accidents, poisonings and violence were excluded from the analysis because five per cent or more of SLAs had no cases. Thus there were 10 variables to analyse 28 records. This is not quite enough data.

A cluster analysis of all the above variables was tried to see if it gave a sensible solution despite the lack of data. This produced a perfectly clean two cluster solution of good quality. It was felt that a two cluster solution, although very clean, was uninformative. More complicated techniques were tried to find a better solution.

The result of these analyses (described in Appendix 1.6) was a solution of good quality, which produced a genuine three cluster solution. It was accepted and is reproduced in **Table 8.6** and shown in **Map 8.6**. Note that the Poor health status group had higher status than the Good health status group for people with a disability.

The ABS Index of Relative Socio-Economic Disadvantage (IRSD) was again used as an independent check on the solution. It was found that, of the bottom 12 SLAs for the non-metropolitan SLAs in Tasmania as classified by the IRSD, nine (75.0 per cent) were classified to the Poor health status group in this analysis. Further, of the top four SLAs under the IRSD, three (75.0 per cent) were classified to the Good health status group.

Health service utilisation clusters of SLAs in the non-metropolitan areas

The variables for admissions for infectious diseases, lung cancer, breast cancer, psychosis, respiratory system diseases of children 0 to 4 years, bronchitis, emphysema and asthma, tonsillectomies and/or adenoidectomy, myringotomy, Caesarean section and hip replacement were excluded from the analysis because five per cent or more of the SLAs had no cases. Thus there were 20 variables to analyse 28 records. Clearly this was not enough data.

A cluster analysis of all the above variables was tried to see if it gave a sensible solution despite the lack of data. This produced a reasonably clean four cluster solution, although the distinction between the two highest use clusters was not all that sharp.

More complicated techniques were tried to find a better solution.

The result of these analyses (described in Appendix 1.6) was a definite three cluster solution, which was cleaner than any other solution examined. The solution lined up worse against the IRSD than the original four cluster solution, but this was not considered as important as providing a solution which is supported by the data. The solution was of good quality, and was a genuine three cluster solution. It was accepted and is reproduced in **Table 8.6** and shown in **Map 8.7**.

There was moderate agreement with the IRSD: of the lowest nine SLAs for the IRSD, three (33.3 per cent) were classified to the High health service use cluster; and of the highest three, one (33.3 per cent) was classified to the Low health service use cluster.

Social health status clusters of SLAs in the non-metropolitan areas

Data considered for inclusion were the demographic variables in the final model for SLAs in the non-metropolitan areas of Tasmania used to examine socioeconomic status, and the health status variables used in the final health status model. The variables excluded from the health status model because of missing data were also excluded from this model. Thus there were 17 variables to analyse 28 records (SLAs). Clearly this was not enough data.

A cluster analysis of all the above variables was tried to see if it gave a sensible solution despite the lack of data. This produced a clean two cluster solution of good quality, which was not accepted because it was considered uninformative.

These analyses (described in Appendix 1.6) resulted in a four cluster solution, which was less clean than the original two cluster solution, but much more informative. The solution was of

good quality, although the discrimination between the High and Medium clusters was not all that sharp. It was considered this was the best solution produced, and the solution is supported by the data. The SLAs in each cluster are listed in **Table 8.6** and shown in **Map 8.8**.

Of the seven lowest SLAs for the IRSD, five (71.4 per cent) were classified to the Low social health status cluster; and of the top four SLAs for the IRSD index, two (50.0 per cent) were classified to the Very high social health status cluster.

