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Inequalities and inequities in mental health and care

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Glossary

- Belgian Health Interview Sur. Belgian Health Interview Sur
- BPCO. : *Bronchite Pulmonaire Chronique Obstructive*
- CES-D. Center for Epidemiological Study of Depression
- CIDI. Composite International Diagnostic Interview
- Cii. illness concentration index
- CREDES. Centre de Recherche, d'Etude et de Documentation en Economie de la Santé
- DCP. Direction Control and Planning
- DIS. National Institute of Mental Health Diagnostic Interview Schedule
- DSM. Diagnostic and Statistical Manual of mental disorders
- ECA. Epidemiological Catchment Area
- ECHP. European Community Household Panel
- GAF. Global Assessment and functioning scale
- GHQ. General Health Questionnaire
- GP. General Practitioner
- HDL. Health and Daily Living Form
- HIS. Health Interview Survey
- HULLS. Hospitals Unexpected Long Length of Stay
- ICD. International Classification of Diseases
- ICPC. International Classification of Primary Care
- ISCO. International Standard Classification of Occupation
- LLTI. limiting long-term illness
- LOCF. last observation carried forward
- MAUP. modifiable areal unit problem
- MCAR. missing completely at random
- MPS. Minimum Psychiatric Summary
- NCS. National Comorbidity Survey
- NIS. Belgian National Institute of Statistics
- OECD. Organisation of Economic Coorporation and Development
- OLS. Ordinary Least Squares
- OR. odds-ratio
- PCC. Psychiatric Community Care
- PSBH. Belgian Panel of Households
- PSE. Present State Examination
- RAWP. Resources Allocation Working Party
- RDC. Research Diagnosis Criteria
- RPM. Résumé Psychiatrique Minimum
- SAR. Simultaneous Autoregressive
- SES. socio-economic status
- SF-36. Short Form-36 physical functioning scale
- SMR. standardised mortality ratios
- UK. United Kingdom
- USA. United States of America
- WHO. World Health Organisation. World Health Organisation
- WLS. Weighted least squares

Introduction

This dissertation aims at analysing the relationship between socio-economic status and mental health and care. It attempts to understand how different socio-economic groups present unequal risks of mental disorder and to what extent different socio-economic groups use unequal quantity, type and quality of mental care.

There are three main reasons for studying inequality and inequity for mental disorders. First, such disorders are highly prevalent and disabling. Secondly, they induce a heavy burden in terms of mortality and health care expenditures. Mental care presents, thirdly, a rather high mismatch between needs and use, entailing a higher risk of inequity. Finally, a longstanding body of research has shown its relationship with socio-economic status.

The introduction first provides some background information regarding the disease importance and burden, its relationship with socio-economic status and the use of mental care. The objectives and the organisation of the dissertation are presented respectively in the second and third sections. Because this dissertation uses a wide range of data, we provide a brief description of the databases used in the several chapters.

1. Importance and burden of mental disorders

The year 2001 was devoted to mental health. This is not an undue merit, for mental disorders represent an important share of the burden of diseases, invalidity and mortality. If we consider recent data from studies using diagnostic schedules, it is found that one in five individuals had a mental disorder in the preceding year in the Netherlands (23%) and in Germany (24%)(6). Mental health is not only a very prevalent but also a very disabling disease. Psychiatric disorders interfere with occupational role dysfunction for 35% of the cases, entail physical disability in 48% of them and last an average of 6 days (251). The World Health Organisation (WHO) estimated that neuropsychiatric disorders account for 13% of all the daily adjusted life years disability (250). Mental disorder increases the risk of morbidity and mortality. It is well known that depression increases the risk of suicide. Moreover, mental disorders also increase the risk of overall mortality. A 16-year follow-up of a community sample of the Stirling County, Canada, showed that individuals with a diagnosis of depression or anxiety had a 69% higher risk of death compared with those not having such a diagnosis (142). This risk was stronger in the younger age groups. Also, because depression affects immunological functions, it may increase the risk of morbidity (49). A population-based case-control study evidenced that men with depression within the preceding 10 years were three times more likely to develop an ischaemic heart disease (136).

The treatment of mental disorders has put public budget under huge strain. Mental disorders are costly to society both in terms of direct health care spending for treatment as in terms of the individual and collective losses sustained as a consequence of the disorders (unemployment, earnings, criminality, child abuse, homelessness, divorce) (101). Because several mental disorders turn out chronic and because a major part of the treatment aims at caring and not curing, this group of diseases ranked as one of the costly diseases, accounting for 28% of all health care costs (223).

2. Objectives

Since its earlier beginnings, psychiatric epidemiology has evidenced the association between socio-economic status and mental disorder. One of the early review found 17 out of 20 studies involving higher overall rates of psychopathology in the lowest social class, with rates in average 2.6 times higher than for the higher class (84).

However, the numerous prevalence studies addressing depression, have yielded inconsistent results (184). The inconclusive results related to socio-economic factors of affective disorders call for a thorough investigation of the sources of such heterogeneity. **Our first objective is to unfold contextual and methodological covariates that can strengthen or weaken the SES/mental health relationship.** As predicted by the strain theory, time, place, setting and population type are some contextual determinants which may alter the socioeconomic gradient in mental health. There is increasing indication that socio-economic inequalities in health are context specific. For example, there is evidence that European countries do not present the same level of socio-economic inequalities in mortality(189). Regarding mental health, a study by Scott Weich hints that local income inequality increased the risk of common mental disorder amongst the most affluent individuals(340). This suggests that place of living is interacting with socio-economic inequalities in health.

We count with a lot of study showing some positive association between material deprivation and psychiatric disorders. The difficulty to move from correlation to causation, owes partly to the difficulty of disentangling the direct effect of socio-economic status from other –and numerous- confounding factors such as family history, genetic endowment, cognitive abilities, early schooling experience, overall health status,... Previous researches have showed that deprived individuals had an increased risk of mood disorder compared with the well-off. Here, we want to test **whether an increase of material deprivation is a risk factor of depression onset or persistence, for given individual characteristics.** This will help to assess the direct link between material deprivation and depression.

Because of the importance of mental disorders in terms of prevalence, disability, mortality and expenditures, the use of mental care has long been scrutinised. In particular, the last generation of psychiatric epidemiological surveys carried out with structured schedules allowed to make psychiatric diagnosis and, hence, to distinguish between disordered and non-disordered individuals. Some of those works paid also attention to mental care use in Canada, USA, the Netherlands, Australia and the UK. Whatever the country, at best one third of affected individuals received any form of treatment. Such coverage ranged from 12% in the UK (224), 22% in North America (2), 33% in Australia (8) and 34% in the Netherlands (29). Conversely, there is a small proportion of use of mental care by not disordered individuals. Although such proportion is small (3% in Canada and 9% in the Netherlands), it entails that mental care may divide equally between individuals without any psychiatric diagnosis and individuals with a psychiatric diagnosis. This suggests that delivery of mental care would be heavily inequitable, because the majority of those with needs do not use any care and nearly half of those using do not need such care. The low take-up rate among disordered individuals and the use of mental care among non-disordered individuals make the mental health delivery system at higher risk of socio-economic inequity.

From this background of poor coverage of mental care and of socio-economic inequalities in mental health, we attempt to assess **whether mental care is fairly used in the different socio-economic groups.** This objective aims at measuring equity in mental care and is

undertaken both for outpatient and inpatient care. We first define equity as a distribution in which individuals in equal ill-health status use equivalent quantities of (mental) care (called horizontal equity). Although such method is now widely used in health economics, it does not get rid of equity which can encompass different underlying social justice theories. If society bothers about equity in care, more than about equity in, say, pizzas, it is not for health care as such but for health : because health care helps to improve – or protect – health status, considered not as means but as an end in itself. The horizontal equity principle makes two restrictive assumptions, which jeopardize the link between horizontal equity and equality of health. These studies assumed that a fair distribution of care is achieved when individuals of equal ill-health status use the same quantity of care. Moreover, such studies are settled on the hypothesis that care has a uniform health enhancing ability. They take as granted that there is no difference in quality of care and no disparities in capacity to benefit (107). Checking such assumptions leads us to a second model in which equity is defined in terms of equal health outcome. As such, we hope to contribute to a model of equity which is bound to support a higher goal, largely considered here and in the World Health Organisation agenda, equality of health (249).

3. Plan and format of the dissertation

To achieve those four objectives, the dissertation encompasses four steps (see Figure 0-1. Dissertation flowchart.). **In a first step**, a general qualitative and a quantitative review are undertaken. The qualitative review aims at providing a synthesis of the magnitude, the direction, the pathways, the dynamic of socio-economic inequalities in mental health and

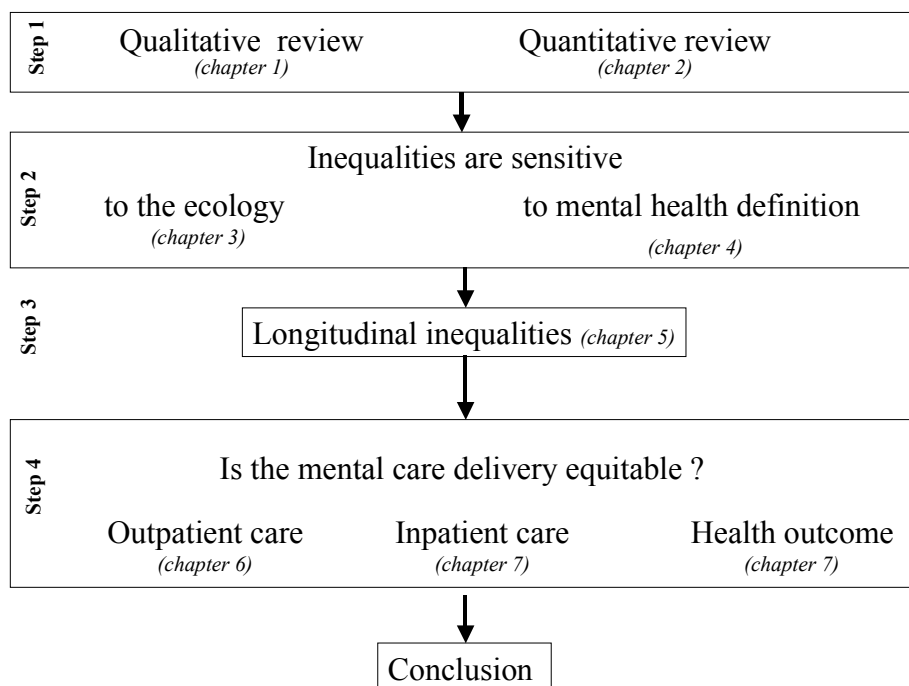


Figure 0-1. Dissertation flowchart.

care (Chapter 1). As the results specific to mood disorders are conflicting, we attempt to understand the variability of the research results devoted to socio-economic factors of mood disorders. This will lead us to carry out a meta-analysis of 51 studies addressing socio-economic factors of depression (Chapter 2). The meta-analysis allows us to measure the magnitude, the form and the covariates of the association between SES and depression.

