

# Summary

## Mental health and urbanization

### *An investigation of urban-rural and inner-city differences in psychiatric morbidity*

#### Introduction

The primary focus of this thesis is the examination of the differences between the rates of psychiatric disorders in urban and rural settings. The second issue it addresses is whether there are links between psychiatric problems in urban areas and the characteristics of those areas.

A well-known review dating from the 1970s that looked at differences in the prevalence of psychiatric disorders between town and country showed that there was a tendency towards higher total rates of psychiatric disorders in urban areas. More specifically, rates for neurosis and personality disorders were higher in urban areas, while rates for psychoses, including manic-depressive psychoses, were higher in rural areas. Later reviews in the period 1981-1998 concluded that overall rates in urban areas were marginally higher and, specifically, that rates for depression were higher. In the last decade, there have been no systematic reviews of urban-rural differences in psychiatric morbidity. This thesis describes a recent international overview of studies of urban-rural differences in the prevalence of psychiatric disorders. It then bundles the prevalence rates from those studies, producing a single average ratio that expresses the urban-rural difference in the prevalence of psychiatric disorders (Chapter 4).

Large-scale epidemiological studies of the prevalence of psychiatric disorders in the population incorporating levels of urbanization are scarce in the Netherlands. In 1996, the first observations were made for the national Nemesis study of the prevalence of psychiatric disorders. This set of data created the opportunity to investigate whether there were differences according to level of urbanization and, if so, how large these differences seemed to be (Chapter 2). Later, a comparable study was possible in Germany (Chapter 3).

When there are differences in disorder prevalence rates in the population depending upon the level of urbanization, the logical question is whether this is also reflected in variations in the use of psychiatric facilities. Using a national dataset of psychiatric admissions, differences in use according to level of urbanization are therefore also studied in this thesis (Chapters 5-7). The findings relating to prevalence and

health-care consumption are then used as a basis for determining the extent to which the present distribution of mental health care capacity is adequate.

The absolute ratios between urban and rural facilities are important for day-to-day practice: we need to know what proportion of our population receive care or have disorders requiring professional help. Urban-rural differences in the use of psychiatric services and the prevalence of disorders in the population may be explained in part by variations in the population profile (gender, age, civil status etc.). This thesis puts forward hypotheses to explain the differences that persist after correction for demographic variations – the ‘urbanization factor’.

The second part of the thesis looks at whether variations in rates of psychiatric morbidity in urban settings are related to neighbourhood characteristics. A well-known study in Chicago has already shown that the highest levels of schizophrenia were found in the city areas with the highest rates of crime, unemployment, suicide, mobility and population density. In this thesis, the relationship between psychiatric morbidity and neighbourhood characteristics was studied in the city of Amsterdam (Chapters 9-11). Links demonstrated in this way between, for example, socio-economic deprivation and the presence of psychiatric problems are admittedly not causal, but they can indicate, in a relatively simple way, the main areas that should be targeted by, for example, prevention activities.

The aims of this thesis and associated research issues are the following:

Aim 1: To investigate the relationship between urbanization and the prevalence of psychiatric disorders, as well as psychiatric service use.

Question 1: Is degree of urbanization related to the prevalence of psychiatric disorders?

Question 2: Is degree of urbanization related to psychiatric admission rates?

Aim 2: To investigate the relation between city neighbourhood characteristics and depression symptom levels, as well as psychiatric service use.

Question 3: Are neighbourhood characteristics related to depression symptom levels when controlled for individual characteristics?

Question 4: Are neighbourhood characteristics related to psychiatric admission rates?

The answers to these questions are stated briefly below.

## Results

### ***Part 1: Urban-rural differences in psychiatric morbidity***

Is degree of urbanization related to the prevalence of psychiatric disorders? (Question 1, Chapters 2-4)

Urban-rural comparisons of prevalence data in the Netherlands (Chapter 2) showed significant urban-rural differences in total rates of psychiatric disorders, mood disorders, anxiety and substance abuse. Prevalence rates for one or more disorders were 77% higher in the most urbanized category of municipalities compared to the least urbanized category of five categories. Prevalence rates adjusted for comparable variables also varied significantly according to urbanization. A comparable study in Germany resulted in a virtually identical picture (Chapter 3). Significant urban-rural differences in total rates of psychiatric disorders, mood disorders, and anxiety were found. In Germany, prevalence rates for one or more disorders were 37% higher in the most urbanized category of municipalities compared to the least urbanized category of five categories. Although German data showed that gender, age, marital status and social class play a significant role, urbanization also remained significantly related to prevalence rates after correction for these factors.