Table 8.6: Composition of SLA clusters in non-metropolitan areas of Tasmania

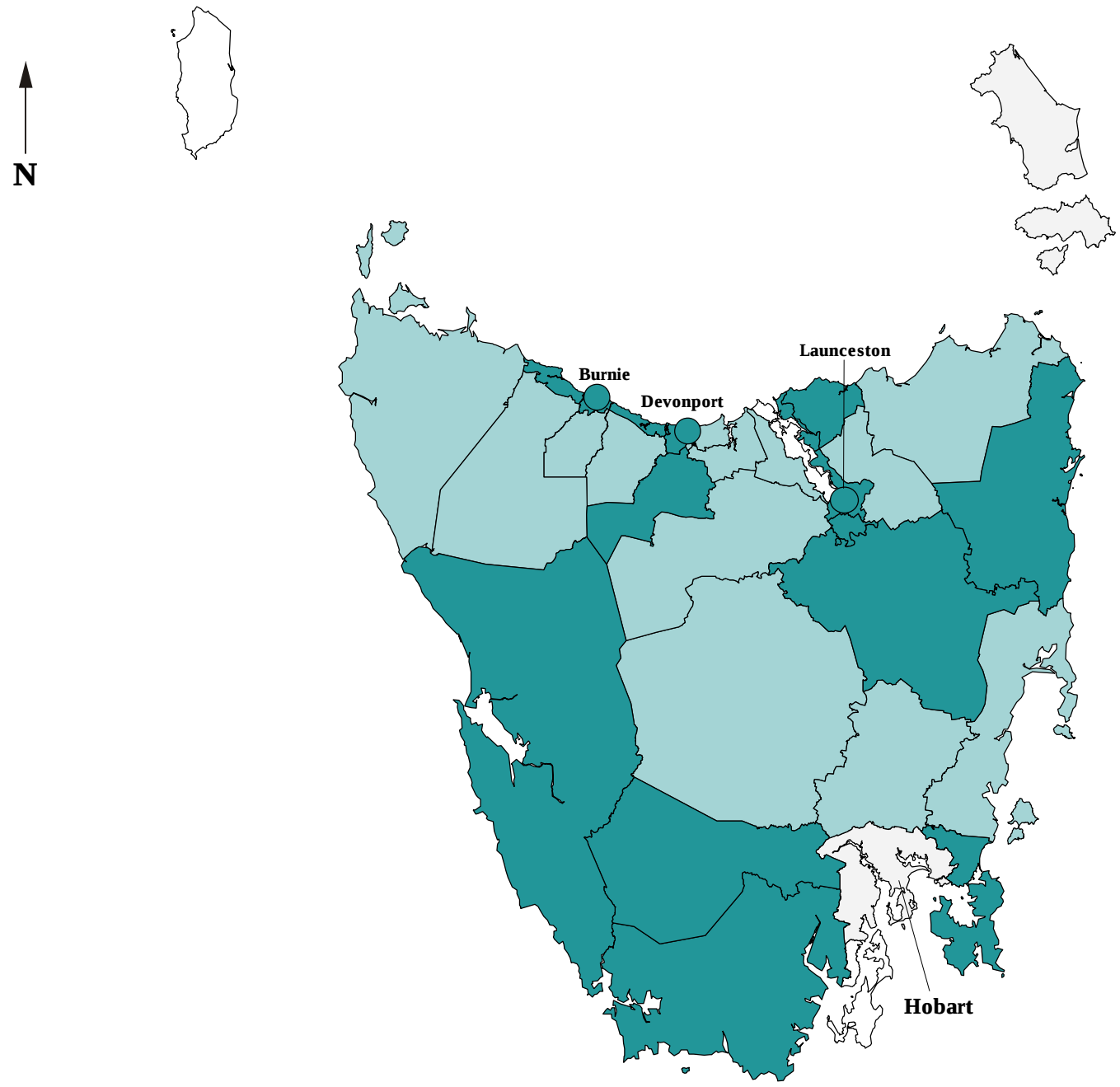
SLA	Socioeconomic status	Health status	Health service utilisation	Social health[1]
Break O'Day (M)/Northern Midlands (M) Pt B	Low	Poor	High	Low
Burnie (C) Pt A	Low	Poor	High	Medium
Burnie (C) Pt B	Medium	Good	Low	Very high
Central Coast (M) Pt A/Devonport (C)	Low	Poor	Medium	Medium
Central Coast (M) Pt B	Medium	Medium	Low	Medium
Central Highlands (M)	Medium	Poor	Medium	Low
Circular Head (M)	Medium	Medium	High	Very high
Dorset (M)/Launceston (C) Pt C	Medium	Medium	High	Very high
Flinders (M)	Not grouped	Poor	High	High
George Town (M) Pt A	Low	Poor	High	Low
George Town (M) Pt B	Low	Medium	Medium	Low
Glamorgan/Spring Bay (M)	Medium	Medium	Medium	Medium
Huon Valley (M)	Low	Poor	Medium	Medium
Kentish (M)	Low	Poor	Medium	Low
King Island (M)	High	Good	High	High
Kingborough (M) Pt B	High	Good	Medium	High
Latrobe (M) Pt A	Medium	Poor	Medium	Medium
Latrobe (M) Pt B	Medium	Medium	Low	Very high
Launceston Pt B/Meander Valley Pt A/Northern Midlands Pt A/Launceston Inner	Low	Medium	Medium	Medium
Meander Valley (M) Pt B/West Tamar (M) Pt B	Medium	Medium	Medium	Medium
New Norfolk (M) Pt B	Low	Poor	Medium	Low
Sorell (M) Pt B	Low	Medium	Medium	Medium
Southern Midlands (M)	Medium	Medium	High	Medium
Tasman (M)	Low	Medium	Medium	Medium
Waratah/Wynyard (M) Pt A	Low	Poor	Medium	Medium
Waratah/Wynyard (M) Pt B	Medium	Medium	Medium	Medium
West Coast (M)	Low	Poor	High	Low
West Tamar (M) Pt A	High	Good	Medium	High