The second step addresses two methodological issues raised by the previous meta-analysis, the role of the ecology and the way mental health is defined. First, mental health is also rooted in a specific spatial context and the socio-economic influence on mental health is also sensitive to such a context. Chapter 3 analyses spatial inequalities in mortality. It will lead us to analyse socio-economic inequalities for several mortality causes. Distribution of mortality for two causes linked with mental health, cirrhosis and suicide, are also provided. It suggests that specific ecological factors may be at stake when measuring socio-economic inequalities in health. Secondly, we compare inequality indices for several definitions of mental health status, categorical or continuous measure, for functional and symptoms-based approaches of mental disorders (Chapter 4).

The third step is devoted to a longitudinal analysis of the mental health inequalities. It seeks to measure the contribution of socio-economic status to the onset and the maintenance of mental disorders considering various confounding factors (Chapter 5).

The fourth step is devoted to measuring inequity in mental care. Regarding outpatient mental care, it is unclear whether access to mental health care is different from access to overall health care. When seeking to assess equity in the delivery of outpatient mental care, it is thus necessary to check whether mental health performs as well as overall non-mental care. The purpose of Chapter 6 is to compare equity in mental health care with equity in non-mental health care, considering the population needing or using any outpatient mental care. We aim at measuring inequity with respect to three broad types of outpatient care in Belgium, which all have a good overall access utility: general practice, specialty care and medication.

There are plenty of studies addressing socio-economic inequalities in outpatient or primary care settings (67), but (100) (141,166,217,302,304,313) very few have addressed inequalities within inpatient psychiatric wards. Because they used a population sample, epidemiological studies had a limited ability to focus on psychiatric inpatient care. Inpatient setting is mostly used by severely ill patients with poor functioning, more psychiatric comorbidity, with substance abuse or schizophrenia (29). Although, inpatient care accounts for a rather limited share of all mental care, it concerns those patients with poorer prognosis. Chapter 7 of this dissertation is dedicated to measuring inequalities in the use of psychiatric inpatient setting. We go beyond the equal use for equal ill-health principle and seek to assess inequalities in appropriateness and outcome of mental care.

This dissertation is constructed around a set of papers submitted, accepted for publication or already published. Such presentation presents one drawback and two advantages. Papers present a less organised picture of the whole dissertation and make it more difficult for the reader to follow the progression. However, these papers were a very stimulating way of communicating and discussing the work being carried out with both the supervisors and reviewers. They also help distribute the literature review, the methods design and the data processing on various sub-products, making the thesis less cumbersome to read and the final product less vulnerable.

4. Materials

These various tasks have been carried out with the help of several databases. Although each paper provides a full description of the information used, the overall presentation of the sources used will help to catch the originality and limits of the work performed. Moreover, as

a few databases have been used for several chapters, it is useful to help the reader finding the results of each of them.

The first and second chapters are developed on a review of previously published works. We built a database of studies addressing the socio-economic factors of mental health in adults, using population data and being published in English, French, German and Spanish after 1979. Searching several bibliographic databases, we found 51 studies meeting those criteria.

Death certificates of the Belgian National Institute of Statistics (NIS) were used for chapter 3. We obtained information on 952 677 deaths, covering the 1985-93 period; we analysed all causes mortality and 11 specific mortality causes which are known to be vulnerable to primary and secondary prevention, among which liver cirrhosis and suicide .

Data of the first Belgian Health Interview Survey (HIS) were processed for chapters 4 and 6. The HIS is a cross-sectional household-health interview survey carried out in Belgium in 1997 by the Scientific Institute of Public Health Louis Pasteur. HIS counts with numerous information on health status, mental health, lifestyles, socio-economic status and health care use. Those data were collected by face-to-face interview and auto-questionnaire. Out of the 10 225 individuals, we analysed the data of the 7 378 of them aged at least 25.

Chapter 5 is carried out with the help of the Belgian Panel of Households (PSBH). This is an annual panel survey carried out between 1992 and 1999 on a sample of Belgian households. Although this panel was not conceived for health assessment, it counts with some health and mental health data, as well as a few data on health care. Two Belgian Universities, the University of Liège and the University of Antwerpen manage the PSBH.

Chapter 7 is making use of the “Minimum Psychiatric Summary”. Since 1996, all psychiatric admissions, treatments and discharges have faced a mandatory registering on a unique format, the Minimum Psychiatric Summary (MPS), held at the Ministry of Health (56). Of the 166 839 discharges which occurred during the 1997-1998 period, we selected the non-psychogeriatric wards discharges (N=144 754).

Chapter 1. Socio-economic status and mental health : a comprehensive review

1.1. Introduction

Mental disorders represent an important share of the burden of diseases, invalidity and mortality. From recent epidemiological studies, it is found that one in five individuals had a mental disorder in the preceding year in the Netherlands (23%) and in Germany (24%) (6). Mental health is not only a very prevalent but also a very disabling disease with psychiatry disorders interfering with occupational role dysfunction for 35% of the cases, and leading to physical disability in 48% (251). The World Health Organisation (WHO) estimated that neuropsychiatric disorders accounts for 13% of all the daily adjusted life years disability (250). Because several mental disorders turn out chronic and because a major part of the treatment aims at caring and not curing, this group of diseases ranked as one of the costly diseases, accounting for 28% of all health care costs (223).

Social psychiatry has long noted the association between socio-economic status and mental disorders. Inequalities are found for morbidity, risk factors, disability and health care use. A very early review, dating back to 1969, found 17 out of 20 studies involving higher overall rates of psychopathology in the lowest social class, with rates in average 2.6 times higher than for the higher class (84). A recent review restated such results and suggested that the magnitude of such socio-economic factors was disorder specific (184). Poorer coping styles, ongoing life-events, stress exposure and weaker social support are some examples of psychiatric risk factors, which are more prevalent in lower socio-economic groups (311). The outcomes of such highest mental morbidity were also unequally distributed. For the same level of severity, lower socio-economic group faced more disabilities (22) and a poorer prognosis (339). In countries providing less generous welfare support, such groups also faced less favourable access to health care (166). Whatever the welfare coverage, they were less likely to use specialised mental care (2).

This chapter reviews the relationship between socio-economic status and mental disorders and care. The review aims at tackling five issues: we first sought to assess the magnitude, the direction and the pathways of the relationship between socio-economic status and mental disorders; we then proceed to a longitudinal analysis and finally we study mental care. In a first step, we sought to measure the overall magnitude of such a relationship by using a previous recently published review (184). The direction of such a relationship has long been a puzzling issue in social psychiatry and can be summarised by the following question : Is socioeconomic status influencing mental disorder or is it the reverse : mental disorder acting on socio-economic status ? Such a question has been labelled as the causation/selection issue and is addressed in the second part of this chapter. But stating that socio-economic status is influencing mental disorders does not provide the full story. More precisely, it is necessary to provide the pathways linking such two variables and to explain how socio-economic status turns out to increase the risk of mental disorders. There are several contending explanations here and these are presented in the third part of the chapter. The fourth part of the review attempts to assess the relationship in a more dynamic perspective. We will try to state whether socio-economic status is a predictor of the onset versus the duration of mental disorder and whether the lifecycle has anything to do with such issue. Last, none of the previous reviews

has paid attention to mental care. More recently, it is repeatedly found that at best one third of disordered individuals received any form of treatment in the UK (224), in North America (2), in Australia (8) and in the Netherlands (29). Because of this very particular relationship between mental care and mental disorders, the study has also embarked in reviewing the link between socio-economic status and the use of mental health care.

1.2. Magnitude of the relationship

The study of Faris and Dunham, Chicago, was one of the first studies to evidence the relation between socio-economic status (SES) and psychiatric disorders. The Chicago study showed that the location in a social structure had an impact on mental health, especially on the likelihood of schizophrenia (64). This work was followed by other landmark studies by Hollingshead and Redlich in New Haven, Langner and Srole with the Midtown Manhattan study, and the Stirling County study. At the beginning of the 80thies, one of the early review found 17 out of 20 studies involving higher overall rates of psychopathology in the lowest social class. In average, the lowest class had 2.6 times the rate of the highest class. The relationship seems less strong for neuroses for which only 5 out of 11 specific studies yielding higher prevalence rate for the lowest social class, with an average rate ratio of 1.3 (84) .

Such first and second generation works had some methodological weaknesses. First, some of those works relied on patient's observations making results vulnerable to help-seeking and referral process (140). Second, they conceptualised psychiatric disorder in general with poor nomenclature and without adequate criteria for setting threshold of psychiatric caseness (12,82). Last, they tended to use symptom-screening instruments, which were poorly specific, because they included a wide range of psycho-physiologic problems rather than true psychiatric disorder (84).

The third generation of psychiatric epidemiology studies began around 1980 with the third edition of the diagnostic and statistical manual of mental disorders (DSM). It led to the development of numerous symptoms checklists (GHQ, CES-D,...), semi-structured diagnostic interview (Present State Examination, the Schedule for Affective Disorders and Schizophrenia) and fully structured diagnostic interview, mainly the National Institute of Mental Health Diagnostic Interview Schedule (DIS) and the World Health Organisation Composite International Diagnostic Interview (CIDI) (82). Increasingly, several of these instruments were used in large population surveys by lay interviewers. The Present State Examination (PSE) has been used since the end of the 70^{ties} in community surveys in the UK, Spain, The Netherlands and New-Zealand (41,137,327) . The Munich Follow-up Study, the Epidemiological Catchment Area survey, the National Comorbidity Survey in the US, the Nemesis study in The Netherlands, were among the first large population surveys using the DIS (30,181,265,350).