A pooled analysis of data from 20 international studies (Chapter 4) showed that total prevalence rates for the total of all disorders are on average 38% higher in urban areas compared to rural areas. The urban rates for the separate categories of mood disorders and anxiety disorders were 39% and 21% higher respectively. Rates for substance abuse were not significantly higher. Total prevalence rates and prevalence rates for mood disorders adjusted for various confounders were significantly higher for urban areas (+21% and +28% respectively).

Is degree of urbanization related to psychiatric admission rates? (Question 2, Chapters 5-8)

Three studies of urban-rural differences in admission rates found significant relations between urbanization and total admission rates (Chapters 5 and 7), as well as for rates for schizophrenia (Chapter 6), and affective psychoses, organic psychoses, other psychoses, and neurotic and personality disorders (Chapter 7). The number of people admitted per 100,000 inhabitants in the most urbanized category of municipalities was more than two and a half times the rate found in the least urbanized category (Chapter 5). Admission rates for schizophrenia were studied separately (Chapter 6). It was found that, in the 15-34 year age group, men from the most urbanized municipalities were admitted 4.9 times more often with a diagnosis of schizophrenia than men from the least urbanized municipalities. The rate was 3.8 times higher for women in that age group. In the 35-54 year

age group, the multiples were 5.7 and 4.5 for men and women, and 2.8 and 2.4 respectively in the 55 years and older group. In addition to these main results from admission studies, it was not only found that urbanization was significantly related to admission rates; municipality income distribution and mortality rates were also related to admission rates (Chapter 5). Furthermore, other risk models found that individual civil status was strongly related to the risk for admission in general, and also to admission for specific diagnostic groups (Chapter 7). Another additional finding concerning admissions for schizophrenia was that re-admission rates and length of stay were not related to urbanization (Chapter 6).

## ***Part 2: Inner-city differences in psychiatric morbidity***

Are neighbourhood characteristics related to depression symptom levels when controlled for individual characteristics? (Question 3, Chapter 9)

In a study among the elderly population (Chapter 9), it was shown that some neighbourhood variables were correlated to depression symptom level scores. In a multi-level model however, which included individual characteristics of the elderly alongside neighbourhood characteristics, only individual variables were found to relate significantly to depression symptom level scores.

Are neighbourhood characteristics related to psychiatric admission rates? (Question 4, Chapters 10-11)

Two factors were derived from a set of neighbourhood demographic variables: socio-economic deprivation and housing quality. They were both significantly related to neighbourhood admission rates (Chapter 10). After adjustment for sex, age and marital status, housing quality was no longer significantly related to admission rates while socio-economic deprivation remained a significant factor. It was also found that social deprivation was negatively related to mean neighbourhood length of stay (the higher the level of deprivation, the longer the length of stay) and was positively related to the neighbourhood proportion of re-admissions (the higher the level of deprivation, the larger the proportion of re-admissions).

In a subsequent paper (Chapter 11), socio-economic deprivation was found to be significantly related to admission rates for the separate diagnostic groups of schizophrenia, other psychotic disorders and neurotic disorders. The most deprived neighbourhoods (divided into four categories) had a 73% higher rate of admissions on average compared to affluent neighbourhoods. Admission rates for schizophrenia, other psychotic disorders, and neurotic disorders were 141%, 62% and 100% higher respectively. There were no significant differences for affective psychoses, organic psychoses and personality disorders.

Length of admission was positively related to socio-economic deprivation for affective disorders, other psychotic disorders, and the total of all disorders. The re-admission rate was negatively related to socio-economic deprivation for total rates of disorder (the higher the re-admission rate, the lower the level of deprivation).

In summary, the first main finding was that total prevalence rates and admission rates are related to urbanization (Chapters 2-8). Although, sex, age and civil status in particular affect the relation with urbanization, the relation remained significant after adjustment. This main finding also applied to many of the diagnostic subcategories.

The second main finding was that individual depression symptom level data for older inhabitants were not related to neighbourhood-level census statistics after individual characteristics had been accounted for (Chapter 9). However, neighbourhood levels of social deprivation, and the census variables related to this concept, were positively related to neighbourhood admission rates (Chapters 10-11).