[1] Social health 'clusters were produced by a joint analysis of the socioeconomic status and health status variable

Map 8.5

Socioeconomic status clusters based on Statistical Local Areas, Tasmania, 1996

clusters of SLAs with generally similar socioeconomic status characteristics



Socioeconomic status clusters

- *High*
- *Medium*
- *Low*
- *Not mapped**

**Areas not mapped include Flinders (which was not allocated in the cluster analysis) and Hobart, which was analysed separately*

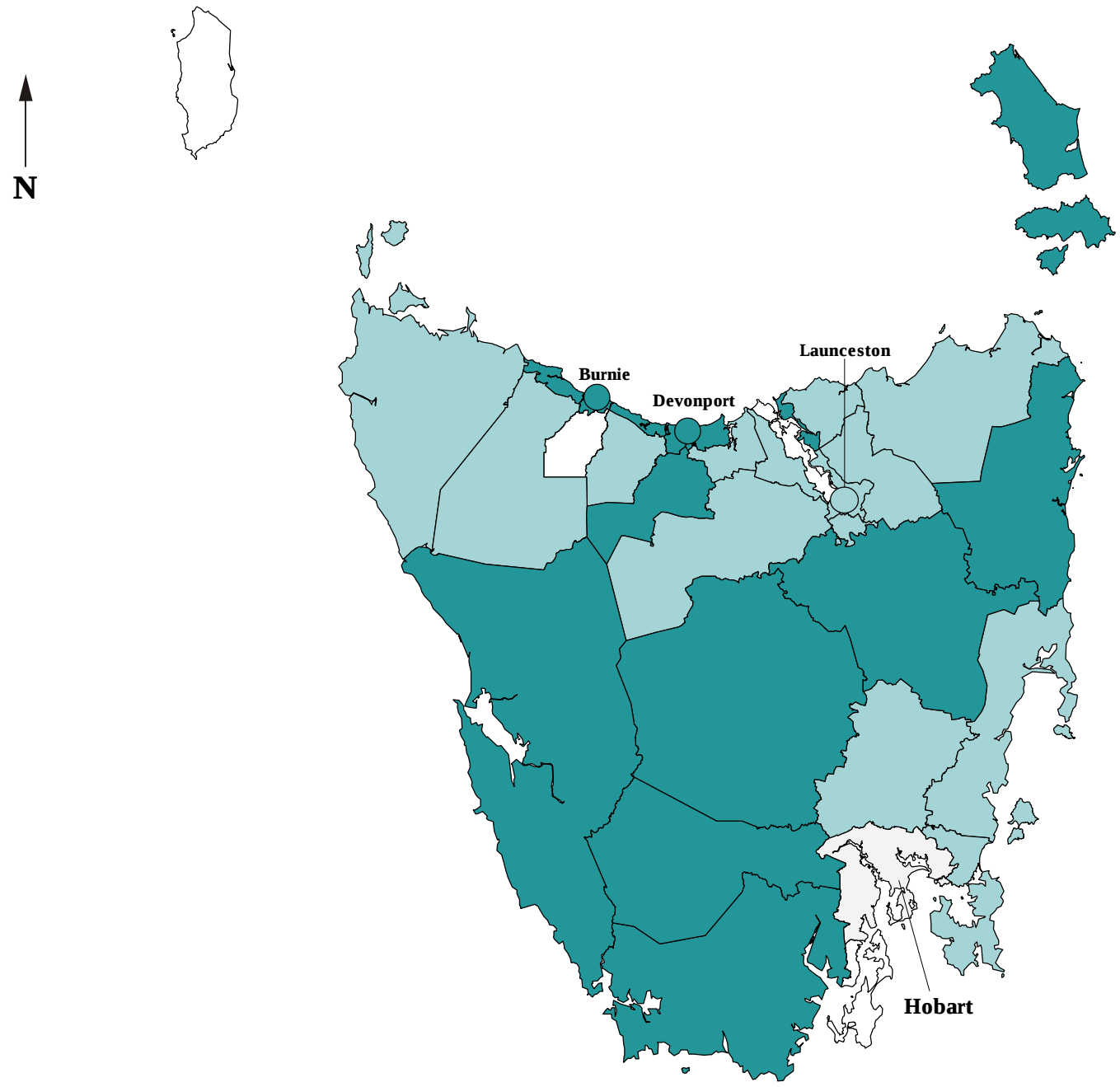