In a more recent review of the socio-economic factors and mental disorders, Kohn found that the median ratio comparing overall psychopathology in the lower socioeconomic group with the higher reached 2.1 for 1-year prevalence and 1.4 for lifetime prevalence (184) . There were significant differences between groups of disorders (Table 1-1). Antisocial personality, panic disorder, schizophrenia and substance disorder evidenced a stronger gradient than major depression or general anxiety disorders. It is interesting to note that whatever disorder, lifetime rate ratio were smaller than 1-year ratio. This suggests that lower SES groups have more episodes or that their episodes have a higher duration. Hence, there may be a case for

understanding how SES leads to chronic or longer episodes compared with the relation is has with its onset.

Table 1-1. Rate ratios of prevalence of psychiatric disorder in the lower Socio-economic group to the prevalence of psychiatric disorder in the higher socio-economic group by disorder type.

Type of psychiatric Disorder	1-year ‡ prevalence ratio ¶	Lifetime prevalence ratio¶	Nber of studies	Consistency †
Antisocial personality		7,7	7	71%
Panic	5,6	1,9	10	60%
Schizophrenia	3,4	2,4	11	73%
Alcoholism	3,4	1,6	13	77%
Phobia	2,5	1,6	9	56%
Major depression	2,4	1,1	23	52%
General anxiety	1,7	1,0	6	33%
Obsessive-compulsive	1,7	1,3	9	44%

Source : (184)

† percentage of the studies yielding prevalence ratio significantly different from 1.

‡ period closer to 1-year.

¶prevalence ratio of disorder in the lowest socio-economic group to the prevalence of disorder in the highest group.

1.3. Direction of the relationship : selection or causation

A question which has long dominated the debate is the direction of this relationship as it can go in two ways. The causation way spells that lower socio-economic groups are exposed to more stressful life events, have less material, occupational and psychological resources to buffer the impact of such environmental stressors. The study of Brown and Harris is a pioneer empirical work within this framework. It showed that working class women had a higher risk of major depression than those of the middle class, because they combined more provoking agents, higher vulnerability and lower protective factors. More concretely, Brown showed that women of the working class were 3 times more likely to face severe and enduring events, they were more vulnerable to such events because they could not count with the same intimacy than women of the middle class and because they were more likely to have had a previous experience of a loss in their childhood and to have lower protective factor such as self-esteem (41). The selection hypothesis assumes the reversed causality : individuals of poor mental health status are less likely to be socially upwards mobile and are more likely to have a downward drift in their social position. Some studies have shown that schizophrenic patients or children with epilepsy were likely to have a downward occupational drift (16,131).

The Israël study has been the first to apply a quasi-experimental design to the causation/selection debate (83). The selection theory predicted that the hindered social mobility in the ethnic minority group would keep the healthier members of such group in the lower socio-economic strata, leading to lower prevalence of mental disorder in such group compared with the ethnic majority group. The causation theory assumes that, owing to the stressful discriminations affecting its members, the ethnic minority group would have higher level of mental disorder than the ethnic majority group, at every level of the social

stratification (83). By comparing the distribution of mental disorder prevalence in the two ethnic groups, nested by socio-economic strata, the Israel study was able to state that selection was applying to schizophrenia, while major depression (for women only), substance abuse disorder (for men) and antisocial personality (for men) were consistent with the causation theory. However, this study had limitations: by using cross-sectional data, it could not disentangle the causation from selection (226); second, it assumes that the stressful process affecting low socio-economic status was the same as the one influencing ethnic minority group (93).

As cross-sectional design had limited abilities to disentangle causation and selection, several studies have used longitudinal data to test for selection and causation. Social selection has been tested by studies assessing educational and occupational attainment of those offspring having an early mental disorder: the National Comorbidity study in the US (180), the Dunedin study in New-Zealand (226), the New-York study (152). The NCS studies suggested that any earlier disorder affect educational attainment, for mood, anxiety, substance and conduct disorders. However, this NCS study did not take into consideration parental own socioeconomic status or psychopathology and relied on a 15 years retrospective assessment of school dropout. The Dunedin and the New-York studies had the strength of being longitudinal studies, to control for parental SES and – for the New York study – for parental psychopathology, two covariates belonging to an inter-generational causation hypothesis. These two latter studies concluded that early depressive or anxiety disorders were not predictive of later educational attainment. However, the three studies converged that offspring having a disruptive or substance disorder were on average 3 times less likely to complete high school. Regarding causation, the Dunedin and the New-York studies investigated the relation between parental SES and offspring psychopathology. Those studies provided results supporting causation for anxiety disorders, while the New-York study supported such theory for depression.

But this causation/selection debate can hardly be considered as closed for several reasons. First, it is still unclear why the selection assumption holds for schizophrenia and not for, say, anxiety or mood disorders. Disability could provide a tentative explanation : the higher disability burden of schizophrenia, compared with other mental disorders (318), might explain the finding that for psychosis selection has the edge other causation. However, this would imply that selection would be general and influenced by the disabling burden and chronicity of a disease. This assumption remains to be tested. The second limitation of the causation/selection studies carried out up to now arises from the design. By focusing mainly on time-invariant socio-economic status (such as education and occupation), previous studies have left open the case of selection for time-variant covariates such as income, poverty, deprivation, job control. It is poorly relevant to assess selection on SES covariates which are mostly stable over time. Finally, most of previous studies have focused on early adulthood, leaving the selection/causation issue opened regarding adulthood which plays a determinant role in status achievement.

A final point is worth noting about the selection and causation processes. Neither of such processes keeps out social or biological processes. If epileptic patients fail to be properly employed, if young men with substance disorder do not achieve high school, such selection owe to social processes. As stated by West, social selection is often considered as theoretical debt to social Darwinism (344). It is not. Selection encompasses a wide range of social processes such as discrimination towards the mentally ill, exclusion from the labour market,

cream-skimming in the educational or health care system. And West to call for a reformulation of health selection as a profoundly social and sociological issue. In the opposite, causation may also imply biological pathways. Brunner and Marmot have been suggesting that the stress theory may contribute to explain the impact of socioeconomic status on health, through the sympatho-adrenal pathway and the hypothalamic –pituitary-adrenal axis, the chronic stress may affect the neuroendocrine, the cardiovascular and the immune system (43). Let us give a look at those pathways.

1.4. Pathways

The landmark Israel study showed that stating the direction of the relation did not give the full story. In particular, research needs to understand how low socio-economic status is linked with higher mental disorder in order to unfold both causation and selection processes. There are two main contending groups of explanations, which have been respectively labelled stress and strain (306).

The stress theory provides a micro-social explanation of how exposures to stressful ongoing life-events, combined with unfavourable coping styles, produce mental disorders. The strain theory provides a macro-social explanation involving the society organisation such social cohesion, income distribution,...

The stress theory

In dealing with the explanation, the stress theory has been given major emphasis. Such theory suggests that the social differences in depression arise from, first, the socially-patterned differences in risk exposure and, second, differences in vulnerability or protective factors . It has been particularly popularised by two early empirical studies : the landmark study of Brown and Harris and the work of Wheaton (41,345). The Camberwell study showed that the impact of severe life events or severe ongoing difficulties was mediated by various vulnerability factors: lack of confident, low self-esteem, no paid employment and loss of a parent in childhood (41). However, the Camberwell study could not be replicated by Bebbington with the same population (23). Using panel data on two Illinois rural areas and a panel of Michigan youth, Wheaton illustrated that fatalism (a predisposition to interpret the external environment as having high causal power) was a significant mediating variable of the relation between SES and psychological disorders (measured by the Langner scale)(345) : increasing SES level led to a reduction of fatalism, while fatalism increased level of psychological disorders.

The conceptualisation and measurement of the theory has since been refined. Chronic stressors and ongoing difficulties are being considered (9). Mastery, self-efficacy, self-esteem, locus of control, social support are some vulnerability and protective factors which appear to buffer the impact of acute and chronic stressors on psychological distress (72,256,281). The link between socio-economic context and such factors has been evidenced (39). In particular, mastery and self-esteem are correlated with socio-economic status. Occupational characteristics explain why mastery and self-esteem are linked to socio-economic status. Mastery, the extent to which life-chances are being regarded as under one's control, is linked to occupation, because the greater the opportunity of self-direction, the greater the resulting sense of personal efficacy (103). Self-esteem expresses an attitude of approval or disapproval towards oneself, also correlated with socio-economic status through occupation because those

in the higher classes have more resources (prestige, power, initiative) to enhance their positive self-image. Most of the first studies of the stress theory were often carried out using psychological distress scales and treated mental health as a unique end-point. Such approach biased the results, as shown by Aneshensel, because different groups (or genders) tend to react differently to different types of stressors (10).

Formal tests of the mediating effect of the stress theory using structured psychiatric interview schedule have been carried out recently (311). The study of Turner and Lloyd showed that the exposure to stress and vulnerability factors (mastery, self-esteem, social support, emotional reliance and assertion of autonomy) accounted for 91% of the socio-economic difference in depressive symptoms and 47% of the relation between socio-economic status and major depressive disorder, with mastery being the major mediating variable of the SES/depression relation (311). Yet, as the design was cross-sectional, this latter work couldn't exclude reverse causation, in particular the fact that depression might lower self-esteem, mastery and social support. This eventuality was already raised by Brown and Harris when they wrote that "*women low on self-esteem might tend [...]not to involve in work outside the home*" so that "*their low self-esteem may have predated the vulnerability factor*" (41). In fact, there are some evidences of such reverse causation. Depression has been shown to lower self-esteem in an adolescent population (279) and social relations in adults (153). Last, in the study of Turner and Lloyd, the mediating effect was smaller for the diagnostic of major depression (using the DSM-CIDI) than for symptoms of depression (with the CES-d scale) (311).

But still, there is a missing link in this theory. Specifically, it remains to explain why lower socio-economic individuals are less favourably endowed of such protective or vulnerability factors, such as mastery, locus of control or self-esteem. Here, worksites have provided some insights. Kohn and colleagues demonstrated how occupational self-direction implied a complex job, not closely supervised, not involving routine tasks, demanding repeated challenges and creativity, and better psychological functioning and less distress and anxiety (202). Similarly, having control over others enhanced a sense of personal efficacy and mastery. The explaining power of such work characteristics have been investigated by several empirical works, the Whitehall II study and a case-control and community study. Using the Job Strain model of Karasek, Stansfeld and colleagues suggested that work characteristics such as decision latitude, control over work, work pace and conflicting demand, skill use and variety explained most of the occupational gradient in depression among men (297). Similar results were reached by Link and colleagues (202). They showed that socio-economic status was no longer a risk factor of psychological distress when direction, control and planning (DCP) tasks were considered. Their study was also noteworthy because it suggested that DCP was no longer an explaining factor of depression when mastery and external locus of control were entered. It is worth mentioning that these studies were both cross-sectional; although they used retrospective data, they faced a significant degree of collinearity between employment grade and decision latitude, suggesting that decision latitude or direction and planning abilities were merely indicators of occupational status. Further longitudinal studies are needed to clarify such point.

