

# **Adult Community Psychiatric Service (ACPS) Research and Mapping Project**

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## **EXTENDED ABSTRACT**

The project has been a joint exercise between the Mental Health Division of the Canterbury District Health Board (CDHB) and the Surveillance Team at Crown Public Health (CPH), Christchurch, New Zealand. The project's main objective was to provide background information for a review of current Adult Community (outpatient and day patient) Psychiatric Service (ACPS) sector boundaries. As a secondary objective the project was to compare selected spatial and demographic characteristics of the ACPS client caseload with the general population of the sectors covered by the ACPS.

Outputs from the project included a series of maps and tabulated statistics and charts. A relatively heavy ACPS caseload density was indicated for an arc of inner-city suburbs to the north, east and south-west of the central city. Use of the NZDep96 index indicated that ACPS clients tended to reside within more deprived census meshblocks – 27% within decile 9 and 10 (most deprived) compared with 15% for the general population. Median straight-line distances between ACPS clients and their current allocated clinical base ranged from 2.8km to 4.6km. General Medical Practices throughout the study area tend towards relatively low numbers of ACPS clients (130 practices, median per practice = 12) but a small group of practices (n=10) were attended by 41 or more ACPS clients, for a total of 492 clients, or 24% (492/2,087) of the 2001 ACPS caseload. The location of these practices generally corresponded to residential areas with heaviest ACPS caseload.

The project illustrates the use of GIS in support of public health service planning; primarily as a visualisation and contextualisation tool. In common with much GIS work, results on spatial distribution of clients, and socio-economic disparity between different parts of Christchurch tend to confirm existing impressions derived from non-GIS resources. However results on the distribution of medical practices by numbers of ACPS clients, client distance to clinical bases, and the extent of relative deprivation for areas with high concentrations of ACPS clients are outputs which would be difficult to replicate using non GIS techniques.

## **1.0 INTRODUCTION**

This project has been a joint exercise between the Mental Health Division of the Canterbury District Health Board (CDHB) and the Surveillance Team at Crown Public Health (CPH) Christchurch, New Zealand.

The project's main objective was to provide background information for a review of current Adult Community (outpatient and day patient) Psychiatric Service (ACPS) sector boundaries. As a secondary objective the project was to compare selected spatial and demographic characteristics of the ACPS client caseload with the general population of the sectors covered by the ACPS

GIS techniques were utilised to analyse and depict the spatial distribution and other characteristics of caseload records for the CDHB's Adult Community Psychiatric Service (ACPS) for the 2001 calendar year. Caseload data is also compared against demographic and socio-economic variables derived from the 2001 census and the NZDep96 Index.

In particular, the CDHB Mental Health Division was interested in:

- Spatial distribution of the ACPS caseload – where do ACPS clients live ?
- Selected characteristics of the general population residing within sectors served by the ACPS;
- Comparison of ACPS caseload characteristics with general population;
- Spatial distribution of General Medical Practices usually attended by ACPS clients.

In general terms the project's scope and objectives may be characterised as empirical and descriptive, rather than analytical and explanatory; though further lines of enquiry are suggested by some of the project's findings.

## **2.0 THE CORE DATA SET, DATA PROCESSING, AND PRACTICAL DIFFICULTIES**

The core project dataset comprised 2,180 rows of case data supplied by the Canterbury District Health Board, covering the Adult Community Psychiatric Service's caseload from 1 January to 31 December 2001.

The dataset's individual information fields include case ID number, ethnicity, gender, date of birth, address and usual medical centre. Extraction of this dataset took some time and presented some problems for information systems which are not geared towards bulk or aggregate extraction of data for analysis purposes. In addition, time and staff resources for extraction of data for analysis purposes inevitably took a lower priority than day-to-day operational requirements.

Upon receipt from the Canterbury District Health Board, case data was subjected to a data validation and geocoding process.

The data validation process included identification of duplicated case records, as well as consolidation and mapping of usual medical practice data against General Medical Practice data held by Crown Public Health.