Source: Compiled from project sources

Details of map boundaries are in Appendix 1.2

National Social Health Atlas Project, 1999

Map 8.6
Health status clusters based on Statistical Local Areas, Tasmania, 1996

clusters of SLAs with generally similar health status characteristics



Health status clusters

- *Poor*
- *Medium*
- *Good*
- *Not mapped**

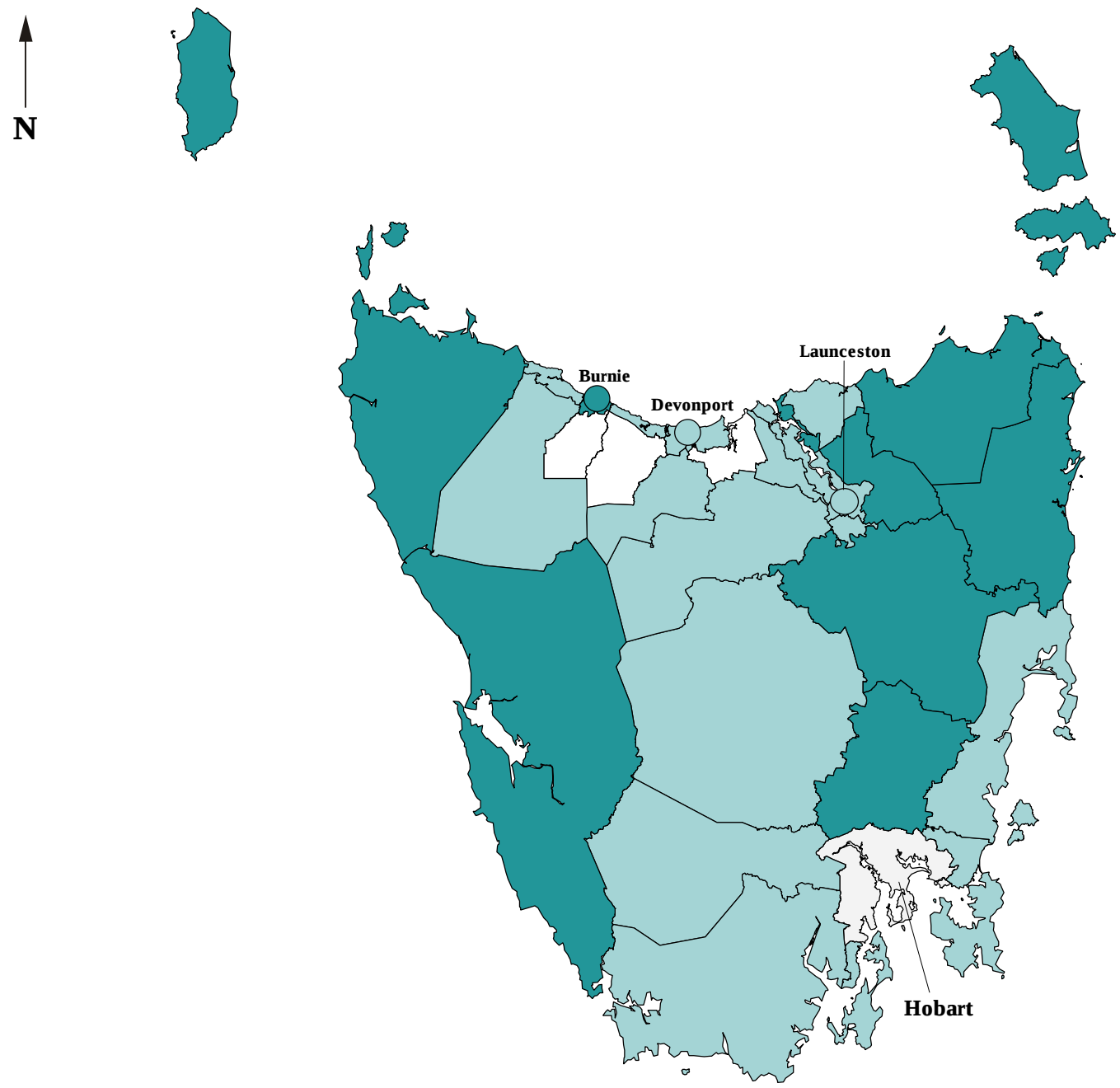
**Hobart was not mapped as it was analysed separately*