The stress theory yields a compelling picture of the way exposure to stressor and personal resources interact with psychiatric disorders. Within such theoretical framework, some successful experiments have been carried out to test its usefulness in the case of unemployed individuals who are at higher risk of depression (264).

The structural strain theory

The stress theory has put heavy emphasis on the independent effect of stressors on mental disorders. However, as put by Aneshensel, such approach has overlooked stress as an intervening variable linking social position with psychological dysfunction (9). By showing how genders were reacting differently to different types of stressors, Aneshensel has been able to evidence that social position (gender, ethnic background, socioeconomic status) had an etiological role on the relation between stress and mental disorders. This calls for an analysis of the stressful consequences of social organisation, a point raised by the structural strain theory.

The stress theory favours an individual explanation of depression, leaving aside macro-social factors which, in the early works of Durkheim and Merton, were considered a significant factors of mental health. Yet, health is also the product of values, social welfare, social cohesion, ecological features, infrastructure supply, public health policy, all characteristics of community or society (205,273). The very first social psychiatry study of Farris and Dunham was an ecological one, stressing the link between social isolation and psychiatric admission (138). The strain theory emphasises that the organisation of the society disadvantages some groups of individuals by limiting their access to resources such as employment, housing conditions, education, knowledge, and health care. The conflict between cultural goals and means lead to several adaptative processes, among which mental disorder (306). In particular, strain theory has supplies two empirical investigation lines : the contextual effect of socio-economic deprivation of the areas and the inequality of income distribution.

Since the mid 90ties, several studies have been trying to evidence the impact of the socio-economic characteristics of the areas (also called contextual effect) over and above the individual effects so that space, as such, makes a difference. Put simply, the idea is that living in a poor, unsecured and undeserved area shall affect individual health, whatever their individual socio-economic status. Using multilevel modelling, the evidence of such socio-economic contextual effect is accumulating for mortality (5,191,192,292) (but see (291)), chronic illness (154,288) and self-assessed health (177). Results are less consistent for lifestyles (183,267). There are few such works done in psychiatry. The two studies found yield non convergent results : a British study (89) found no evidence of an area effect on psychiatric morbidity (measured through the GHQ), while a Dutch study showed a small neighbouring effect for psychiatric service use (in and out patient) (87). Such methodological approach, making an intensive use of multi-level modelling, has evidenced contextual effect which remains, in general, rather small in size (273) and present some methodological challenges (80).

A second macro-social investigation line has developed around the theme of income inequality and social capital. This very large and growing body of research has shown some sort of correlation between income inequality and mortality(165,168,177,178,284,352), life expectancy (346) and self-assessed health (177). Much of the initial work has been developed without a clear theoretical framework, needed to explain how such macro-social feature gets deep into the individual life. More recent works have suggested two macro-social pathways : higher income inequality leads to lower investment in social capital (health care, social services, education) (165), income inequality lowers social cohesion and trust, resulting in damage to the social fabric (170). Recent reviews of this highly productive body of literature suggest that there is still little empirical support for such an hypothesis (332), that the effect of area income inequality on health largely depends on income at the individual level (273)

and, finally, artefactual or methodological problems have still to be resolved (121,162). Regarding mental health, a study by Weich hints that local income inequality increased the risk of common mental disorder amongst the most affluent individuals (340). These results, which need further confirmation, suggest that place of living are interacting with individual socioeconomic factors and mental disorders.

1.5. Onset, maintenance and life cycle

Because mental disorders turn out to remain chronic for about 12% of the patients (290), it is unclear which end-point socio-economic is acting upon (175). Is low SES related to the onset of a depressive episode or/and to its duration, or its chronicity? The cross-sectional observed relationship between SES and depression is compatible with either (or both) onset and duration. Such question has obvious relevance for policy makers and clinicians. The more SES is a risk factor of onset, the more policies should focus on prevention and factors laying out of the health care system such as welfare-to-work programmes, availability of child care of women with young children as suggested in the Acheson report (118). Conversely, poor remission, longer or chronic episodes call for better care or improved coping strategies. The fact that the inequalities are smaller for lifetime period than shorter period of references hints that socio-economic status might be influencing the duration of the episodes. However, longitudinal studies are clearly needed here.

We identified several longitudinal population studies addressing the question of social correlates of mental disorder onset, maintenance, remission or relapse (38,42,143,206,239,276,277,285,339). The relation of socio-economic status with the maintenance or remission of mental disorders have been evidenced by the studies of Weich and Romans (277,339). In a Belgian study, education predicted maintenance only for men (38). The Epidemiological Catchment Area ECA study of Sargeant had mixed results. Education predicted depression 1-year persistence but such association faded away once comorbidity, severity and prior episodes number and duration were taken into account (285). The impact of SES on mental disorder duration was not found in the Stirling county, Canada, study which had, however, limited instrumentation for both mental disorders and socio-economic status (239).

The results converge to show that low socio-economic status has, at best, a slight influence on the risk of disorder onset. The ECA incidence study did not find an increased risk of onset of major depression for low socio-economic groups (143). However, such risk was found for poor individuals compared with non-poor in the New-Haven ECA study (42). Weich and Romans found no difference for poverty or socio-economic status and a small effect for self-perceived financial strain (276,339). The Canadian longitudinal community sample showed that low SES increased vulnerability to depression (239). Two studies measured the risk for attack rate; in both cases they found socio-economic status to be at best a weak predictor of new cases on a period of around 9 years (cumulated incidence) (94,164). The Seattle and Denver Income Experiments provided an interesting experiment to study the impact of income maintenance on distress among low socio-economic status families. The difference between the experiments (receiving guaranteed income during 3 to 5 years) and controls were minimal in terms of distress (306).

It is interesting to note that the mental disorders presenting the higher prevalence ratio (see table 1-1) are also those where chronicity is more important, such as schizophrenia, alcoholism and anxiety disorders.

Previous analyses have overlooked the interaction of the life cycle with the SES/mental health relationship. Theories and explanations are presented as if they were time neutral or as if the relationship was “ageless” (227). In fact, time might be an important vector of the relation between SES and mental disorder, knowing the opposite relation that age has with socio-economic status (\cap shaped) and with depression (\cup shaped). Developmental psychology shows that some protective factors in childhood (family cohesion, availability of external support, opening up of opportunities, early school experience) may influence the risk of future depression (15). Adolescence and young adulthood are also important developmental periods which will influence, through school performance and early occupational experience, future socio-economic status (93). The Camberwell study has also evidenced the importance of life cycle in understanding the relation between socio-economic status and depression. Brown and Harris showed that the class gradient of depression was observed only for women who had children below the age of six: the rate of depression among those of the lowest class was 31%, comparing with 8% of the middle class women (41). The relation was not observed at the other life stages. Regarding middle-adulthood, some works show that job control and other work characteristics are significant explaining factors of the socio-economic inequalities in mental health among the working population (202,297). Other studies indicated that changes in social role (retirement), adversities (widowhood, disability) and economic hardship explain the increasing level of depression in older ages (230). But as far as lower social groups are more exposed to these adversities, the theory of cumulative advantages postulates that inequality in health will increase with age (282). Those factors have a cumulative effect on health and mental health. Empirical work confirmed that the relation between SES and mental health strengthens with increasing age (227). This suggests that different processes at various life stages are increasing socio-economic health inequalities; and they add up.

1.6. Socioeconomic status and mental care

The Rand Experiment and the National Medical Care Utilisation and Expenditure Survey were among the earlier works on mental health care use (217,302,343). Those studies were aiming at estimating price or co-insurance elasticity of mental care demand. They showed that mental care was much more responsive to price and co-insurance rate than the other care. However, such first surveys had the drawback of being undertaken with symptoms checklists, which had low clinical validity. The last generation of psychiatric epidemiological surveys using structured schedules also sought to question mental health care use. We report here the results from the US National Comorbidity Survey, from the Ontario Mental Health supplement, from the Dutch Nemesis study (2), from the UK OPCS survey of psychiatric morbidity (224) and from the Australian Survey of Mental Health and Well-Being (8). Whatever the country, at best one third of disordered individuals received any form of treatment. Such coverage ranged from 12% in the UK (224), 22% in North America (2), 33% in Australia (8) and 34% in the Netherlands. Use of mental care increased in those with more than one psychiatric disorder or with physical illness; it is higher for affective disorder compared with substance disorder (29,167,224). Another interesting feature of the mental health delivery is its use of mental care by not disordered individuals. Although such proportion is small (3% in Canada and 9% in the Netherlands), it entails that mental care

mostly divided equally between individuals without any psychiatric diagnosis and individuals with a psychiatric diagnosis¹. Is there any association with socio-economic status? As often in such issue, the answer is mixed and we address four specific questions: socio-economic differences in the use of any mental care among disordered individuals, differences in the use of any mental care among not disordered individuals, differences by type of mental care, inequalities in the outcome of any mental care.

Among individuals with a DSM-III-R disorder, there were no socio-economic differences in the use of any mental care in the US, in Ontario or in the UK (2,224). Lower SES individuals with disorder were 80% more likely to receive any care in the Netherlands (2). The Australian results were not stratified by disorder status (8). When turning to individuals with no disorder, the US evidenced higher use of any care by the higher income groups in comparison with Ontario or the Netherlands (2,166). Because mental health delivery systems seems to matter, it would have been interesting to compare with the UK. Unfortunately, British results were not available for not disordered individuals. Regarding the sector of care, strong socioeconomic gradient has been found in the US where the highest income group with no mental morbidity were 5.2 times more likely to receive speciality care compared with their Canadian counterparts (166). In the US, low-income groups patients were 4 times more likely to use the human service sector² and 60% less likely to use speciality care. Similar results were also observed in the Netherlands, with general medical sector being more used by lower SES groups (29). Those results are consistent with the earlier Rand and the National Medical Care Utilisation studies, which concluded that socio-economic status was related to the choice of the mental health provider (343).