The geocoding process generates a New Zealand Map Grid reference for each case address, which facilitates subsequent GIS analysis.

Source data was of generally adequate quality, but data validation and geocoding was complicated by the presence of duplicated records, inconsistent entry of date data, usual medical practice and address data, together with some technical shortcomings in the geocoding software available to Crown Public Health. A significant amount of manual intervention was required in these otherwise automated processes.

A total of 2,100 records were eventually extracted from the original caseload data, relating to 2,087 unique case identifiers (13 case identifiers specified two usual medical centres – these otherwise duplicate records were retained in the complete data set).

A total of 2,052 (97.7%) records were successfully matched against a usual medical centre. A total of 1,997 (95.7%) case identifiers were successfully geocoded by their residential address.

As noted above, these relatively high rates of data matching and geocoding were achieved at the cost of manual processes, carried out following initial data processing and geocoding by automated means. A variant of Pareto's Law applies with this type of data processing, where the last 20% of records, occupy 80% of the time available for data processing.

The project's mapping and analysis work proceeded on the basis of point-data maps generated from this data set.

### 3.0 OTHER DATA SETS AND PROJECT STUDY AREA

Other datasets utilised for comparative and contextualisation purposes included digitised representations of current ACPS sector boundaries and point data for general medical practices, both generated by Crown Public Health, the *NZDep96* Index of Deprivation, and the Ministry of Health/Critchlow Associates *Health Visual Census 01*- derived from the New Zealand 2001 Census of Population and Dwellings.

Apart from the digitised ACPS boundaries, other areal units employed for the purposes of aggregation and presentation were Census Area Units (CAUs) and Census Meshblocks.

The project's study area included the city of Christchurch, together with outlying areas and towns to the north and south-west of Christchurch. This area corresponds with the overall service area for the Adult Community Psychiatric Service (ACPS). The ACPS service area is currently divided into four sectors, each served by a dedicated clinical base:

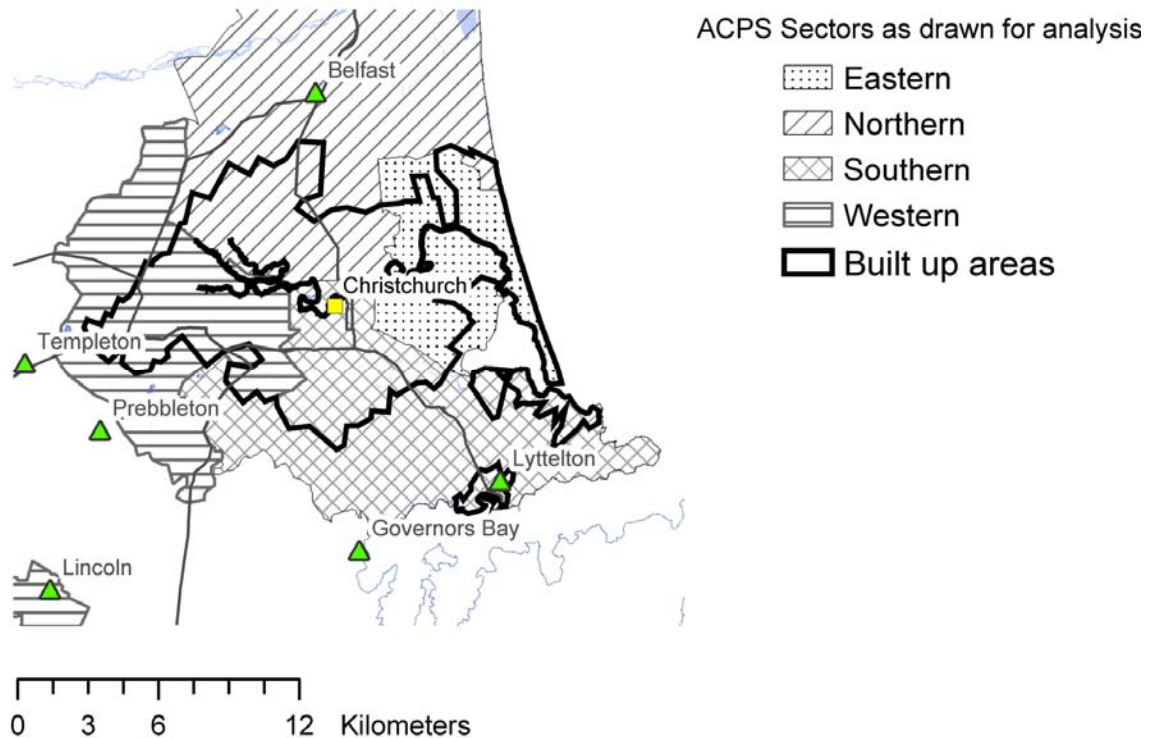


Figure 1: ACPS Sector Boundaries as drawn for analysis – Christchurch City and surroundings

## 4.0 RESULTS

Selected results and outputs from the project are set out below.

### 4.1 Caseload numbers and proportions by current ACPS Sector

The table and chart below set out ACPS caseload numbers and proportions by sector and compares them with the general population within each sector:

Sector	Cases	Cases (%)	General Population	General Population %
Northern	579	27.74%	122,109	35.29%
Eastern	578	27.70%	72,009	20.81%
Southern	422	20.22%	71,400	20.64%
Western	508	24.34%	80,457	23.26%
<b>All Sectors</b>	<b>2,087</b>	<b>100.00%</b>	<b>345,975</b>	<b>100.00%</b>

Figure 2: Tabulated data - ACPS caseload and general population by sector

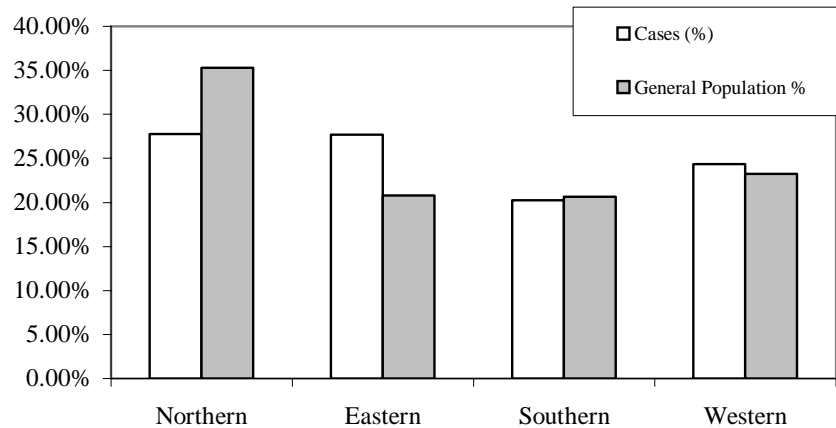


Figure 3: ACPS caseload and general population proportions by sector

The Northern Sector's general population is more than 50% greater than any of the other sectors.

For Southern and Western sectors, caseload proportions reflect their 'share' of the general population. The Northern sector's general population is under-represented in caseload and the Eastern sector's population is over-represented.

### 4.2 Caseload location

Mapping of ACPS clients reveals relatively heavy caseload density for inner-city suburbs to the north, east, and south-west of the central city. Outlying areas with relatively high caseload numbers were noted in the north-east and south-west. To some extent, high densities of ACPS clients may reflect higher general population densities, especially in the adult age groups served by the ACPS, but rate mapping has indicated similar relative patterns of ACPS distribution.