Source: Compiled from project sources

Details of map boundaries are in Appendix 1.2

Map 8.7
Health service utilisation clusters based on Statistical Local Areas, Tasmania, 1996

clusters of SLAs with generally similar health service utilisation characteristics



Health service utilisation clusters

- *High*
- *Medium*
- *Low*
- *Not mapped**

**Hobart was not mapped as it was analysed separately*

Source: Compiled from project sources

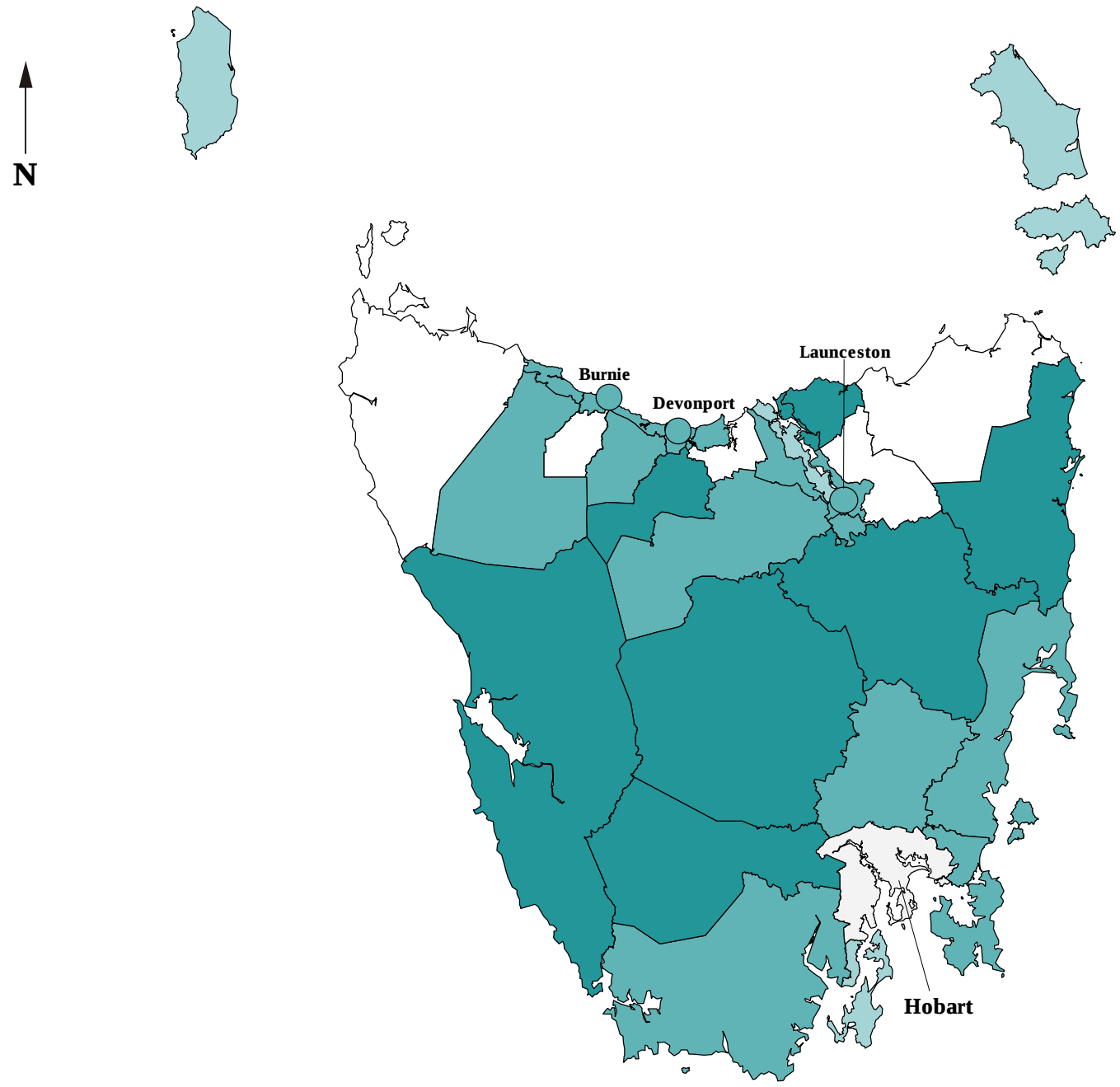
Details of map boundaries are in Appendix 1.2