A final question is whether socio-economic status makes difference in the outcome of mental treatment, for a given mental health care treatment. Among patient studies, there is some conflicting results on the relation between socio-economic factors and clinical course: some have evidenced poorer clinical course for low educational groups (70,112,173,278,300) while others not (174). Two important studies addressing the outcome of anxiety and depression of primary care patients have provided interesting results (253,278). The Hampshire depression project showed that employment status as well as area-level of deprivation predicted both remission and improvement of depression at 6 weeks and 6 months, for a given baseline score (253). The study of Ronalds and colleagues evidenced that educational level was a strong predictor of reduction in Hamilton score³ at 6 month, even controlling for baseline severity score (278). Therefore, regarding the use of mental care, socio-economic inequalities are less marked for the likelihood of any use among disordered individuals but more pronounced for the type of setting used, as well as for the outcome. There are more inequalities among individuals which have no defined psychiatric disorder.

¹ Considering the Dutch epidemiological results, if 34% of the population having any disorder (accounting for 23% of all the population) use mental care, while 9% of those not having disorder (accounting for the remaining 77%) also used care, then the proportion of any care used by the not disordered accounts for 47% of all care used: $=(0.09*0.77)/(0.09*0.77+0.34*0.23)$.

² Human service sector covers treatment by a social worker or a counsellor.

³ The Hamilton Depression scale is used to assess severity once a diagnosis of depression has been made.

1.7. Conclusions

Socio-economic status has presented a moderate-to-strong association with mental health whose magnitude is disorder-specific. Antisocial personality, panic disorder, schizophrenia, alcoholism and phobia present higher and more consistent association than major depression or general anxiety disorder. The direction of the relation seems also disorder-specific. There is some converging indication that schizophrenia entails social selection, while the association between socio-economic status with anxiety or major depression encompass social causation. For substance abuse and disruptive behaviour both processes of selection and causation seem to occur. There is, however, increasing indication that both processes may be occurring at different stages of the life cycle. Selection and causation may not exclude each other. The strain theory provides a macro explanation of how societies produced different degrees of socio-economic inequalities, while the stress theory shows how such macro processes get deep into the individual health status. The former has received some empirical confirmation, while the later is still to be tested. At the individual level, it seems increasingly likely that the higher mental disorder rate of the lower socio-economic groups is largely accounted by an interaction of higher exposure to severe life-events, less protective and more vulnerability factors, jointly with, or because of, labour situation enhancing poor coping strategies. There is more evidence that socio-economic status – as a continuous dimension- has a higher impact on mental disorder maintenance than on the onset of mental disorder, although more research are needed to confirm this. As severity and previous psychiatric history are predictors of remission and relapse, the relationship socio-economic status has with such clinical baseline status and their impact on the SES/mental disorder association should be investigated further. The SES/mental disorder relationship is vulnerable to specific life cycle processes, such as childhood experience, youth educational attainment, motherhood, retirement, job control and latitude in middle-adulthood, widowhood, disability. As these processes add-up, socio-economic mental health inequalities increase with age. Finally, lower socio-economic groups are not less likely to use any care when they need it. But they are less likely to use speciality care when needing and less likely to use any care when they do not need it. For a given use in a primary care setting, they have also a poorer prospect for anxiety and depression.

This review can tentatively support some implications for policies aiming at tackling health inequalities, at improving equity in mental health care and for clinical practice. There are few evidences that policies aiming at relieving financial strain would lead to a lowering of mental health inequalities. Although the Acheson report suggests that relieving poverty would have a significant contribution to health inequalities, empirical demonstration is still lacking (118). Policies seeking to address health inequalities should focus less on relieving economic deprivation and more on fostering personal resources such as self-esteem, self-efficacy, and locus of control (312). This has been shown with very specific groups, such as unemployed individuals (240,264) and remains to be tested on more general population. Future research works on mental health inequalities could be extended in such direction : it would be interesting to assess the stress and coping theory in a longitudinal framework, in order to understand how socio-economic status, coping strategies and mental health ebb and flow other the lifecycle, and to what extent coping strategies are confounders of the SES/mental health relationship.

Fairness is one of the major goal of any health care system (353). It could be improved particularly for specialty care. There is a debate around how to achieve such enhanced access. Some authors have called for enhanced access to specialty mental care (2) while the WHO has been advocating for integrating mental health within the general sector, scrapping big

psychiatric hospitals, and developing community mental health services (250). The debate goes beyond mental care: the primary care and specialty care substitution is found for overall health care and suggests that difference in care setting should be given emphasis in policy making, for example by improving (or limiting) referral, enhancing financial access, reaching a better GP/Specialist partnership,...

The finding that socio-economic inequalities are stronger for persistent depressive disorder than for incidence has some interesting clinical implications. This might be due to under-use of care, failure to be detected, poor delivery of drugs and psychotherapies, poorer outcome or higher disability. The present review does not support that lower SES groups are dumped regarding outpatient care when they need it. The issue is not so much of the use of any care but of the type of care used: lower SES groups use more primary care while high SES groups use more specialty care. A second explanation could be that recognition rate of depression is poorer in lower SES groups. This is not supported by empirical data. Several studies had shown that recognition rate of depression are improved for those individuals having some social problems (246,307), suggesting that for a given contact with a General Practitioner (GP), lower SES individuals are at improved risk of being cared. Is there any problem of delivery of drugs and psychotherapies? While primary care physician are entitled to deliver psychotropic drugs, their abilities to supply efficient psychotherapies (such as cognitive and behaviourist therapies(270)) are reduced. It is unclear but unlikely that GPs foster referrals to mental health care specialist. Thus, the stake would be how to improve delivery of efficient psychotherapies in or through primary care. Finally, psychiatric or non-psychiatric comorbidity might worsen the prognosis of lower SES individuals. Previous epidemiological studies showed that the SES gradient in psychiatric disorder is more pronounced for comorbid psychiatric disorder comparing with pure psychiatric disorder (33). UK data confirmed that, at a given symptom level, lower social groups experienced higher dysfunction (22). The ECA of Baltimore showed that lower educational groups had higher 1-year depression persistence, and that such association faded away once comorbidity, severity and prior episodes number and duration were taken account (285). This issue should be given thorough attention by clinicians. But it also suggests that the question of equal treatment for equal needs should not overlook another issue, that is how unequal needs are treated unequally. Treating a mood disorder with substance abuse comorbidity is not the same as treating a pure depressive disorder. Such issue adds a second research line in order to go beyond the question of use of health care and to analyse quality and outcome of health care, both in outpatient and inpatient setting. This would help addresses the issue of vertical equity in the delivery of health, that is how unequals are treated unequally. This is both a conceptual and a methodological challenge that have been left rather answered up to now.

Chapter 2. Socio-economic inequalities in depression: a meta-analysis⁴

2.1. Introduction

Low socio-economic status (SES) is generally associated with high psychiatric morbidity, disability and poor access to health care. In countries where comparable epidemiological studies have been carried out, the lowest educational group had a higher prevalence of psychiatric morbidity (6). Poorer coping styles, ongoing life-events, stress exposure and weaker social support are some examples of psychiatric risk factors which are more prevalent in lower socio-economic groups (311). The outcomes of such higher mental morbidity were also unequally distributed. For the same level of severity, lower socio-economic groups faced more disabilities (22) and a poorer prognosis (339). In countries providing less generous welfare support, lower SES groups also faced less favourable access to health care (166); whatever the welfare coverage, they were less likely to use specialised mental care (2).

Among psychiatric disorders, depression exhibits a more controversial association with SES. Whereas 17 out of 20 studies examined in a previous review, and including all types of psychiatric disorders, found higher rates of overall psychopathology in the lowest social class (on average 2.6 times higher than in the highest class), the results for depressive neurosis were more ambiguous: only 5 out of 11 specific studies showed a higher prevalence in the lower socio-economic group (average rate ratio of 1.3) (84). A more recent review also showed such controversial results for depression (184), suggesting that inequalities in depression should be further investigated. Most of the early psychiatric epidemiological studies shared three methodological weaknesses (82). First, several of the studies only included patients in the sample, making results vulnerable to variations in the help-seeking and referral process (140). Second, they conceptualised psychiatric disorder in general, with poor nomenclature and without adequate criteria for setting the threshold of psychiatric disorder (12,82). Third, they used symptom-screening instruments which were insufficiently specific, because they mixed a wide range of psycho-physiological problems as well as true psychiatric disorders (84). Since the early 1980s, important psychiatric epidemiological surveys have been carried out on a wider geographical basis. Most of them have used structured diagnostic schedules and more specific psychiatric classifications such as the Diagnostic and Statistical Manual For Mental Disorders (DSM III or IV). However, they have not yielded consistent results for the direction, strength or of the relationship between SES and mental disorder (6). We decided to conduct a meta-analysis in order to measure the magnitude and the shape of the association between SES and depression. Taking advantage of the methodological and geographical variety of previous studies, we also sought to shed light on the methodological and contextual factors which might explain the variability of the results related to the association between SES and depression. Finally, longitudinal studies have allowed us to undertake a more dynamic study of the relationship between SES and depression in terms of incidence (143), remission (112), response to treatment (70,295) or long term outcome (164,278,300,326). As those longitudinal studies help to disentangle the relationship SES had with episode onset, course and duration (82), the review targets the socio-economic gradient of depression in terms of prevalence, incidence and persistence.

². Accepted for publication in the American Journal of Epidemiology.

2.2. Materials and methods

Search

We looked for data on the prevalence, incidence, and persistence of major depression in population-based studies. Studies mainly related to substance abuse, schizophrenia, anxiety or personality disorders were not included in the meta-analysis. Studies addressing common mental disorders (a mix of depression and anxiety) were included. Regarding SES, we retained studies providing a continuous individual level of stratification related to income, education, occupation, social class or wealth (187). We excluded studies mainly devoted to neighbourhood or regional levels of deprivation (or income inequality) (87,89,340).

Four selection criteria were defined in relation to date, language, setting and population. We included studies published after 1979 (corresponding to the first publication of the DSM-III). We selected studies published in English, French, German or Spanish, in order to avoid possible bias entailed by too stringent linguistic criteria (124). The selection was limited to works using a community sample, excluding those relying on primary care or hospitalised patients. These exclusion criteria help to prevent the bias entailed by referral or help-seeking behaviour (93). We restricted the review to studies of adults (16+): research devoted to young people or the elderly were excluded, particularly to avoid the confounding bias of poor physical health .