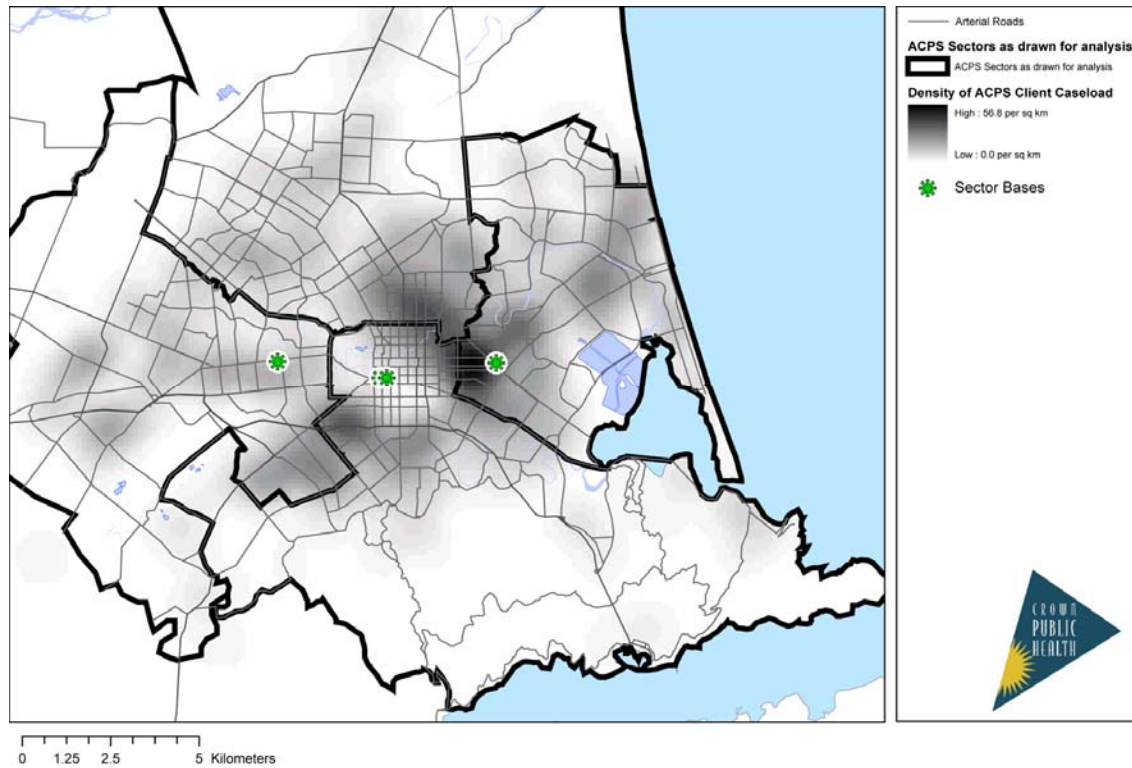


Figure 4: ACPS Caseload Density – Christchurch City

#### 4.3 ACPS Sector Deprivation Profile

At the time the project was prepared, the *NZDep2001* Index of Deprivation was not available. Therefore this aspect of the analysis utilised the *NZDep96* Index.

Aggregation of population by sector boundary and by *NZDep96* ranking revealed that 55% of the Eastern Sector’s population live within areas classified in the four most deprived deciles of the *NZDep96* deprivation index, compared to 26% to 35% for other sectors.

#### 4.4 Caseload Deprivation Profile

ACPS caseload clients were aggregated by the *NZDep96* decile ranking of the census meshblock within which they reside. The table and charts below (figures 5 and 6) present proportions of ACPS caseload by *NZDep96* decile and compare them to proportions for the general population of the study area.