National Social Health Atlas Project, 1999

Map 8.8

Social health status clusters based on Statistical Local Areas, Tasmania, 1996

clusters of SLAs with generally similar social health status characteristics



Social health status clusters

- *Low*
- *Medium*
- *High*
- *Very High*
- *Not mapped**

**Hobart was not mapped as it was analysed separately*

Source: Compiled from project sources

Details of map boundaries are in Appendix 1.2

Socioeconomic clusters of towns

A cluster analysis was undertaken for the 55 towns (urban centres) across Australia that had populations of 7,500 or more at the 1996 Census and were identifiable in the non-Census datasets (see Appendix 1.2 for further details of the selection of these towns). These 55 records are sufficient to carry out a cluster analysis with the nine input variables.

As the analysis was somewhat complicated, only the main results are discussed below. The full description is in Appendix 1.6.

A cluster analysis was performed on the available data, and the solution examined before attempting more complicated techniques to find a solution. This analysis provided a three cluster solution of fair to average quality. It did not discriminate particularly well between clusters, and the High socioeconomic cluster did not perform particularly well against the IRSD.

The 55 records also provided enough information for an exploratory factor analysis, since this analysis has the same data requirements as the previous model.

Although several analyses were tried, the best solution was a four cluster solution (based on low income families, unemployed people, early school leavers, unskilled and semi-skilled workers, Indigenous people and single parent families). This solution is reproduced in **Table 8.7**.

The ABS Index of Relative Socio-Economic Disadvantage (IRSD) was available for the specified towns, but was withheld from the analysis and used as an independent check on the solution. It was found that, of the bottom 17 towns as classified by the IRSD, 16 (94.1 per cent) were classified to the Low socioeconomic group in this analysis. Further, of the top 20 towns under the IRSD, 15 (75.0 per cent) were classified to the High socioeconomic group.

Health status clusters of towns

There were 15 variables to analyse 55 records. This was not quite enough data. A number of alternative strategies were tried in an attempt to produce a satisfactory solution, with the outcome being a three cluster solution of good quality. The clusters were better spread than in other solutions, and it performed better against the IRSD than other solutions (**Table 8.7**).

The IRSD was again used as an independent check on the solution. It was found that, of the bottom 12 towns as classified by the IRSD, five (41.7 per cent) were classified to the Poor health status group in this analysis. Further, of the top 22 towns under the IRSD, 14 (63.6 per cent) were classified to the Good health status group.

Health service utilisation clusters of towns

There were 30 variables to analyse 55 records. This was not enough data. A number of alternative strategies were tried in an attempt to produce a satisfactory solution, with the outcome being a three cluster solution of good quality. The clusters were better spread than in other solutions, and it performed better against the IRSD than other solutions (**Table 8.7**).

A check with the IRSD showed that, of the bottom ten towns as classified by the IRSD, three (30.0 per cent) were classified to the High health service use group in this analysis. Further, of the top 26 towns under the IRSD, 13 (50.0 per cent) were classified to the Low health service use group.