As this topic is inter-disciplinary, sources in psychiatry, psychology, sociology, medicine and economics were considered. The search covered the following bibliographic databases: Medline, PsycLit, Current Contents, Social Science Citation Index, Sociological Abstract and EconLit. We also followed up with a snowball search (73), including the references from the 5 most recent papers (8,14,94,253,340), from two recent book chapters (64,93) relating to this subject and from previous reviews (184,252). Finally, unpublished studies were searched by contacting the various groups included in the International Consortium in Psychiatric Epidemiology web site (316). Only one unpublished study was obtained (190). The following terms were used in the search equation : mood, affective, depression, depressive, mental, psychiatric, SES, social class, socio-economic, socioeconomic, education, social correlates, socio-demographic, income, deprivation.

Data extraction

Most of the studies computed odds-ratio comparing the lower socio-economic group with the highest. In some cases, only prevalence data were given and we computed the odds-ratio from the tables provided in the papers. Seven studies, mainly published in social science journals, treated depression (as well as in general socio-economic status) as continuous variables by way of correlation or regression coefficients. Correlation coefficients were transformed into odds-ratios using the two following formulae from Lipsey and Wilson where r stands for the correlation coefficient, ES_r and ES_{OR} are respectively the correlation effect size and odd ratio effect Size (203).

$$ES_r = 0.5 \operatorname{Ln} \left[\frac{1+r}{1-r} \right]$$

$$ES_{OR} = e^{\left(\frac{\pi ES_r}{\sqrt{3}} \right)}$$

It was, however, not always possible to specify a dose-response relationship because of the variety of socio-economic indicators used (education, income, occupation, social class, assets) and because some socio-economic variables were given with categorical values (such as low, medium, high) or in quintile income groups. In these cases, we used a strategy suggested by others : only the odd-ratio comparing the low versus high socio-economic categories was retained (106). Most studies examined the relation between depression and two socio-economic variables, such as education and income. When several socio-economic variables were available, educational status was retained, because it is continuous and it applies to all respondents, regardless of working status. When education was not available, income was considered next, and then occupation.

Using such diverse studies in terms of population and methods, we anticipated heterogeneity in the results. We sought to investigate the heterogeneity to generate a better understanding of the relationship between SES and depression (122,308). We extracted from the studies various contextual and methodological data which might explain variations in the relationship magnitude in the meta-regression. The covariates were chosen in accordance with the literature on socio-economic inequalities in mental health. As contextual features, we collected information on the overall prevalence of the disorder, the mean age of the sample, the geographical location and the field date. The literature suggests that the SES-depression relationship might be affected by several features related to measurement and analysis. First, many instruments are available to assess the psychiatric status of adults and can be broadly divided into two groups: psychiatric scales and diagnostic schedule (238). Since symptom inventories have poor criterion validity and tap a mixture of anxiety, demoralisation and physical ill-health (116), they might yield stronger socio-economic gradients than the diagnostic schedules. Second, the strength of the relationship may vary according to the clinical category. Incorporating all neurotic disorders, as in the UK study (200), may lead to a greater relationship because the definition pools anxiety and substance disorder which may have steeper socio-economic slopes than affective disorders (181). Alternatively, the inclusion of all affective disorders may lower the slope since dysthymia may be more equally distributed among the socio-economic strata than major depression (265). Third, the period of reference was considered as a possible explanatory factor because the prevalence rate may be more influenced by the duration of the episode for shorter periods of reference. With respect to SES measurement in public health studies, some standards have been suggested (187,351). The studies were screened for two features: the number of social stratification variables, and the number of socio-economic groups. For analysis and reporting, two methodological criteria were defined with respect to the reported statistics and confounding variables (sex and age). An overall index of quality was computed, summing the score of the 10 variables (table 2-1).

table 2-1. Quality criteria and scores for the 44 prevalence, incidence or persistence studies related to the socio-economic factors of depression, published after 1979.

Description of the quality criteria	Scoring
Was the response rate sufficient ?	0, \leq 70%; 1=70% or more
Was the sample nation-wide or local ?	0= local, regional or metropolitan, 1=nation-wide
Was the information gathered by face to face interview ?	0=not face-to-face interview ; 1=face to face interview
Was psychiatric status assessed by a diagnostic schedule ?	0= symptoms inventory; 1=structured diagnostic schedule
Was the case definition restricted to major depression ?	0=common mental disorders or all mood disorders; 1=depression or major depression
Was the reference period short ?	0=more than 6 months, 1=6 months or less
Was social stratification measured by more than one socio-economic indicator?	0=1 variable; 1=two or more variables
Were the socio-economic variables categorized in more than two groups ?	0=up to 3 groups; 1=4 groups or more
Are the results controlled for age and sex ?	0=no or partial controlling; 1=controlling for sex and age
Are standard error (s.e.) and/or confidence interval (c.i.) of the estimates given ?	0=only p value or less, 1=c.i.and/or s.e.

Statistical analysis

Because the studies came from various geographical areas and used different methods, a between- studies variation was expected (60). In such circumstances, a random model was estimated with the SAS Proc Mixed Restricted Maximum Likelihood estimation procedure (245). Weights were set equal to the reciprocal of the variance of the log estimate. Weighted linear meta-regressions were used to assess the effects of method and context on the heterogeneity. Variables reaching statistical significance ($\alpha=0.05$) in the univariate regressions were considered in the multivariate step. The sensitivity of the regression results was assessed by removing the studies having a Studentized residual above 2 (20) .

Treating socio-economic status as a binary variable obscures the possibility that it might have a non-linear effect on depression (46,58,265). Such non-linearity should also be investigated in meta-analytic studies (96). We carried out a weighted regression of the log odds-ratio on the educational status or income ranking (27,123). For educational status, a mean-interval years of education was taken as the dose value. For income, we used the mean relative rank of each socio-economic group. Non-linearity was tested by including quadratic terms in the regression.

We checked the robustness of the results in four ways: 1) by removing studies of low quality (table 2-1); 2) by rerunning the analysis with each study removed; and 3) by applying a fixed model; 4) by focusing on studies devoted exclusively to major depression (254).

Publication bias was considered using a funnel plot in which the log odds-ratio was plotted against the sample size. A Kendall's Tau correlation coefficient between the variance and the log odds-ratio was also computed. A high correlation coefficient might reflect possible unpublished small studies with negative results (134).

2.3. Results

The search procedure yielded 109 references for which additional information was obtained (see Figure 2-1). A few of these studies, however, did not meet the inclusion criteria. The complete list of excluded studies is available on our web site (<http://www.sesa.ucl.ac.be/matpub/meta>). Two studies used work site data (for example (298)); 21 papers were excluded because they referred to an in-patient or primary care setting (for example (16)); a further seven studies were excluded because they targeted at-risk groups such as mothers of toddlers (221), the elderly (for example (349)), young people (for example (45)) or children (for example (34)); another 14 studies were excluded because they were reviews or commentaries of previous studies (e.g.(182)), or because depression was treated as an exogenous variable (65). Of the remaining 63 studies retained for the review, 7 were eliminated because of insufficient reported data (example (185)). The 56 remaining papers included 51 prevalence studies, 5 incidence and 4 persistence studies. A few studies appeared in more than one category, because they provided both incidence and persistence data (example : (143) provided incidence data from the ECA study, while the prevalence data were given by (265)).

The characteristics of the studies are presented in table 2-2. The majority of studies came from North America and Europe, were carried out around 1987, and yielded a mean prevalence of disorders of 9%. The samples were composed of individuals having an average of 42 years of age, with the percentage of females averaging 60% (with 5 studies including women only). In 8 studies the data were not collected by face-to-face interview and in 19 cases the population was defined on a very limited geographical scale (a village or a county). The mean response rate was 78%. Twenty-seven studies covered all common mental disorders, 10 referred to affective disorders and the remaining 19 addressed major depression; 36 used a diagnostic interview schedule. The Composite International Diagnostic Interviews (CIDI) and the Present State Examination (PSE) were the most frequent of the structured diagnosis schedule. The Center for Epidemiologic Studies - Depression Scale (CES-D), the General Health Questionnaire (GHQ) and Langner scale were the most popular instruments among the symptom inventories. Thirty-seven studies used a short period of reference (less than 6-month), 14 used a period of 6 to 12 months, and the remaining 5 used a life-time reference period.

The sample was usually divided into 3 socio-economic groups. The mean relative rank of the lowest and highest SES groups corresponded to the 0.12 and 0.87 quantiles, respectively. The studies used on average 1.7 SES indicators (from 1 to 5), the most popular being education (37 studies), income (23 studies), and occupation (19 studies). In 17 studies the statistical processing controlled for both age and sex. Thirty-three studies provided only p values, with no standard deviations or confidence intervals for the estimates; only 1 study provided a chi-

square trend test. Using an overall index of quality, the mean score across studies was 5/10 (SD=1.8).

table 2-2. Descriptors of the 56 prevalence, incidence or persistence studies related to the socio-economic factors of depression, published after 1979.