Decile Group	All Sectors	
	ACPS	General Population
1 to 2	0.13	0.25
3 to 4	0.14	0.22
5 to 6	0.21	0.20
7 to 8	0.24	0.19
9 to 10	0.27	0.15
Overall	1.00	1.00

Figure 5: *NZDep* Proportions for ACPS Caseload compared to general population

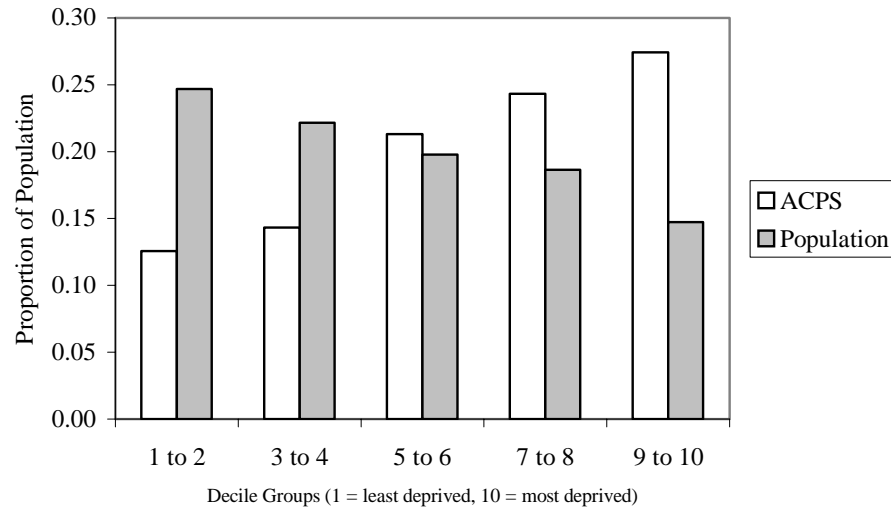


Figure 6: ACPS Caseload Aggregated by the NZDep96 decile ranking of the census meshblock within which they reside, compared with study area's general population

Deprivation profiles for ACPS clients generally follow the relative pattern for each sectors' general population: The Eastern and Southern Sectors have the highest proportion of general population residing within decile 7-10 meshblocks (55% and 35%) and also have the highest proportion of ACPS clients residing within decile 7-10 meshblocks (67% and 56% respectively)

Within sectors, and also for the study area in its entirety, the ACPS caseload tends to reside within more deprived meshblocks: 27% within decile 9 to 10 meshblocks, compared with 15% for the general population, and 51% within decile 7 to 10 meshblocks compared to 34% for the general population. At the other end of the scale, 13% of ACPS clients reside within decile 1 to 2 meshblocks, compared with 25% for the general population.

The pattern of differentiation in deprivation between ACPS clients and the general population is least marked in the Eastern Sector, where 34% of ACPS clients reside in decile 9 to 10 meshblocks, compared to 25% for the general population. In the other three sectors, which are less deprived in a general sense than the Eastern Sector, there is a stronger pattern of differentiation: 22% of Northern ACPS clients in decile 9-10 meshblocks, compared to 11% for the general population, 33% compared to 17% for the Southern Sector, and 21% compared to 10% for the Western Sector.

#### 4.5 ACPS Client Distance to Sector Base

Straight-line distances were calculated between each client's residential address and their allocated ACPS clinical base. In addition, distances were calculated between each client and their closest clinical base, which is not necessarily the base to which they are allocated.

Distances to sector bases broadly reflect the current geographical extent of ACPS sectors, with median distances ranging from 2.8km for Eastern Sector clients through to 4.26km for the Northern Sector. Northern and Western sectors have the greatest geographical extent and consequently longer mean and median distances to the sector base. Compared to the distance to their closest base, regardless of their actual allocated sector base, it would appear on at least a superficial basis that Northern sector clients would have the most to gain from relocation of their sector base.

#### 4.6 Caseload by usual General Medical Practice

Two thousand and fifty-two (2,052) client records included data on the general medical practice usually attended by that client. A total of 130 medical practices were identified.

Generally, medical practices have a relatively small number of ACPS clients – the median per practice is 12. However, there is a small group of practices with larger client numbers. A total of 492 clients, or 24% of caseload, attend one of 10 medical practices which each have 41 or more ACPS clients. The majority of these practices are located in and around the inner city arc corresponding to areas of heaviest caseload.