## **Discussion**

An important topic of methodological concern relates to the concepts 'urban' and 'rural'. Firstly, these concepts are relative. What is defined as 'urban' in some countries according to the national statistical institution or study definitions may be defined as almost 'rural' in another country. Secondly, there are numerous ways in which urbanization is measured. Population density is used most often, but also municipality population size or a combination of demographic characteristics are used. Thirdly, there are many ways in which categories of urbanization are established. However, a simple urban-rural dichotomy is often used, although this makes it impossible to establish an urban-rural gradient (for which more than two categories are needed). A gradient of this kind would indicate a dose-response relationship, which is one of the conditions for postulating a causal relationship. As we generally used a five-category approach to urbanization in this thesis, we were eventually able to detect an urban-rural gradient.

A second methodological issue is the ecological fallacy. This term refers to the fact that correlational findings on an aggregated level cannot be transferred directly to the individual or group level. This topic is relevant to our studies of the relationship between psychiatric admissions from urban areas and the characteristics of those areas. If the neighbourhood proportion of unemployed inhabitants is significantly correlated to the admission figure, it cannot be concluded that the risk of admission is higher for the individual unemployed person. The proportion of unemployed inhabitants can therefore only be used as a 'proxy' for the risk of admission.

Two of the ecological neighbourhood studies (Chapters 10-11) showed quite strong relationships between neighbourhood deprivation and psychiatric admission rates, and this finding concurs with several other studies in the Netherlands and abroad. However, our neighbourhood study of depression symptom scores for elderly inhabitants (Chapter 9) did not show a significant neighbourhood effect. This was in agreement with a number of comparable studies among the elderly. Our study among the elderly differed from the two other neighbourhood studies in this thesis since multilevel analysis was used, and the other two were correlational studies. Incidentally, several comparable multilevel neighbourhood studies among the elderly have found neighbourhood effects that were independent of individual factors. Despite this fact, the possibility cannot be disregarded that our two correlational neighbourhood studies would have shown less pronounced neighbourhood effects, or that there would even have been no effect, if correction for individual factors had been possible. It is also important to take into account that the elderly are a subgroup of the neighbourhood population for which, in our case, depression symptom scores were not related to general neighbourhood characteristics. As the elderly are a relatively small subgroup, we think it is inappropriate to extrapolate the finding for the elderly that the neighbourhood has no effect and to apply it to the total population of Amsterdam involved in the other two neighbourhood studies.

To explain inner-city and urban-rural variations in psychiatric morbidity, there were originally two main theoretical concepts: the drift hypothesis and the breeder hypothesis. The drift hypothesis assumes, on the one hand, that sick and vulnerable people are more or less doomed to remain in socially unstable, deprived neighbourhoods, while better-off people move away (this is also known as the 'social residue' theory). On the other hand, socially deprived neighbourhoods can also exert a 'pull' on some mentally ill people, since they sometimes move to the areas where social control is less strict and there is more tolerance of deviant behaviour. Evidence about drift processes is sparse. The second theory, the breeder hypothesis, assumes that various environmental factors can cause illness. These can be physical factors (air pollution, small housing, high population density, noise), and also social factors (negative life events, social isolation, crime). The concept of social cohesion, which can be thought of as a 'breeder factor', is frequently studied nowadays. Research shows that social cohesion may be a factor alongside various other factors explaining inner-city and urban-rural variations in mental health. An additional finding concerning the breeder hypothesis is that schizophrenia research has identified several possible causal perinatal factors that are more prevalent in highly populated areas, and also in socially deprived areas. Examples are: infectious diseases, obstetric complications, and malnutrition. Another finding supporting the breeder hypothesis is the dose-response relationship between exposure to an urban setting prior to the 15<sup>th</sup> birthday and the individual

risk of admission for schizophrenia. In summary, there is quite strong evidence that both physical and social environmental factors are important determinants of the development of psychiatric disorders. Luckily, there are ways to lower the risk of psychiatric illness in high-risk areas. It was found in Great Britain and Norway that improving neighbourhood living conditions and thereby enhancing social cohesion did improve general mental health substantially.

In the Netherlands, we found a 77% increase in the prevalence of disorders in the population of very highly urbanized areas (Chapter 2). We even found a 100% increase in the admission ratios for the same areas (Chapter 5). As we found these significantly elevated prevalence and admission rates in urban areas and also in deprived city neighbourhoods in Amsterdam, it is legitimate to ask whether the current capacity of psychiatric facilities matches these findings. In the discussion chapter, we suggest that a city like Amsterdam has relatively more severely psychiatrically ill people, even though the mental health costs per patient are average for the Netherlands. This has been achieved by transferring severely ill patients from in-patient to out-patient facilities more than elsewhere. Although mental health services seem to be used more efficiently in a city like Amsterdam, services could ideally be distributed in a way that reflects differences in the assumed demand for mental health according to urbanization.