ref id	Author	Country	Field date	Sample size	Mean age	Preval en.	SES variable	Instrument	Bottom-top OR	# SES groups	Quality score /10
Prevalence studies											
(58)	Cho 1998	North Korea	1998	3711	37	8.7	Education	CESD	3.09	5	6
(28)	Bhagwanjee 1998	South Africa	1998	354	37	4.8	Education	SRQ20	1.50	3	3
(8)	Andrews 2001	Australia	1997	10641	46	7.0	Education	CIDI	1.50	4	8
(1)	Abas 1997	Zimbabwe	1997	172	40	31.0	Education	PSE	3.36	2	4
(195)	Le Pape 1999	France	1997	18288	38	14.9	Education	Mini	1.32	4	7
(225)	Meyer 2000	Germany	1997	4093	42	12.3	Education	CIDI	1.15	3	6
(14)	Araya 2001	Chile	1996	3870	37	5.5	Education	CIS	2.56	3	7
(30)	Bijl 1998	Netherlands	1996	7076	41	7.6	Education	CIDI	1.55	4	8
(76)	de Snyder 1999	Mexico	1996	954	35	6.2	Education	CIDI	1.57	3	3
(350)	Wittchen 1992	Germany	1995	1626	37	6.8	Education	CIDI	0.60	4	5
(47)	Caraveo 1997	Mexico	1995	1937	35	8.3	Other	CIDI	0.98	2	3
(190)	Kylyc 1998	Turkey	1995	5489	36	4.0	Education	CIDI	2.10	4	6
(206)	Lynch 1997	USA	1994	1124	65	7.8	Income	DSM3R	3.24	4	5
(6)	Andrade 2000	Brazil	1994	1464	40	4.3	Education	CIDI	1.30	4	5
(200)	Lewis 1998	UK	1993	9570	41	16.0	Occupation	CIS	1.91	6	9
(236)	Muntaner 1998	USA	1993	1920	60	2.0	Education	DIS	0.53	5	8
(181)	Kessler 1994	USA	1992	8098	33	11.3	Education	CIDI	1.79	4	8
(186)	Kovess 1996	France	1991	2260	42	19.2	Education	CIDI	1.20	5	5
(55)	Carta 1991	Italia	1991	374	40	15.0	Education	PSE	7.09	2	5
(338)	Weich 1998	UK	1991	10264	46	24.6	Income	GHQ	1.48	3	6
(311)	Turner 1999	Canada	1990	1393	35	9.0	social class	CIDI	7.98	5	8
(266)	Reijneveld 1998	Netherlands	1990	4892	46	32.3	Income	GHQ	3.04	5	5
(227)	Miech 2000*	USA	1990	1883	43	.	Education	CESD	1.39	1	6
(108)	Goering 1996	Canada	1990	9953	43	4.5	Education	CIDI	0.81	3	4
(327)	Vazquez 1987	Spain	1987	452	48	14.7	Education	PSE	2.93	2	5
(137)	Hodiamont 1987	Netherlands	1987	3245	37	7.3	Education	PSE	1.97	9	6
(222)	Mavreas 1986	Greece	1986	489	42	16.0	Education	PSE	4.53	3	4
(139)	Hollifield 1990	Lesotho	1986	356	43	12.0	Education	DIS	2.41	4	6
(275)	Romans 1988	N. Zealand	1985	1514	45	8.0	Occupation	PSE	2.30	6	5
(244)	Noll 1985	USA	1985	936	44	5.0	Education	CESD	3.20	4	4

ref id	Author	Country	Field date	Sample size	Mean age	Preval en.	SES variable	Instrument	Bottom-top OR	# SES groups	Quality score /10
(63)	Cockerham 1990*	USA	1985	775	42	.	Education	LANGNER	2.06	1	4
(281)	Ross 1989*	USA	1985	809	42	.	Education	CESD	1.10	1	5
(46)	Canino 1987	Puerto Rico	1984	1551	38	2.9	Education	DIS	1.19	4	7
(314)	Ulbrich 1989*	USA	1984	2115	52	.	Income	HOS	3.30	1	4
(299)	Surtees 1993	UK	1983	576	38	14.0	Occupation	PSE	2.85	2	4
(57)	Cheng 1988	Taiwan	1983	1044	40	24.0	Occupation	CIS-CV	1.73	2	4
(274)	Rodgers 1991	UK	1982	3322	36	6.0	Occupation	PSE	1.09	3	7
(83)	Dohrenwend 1992	Israel	1982	4914	29	5.6	Education	SADS	2.13	3	5
(265)	Regier 1993	USA	1980	18368	44	2.3	social class	DIS	2.17	4	9
(98)	Fichter 1997	Germany	1980	1555	48	6.6	social class	CPIS	1.11	5	5
(280)	Ross 1985*	USA	1978	1360	40	.	Education	CESD	1.48	1	3
(198)	Lehtinen 1994	Finland	1978	7217	55	5.1	Occupation	PSE	2.03	3	5
(148)	Husaini 1981	USA	1977	713	35	11.0	Education	CESD	1.34	1	3
(41)	Brown 1984	UK	1976	458	41	15.0	Occupation	PSE	3.75	2	4
(23)	Bebbington 1981	UK	1976	800	40	10.9	Occupation	PSE	2.17	2	3
(40)	Brown 1981	UK	1976	355	41	11.0	Occupation	PSE	0.68	2	5
(164)	Kaplan 1987	USA	1974	4864	55	16.1	Education	OTHER	1.86	3	6
(92)	Eaton 1981	USA	1971	2867	47	16.0	Education	CESD	3.51	4	6
(129)	Halldin 1985	Sweden	1971	2283	42	25.6	Occupation	OTHER	1.22	3	2
(345)	Wheaton 1980 *	USA	1966	736	42	.	Education	LANGNER	1.49	1	3
(239)	Murphy 1991	Canada	1952	593	42	2.2	Assets	DPAX	7.31	3	4
Incidence studies											
(94)	Eaton 2001*	USA	1996	693	43	10.0	Education	DIS	1.18	1	6
(339)	Weich 1998	UK	1991	10264	46	18.0	Income	GHQ	1.11	4	6
(143)	Horwath 1992	USA	1980	9900	42	1.0	social class	DIS	1.16	4	8
(164)	Kaplan 1987	USA	1974	4864	55	.	Education	OTHER	1.59	3	5
(239)	Murphy 1991	Canada	1952	593	42	5.3	Assets	DPAX	5.31	3	4
Persistence studies											
(38)	Bracke 2000	Belgium	1992	2223	42	68.0	Education	HDL	3.46	3	4
(339)	Weich 1998	UK	1991	10264	46	54.0	Income	GHQ	1.73	4	6
(285)	Sargeant 1990	USA	1980	423	42	19.0	Education	DIS	1.67	2	7
(239)	Murphy 1991	Canada	1952	593	42	80.0	social class	DPAX	5.25	3	4

depression or SES are treated continuously.

Figure 2-1. Flow chart of the selection of the studies included in the review and meta-analysis of the socio-economic factors of depression, published after 1979.

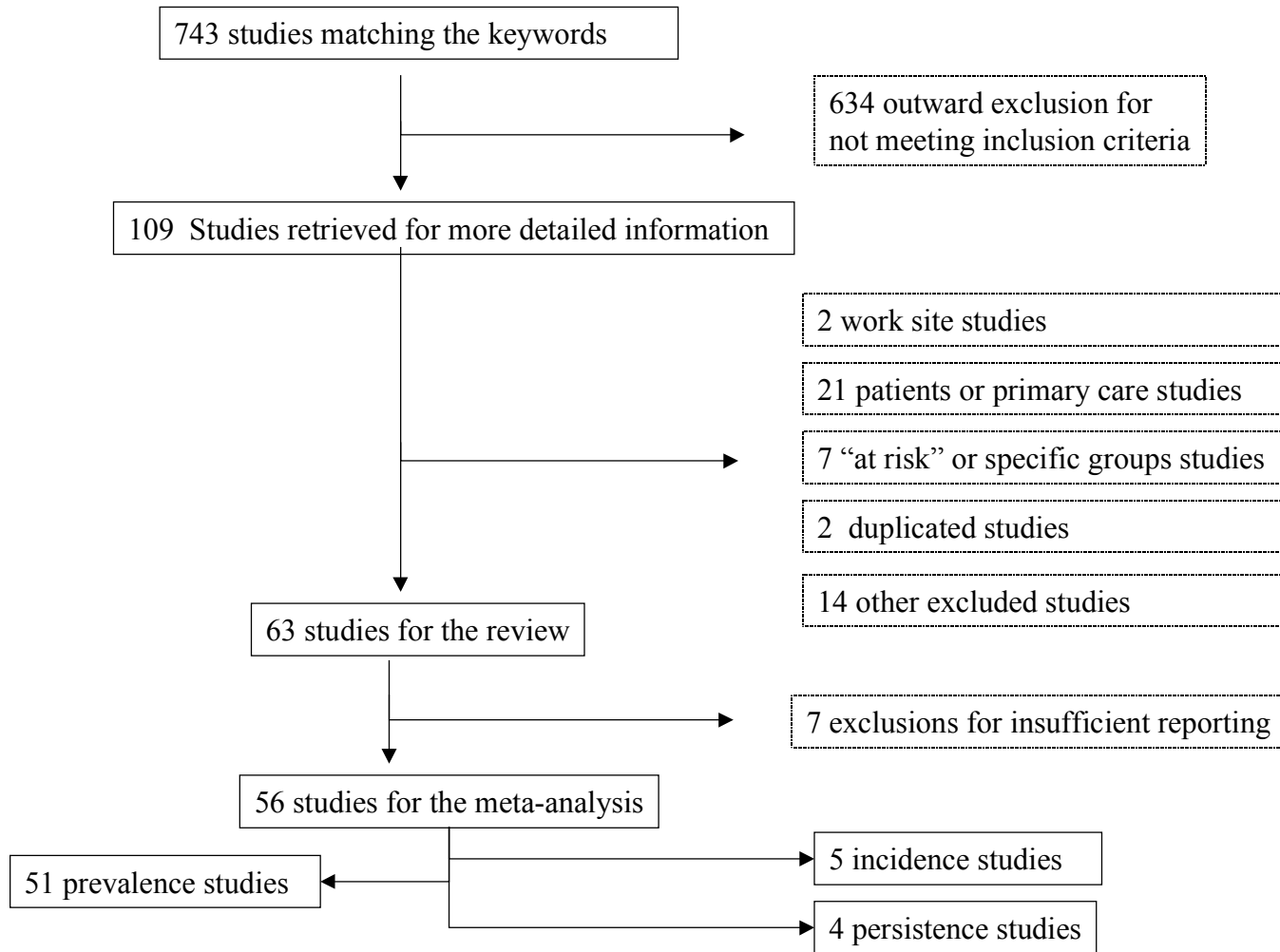
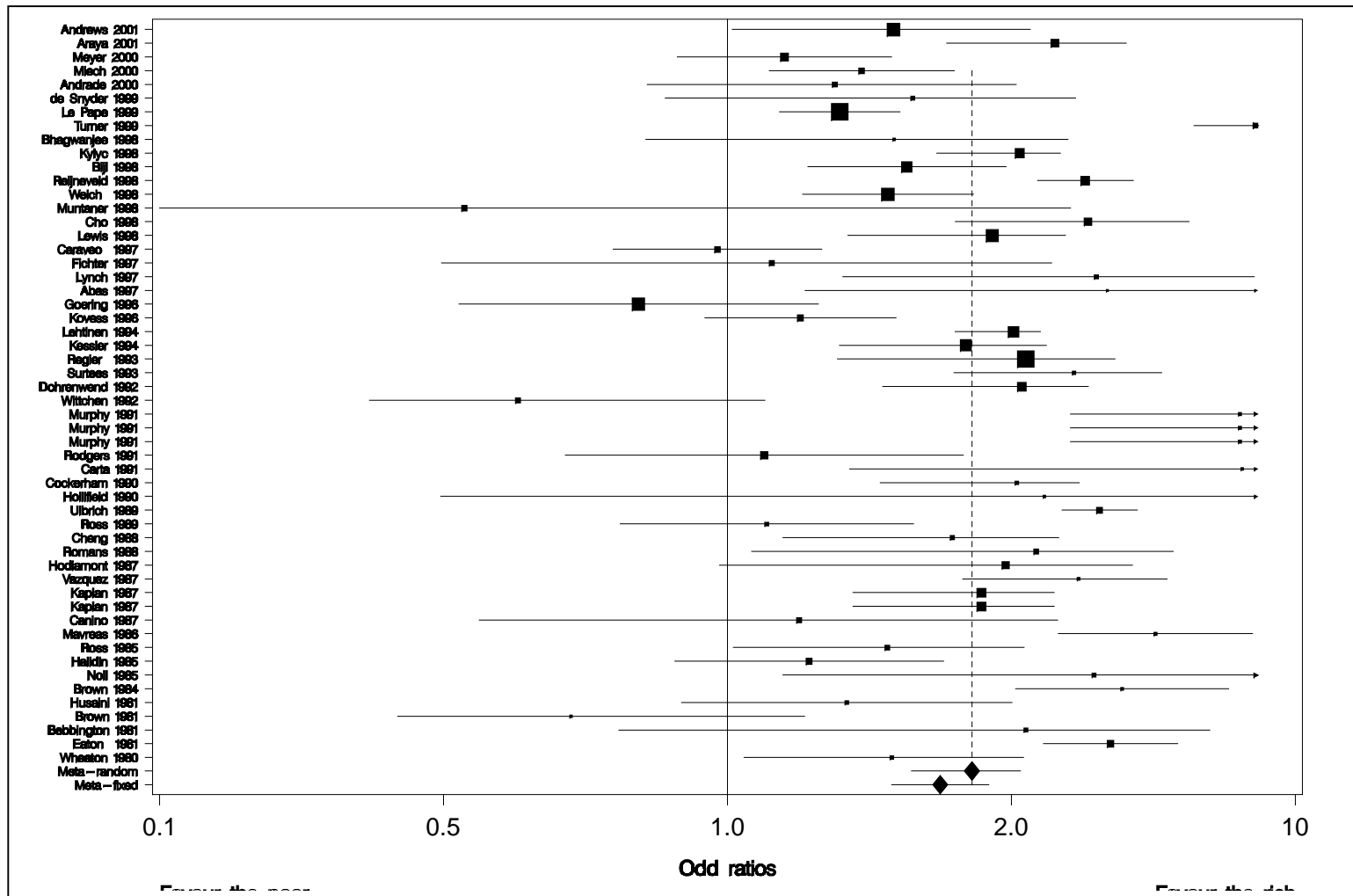