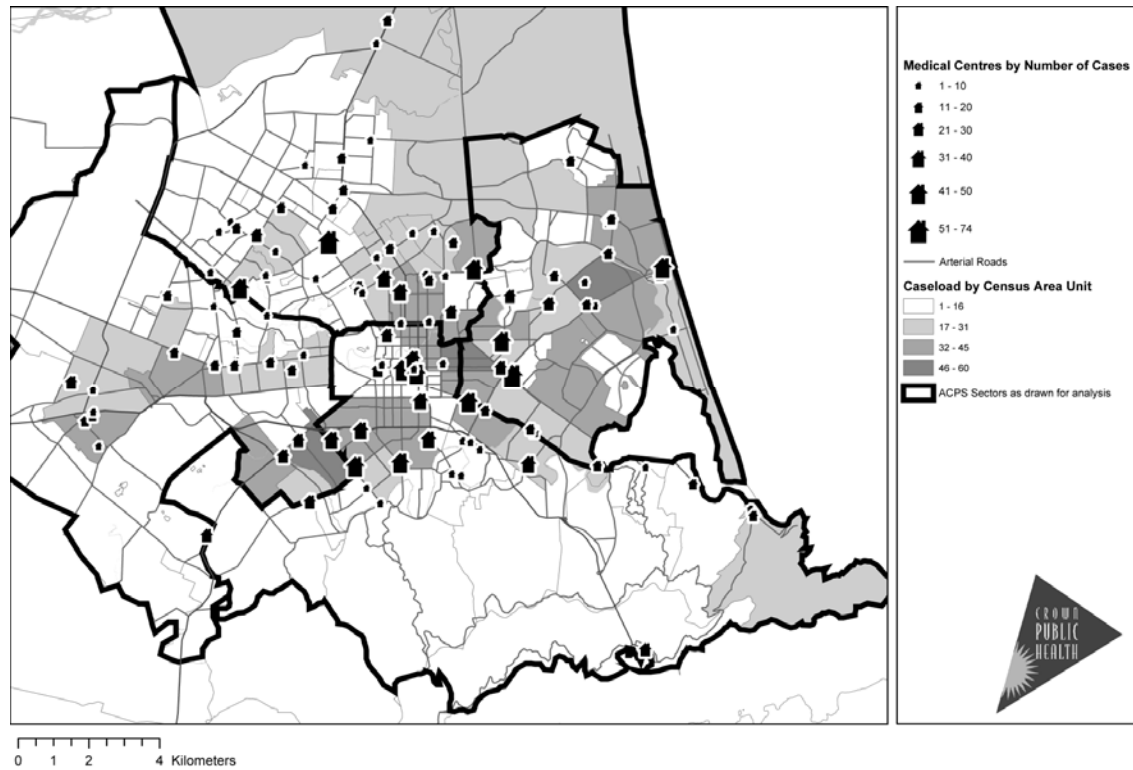


Figure 7: Medical Practices by ACPS Caseload and CAUs by Caseload – Christchurch City

## 5.0 CONCLUSION

The project illustrates the use of GIS in support of public health service planning; primarily as a visualisation and contextualisation tool. In common with much GIS work, results on spatial distribution of clients, and socio-economic disparity between different parts of Christchurch tend to confirm existing impressions derived from non-GIS resources. However results on the distribution of medical practices by numbers of ACPS clients, client distance to clinical bases, and the extent of relative deprivation for areas with high concentrations of ACPS clients are outputs which would be difficult to replicate using non GIS techniques.

Practical difficulties encountered during the project were primarily related to resourcing and data preparation issues. In particular, apparently trivial data processing issues consumed relatively large amounts of time and staff resources.

Similar forms of analysis could be usefully applied to other ACPS caseload data subject to availability, most notably service use/contact and diagnosis data.

## REFERENCES

Ministry of Health Public Health Intelligence, Critchlow Associates – *Health Visual Census 01 Version 2.1 for Arc GIS* (Census and context data distributed on CD April 2002)