Social health clusters of towns

The cluster analysis technique has also been applied to a combination of the socioeconomic status and health status data sets. Data considered for inclusion were the variables in the final models for towns used to examine socioeconomic status and health status.

There were 24 variables to analyse 55 records. This was clearly not enough data. A cluster analysis of all the above variables was tried to see if it gave a reasonable solution despite the lack of data. This produced a three cluster solution of fair to average quality. The solution did not perform at all well against the IRSD for the Low status group, and lacked definition between the Medium and Low status groups.

Alternative strategies were tried in an attempt to produce a better solution, with the outcome a three cluster solution of reasonable quality, with Charters Towers (C) not grouped. The clusters were better spread than in other solutions, and the solution performed better against the IRSD than other solutions (**Table 8.7**).

Of the 17 lowest towns for the IRSD, nine (52.9 per cent) were classified to the Low social health status cluster; and of the top 14 towns for the IRSD, seven (50.0 per cent) were classified to the High social health status cluster.

Table 8.7: Composition of town clusters in Australia

SLA	Socioeconomic status	Health status	Health service utilisation	Social health status[1]
Albany (T)	Very low	Medium	Low	Medium
Albury (C)	High	Medium	Low	Low
Alice Springs (T)	Low	Medium	Medium	Low
Armidale (C)	High	Good	High	High
Ballarat (C)	High	Good	Low	Medium
Bathurst (C)	High	Good	Low	High
Benalla	High	Medium	High	Medium
Bendigo (C)	High	Good	Low	Medium
Broken Hill (C)	Very low	Poor	Low	Medium
Broome (S)	Low	Medium	Medium	Medium
Bunbury (C)	Medium	Good	Medium	High
Burnie (C)	Very low	Poor	Low	Low
Cairns (C)	High	Good	Low	High
Casino (A)	Very low	Medium	Medium	Low
Charters Towers (C)	Medium	Poor	Medium	Not grouped
Colac	Medium	Poor	Low	Low
Dalby (T)	Medium	Medium	Low	High
Deniliquin (A)	High	Poor	Medium	Medium
Devonport (C)	Very low	Medium	Low	Low
Dubbo (C)	High	Good	Medium	Medium
Echuca	High	Medium	Low	Medium
Geraldton (C)	Very low	Medium	Low	Medium
Gladstone (C)	Medium	Good	Low	High
Goulburn (C)	Medium	Medium	Medium	Low
Grafton (C)	Very low	Medium	Medium	Medium
Hamilton	High	Good	Low	Medium
Hervey Bay (C)	Very low	Medium	Low	Low
Horsham (RC)	High	Good	Low	Medium
Inverell (A)	Very low	Medium	High	Medium
Kalgoorlie/Boulder (C)	Medium	Poor	Medium	High
Katherine (T)	Low	Poor	Medium	Low
Launceston (C)	High	Good	Low	Medium
Mandurah (C)	Very low	Medium	Low	Low
Maryborough (C)	Very low	Medium	Low	Medium
Mount Gambier (C)	Medium	Good	High	High
Mount Isa (C)	Medium	Medium	Medium	High
Murray Bridge (RC)	Very low	Medium	Low	Low
Noosa	High	Good	Low	Medium
Orange (C)	High	Good	Medium	Low
Port Augusta (C)	Very low	Poor	Medium	Low
Port Hedland (T)	Medium	Medium	Medium	High
Port Lincoln (C)	Very low	Poor	High	Low
Port Pirie (C)	Very low	Poor	High	Medium
Portland	Very low	Poor	High	Medium
Queanbeyan (C)	High	Good	High	High
Rockhampton (C)	Medium	Good	Low	High
Sale	High	Good	Low	Medium
Shepparton (C)	Medium	Good	Medium	Low
Swan Hill (RC)	High	Good	Low	Medium
Tamworth (C)	High	Medium	Medium	Medium
Toowoomba (C)	Medium	Good	Low	High
Wagga Wagga (C)	High	Good	Medium	High
Wangaratta (RC)	Medium	Good	Medium	Low
Warwick (S)	Medium	Poor	High	Medium
Whyalla (C)	Very low	Medium	High	Low

[1] **Social health 'status clusters were produced by a joint analysis of the socioeconomic status and health status variables**

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