Figure 2-2. Odds ratio of major depression in the lower socio-economic group : 51 prevalence studies.⁵



⁵ Legend to forest plots : surface of the square of proportional to sample size; diamonds represent meta-analytic results. Odds ratios above 10 are truncated, which explains why some studies are not centred on their mean value

Figure 2-3. Odds ratio of major depression in the lower socio-economic group : 5 incidence and 4 persistence studies.

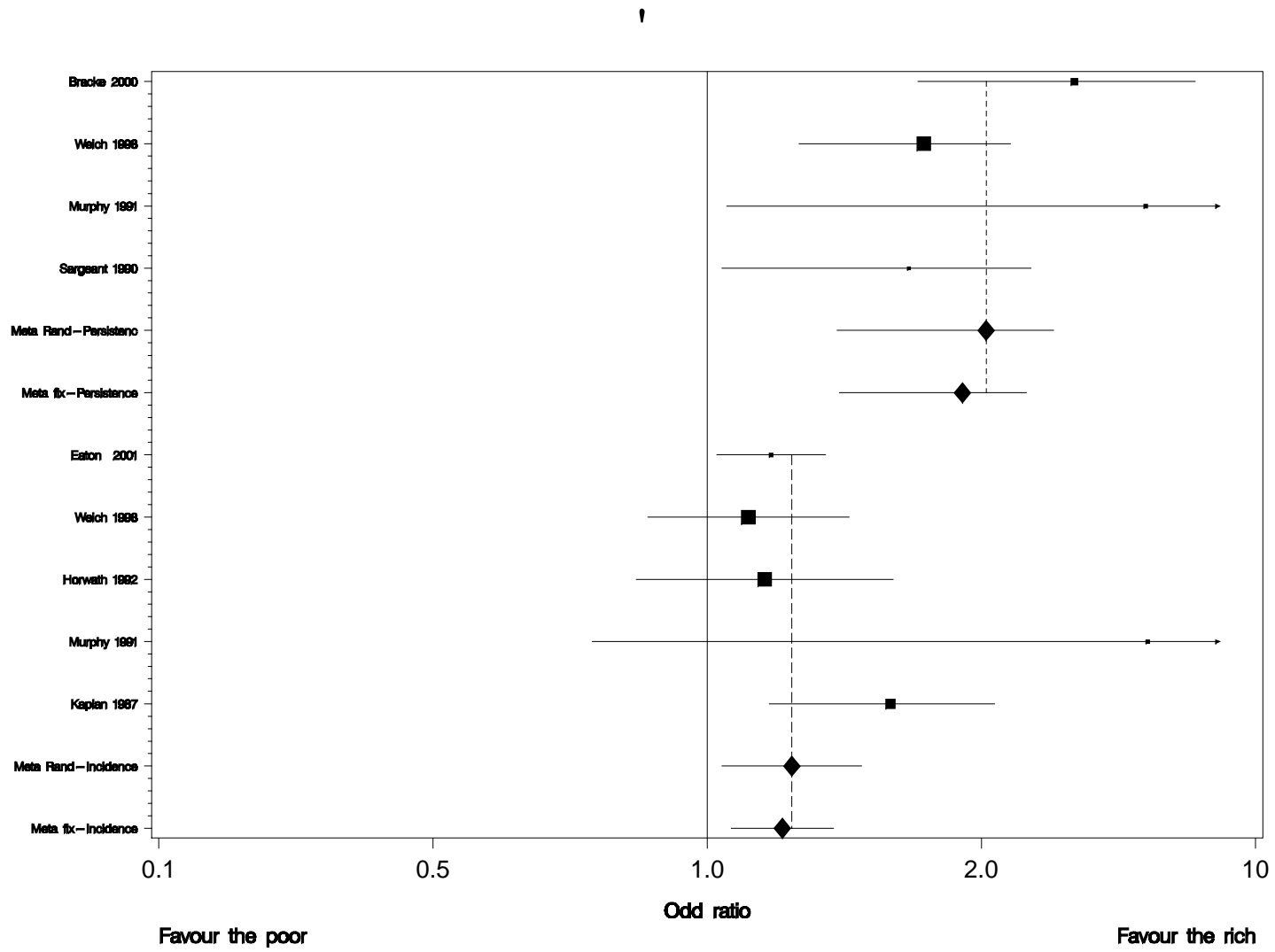


table 2-3. Overall odds ratios (OR†) and their 95% confidence intervals of major depression for the lowest socio-economic group versus the highest, for the prevalence, incidence and persistence studies.

type of study	# studies	Overall OR Random model	95% CI	P value	Overall OR fixed model	95% CI	P value	χ^2 Cochran's Q
Prevalence	51	1.81	(1.57 , 2.10)	<0.001	1.68	(1.49 , 1.89)	<0.001	332.655
Incidence	5	1.24	(1.04 , 1.48)	0.004	1.21	(1.06 , 1.38)	0.001	5.928
Persistence	4	2.06	(1.39 , 3.05)	<0.001	1.91	(1.40 , 2.60)	<0.001	4.920

† Unadjusted OR

Most studies (n=51) reported an odds-ratio (OR) greater than one (see Figure 2-2), of which 35 were statistically significant. Five studies had non-significant OR below 1. Individuals from lower socio-economic groups had an overall OR for being depressed of 1.81, as compared with the higher socio-economic group (see table 2-3). Within the incidence studies (see Figure 2-3), the lowest socio-economic group turned out to have a 1.24 higher risk of experiencing a new depressive episode than the highest group. Once depressed, lower SES individuals were much more likely to persist in depression with an OR of 2.06. As shown by the forest plots (providing each study point and interval estimates), there was significant heterogeneity among the prevalence studies ($\chi^2=333$, $p < .001$). Homogeneity was not rejected for the incidence and persistence studies (χ^2 respectively of 5.9 and 4.9 with $p > 0.18$). However, the number of studies is low, yielding a lower power for the χ^2 test.

These estimates were lower when a fixed model was applied (see table 2-3). Moreover, the overall OR was also hardly affected by the successive removal of each study (Figure 2-5). When the 7 prevalence studies with the lowest quality score were excluded, the overall random OR for the remaining 44 studies increased to 1.84.

The dose-response coefficients are shown in table 2-4. For each additional year of education the log OR of being depressed decreased by 3%. A one percent increase in relative ranking on income led to a 0.74% decrease in the log OR of being depressed. Quadratic terms did not significantly improve the model: i.e., the relationship between SES and depression turned out to be mostly linear. Standardised coefficients indicated a stronger relationship with income than with education .

The impact of covariates on the risk of depression is reported in table 2-5. Inequalities were greater for income than for education. Diagnostic schedules were more likely to show a stronger SES effect than inventories, although the multivariate results were not consistent with the univariate ones. Collinearity diagnosis suggests that two covariates confound the relationship between the type of instrument and socio-economic inequalities: the period of reference and the type of socio-economic variable. First, inventories had a shorter period of reference than diagnostic schedules and, thus, a steeper socio-economic gradient in depression. This is in line with the higher risk of persistence, compared to the incidence: if individuals of lower SES are more likely to remain in a depressed state than to experience a new episode, then a shorter period of reference will reveal greater socio-economic inequalities. Second, most inventories studies used income as socio-economic variable, and hence showed stronger inequalities. When income and shortness of the period are accounted for in the multivariate regression, diagnosis schedule evidenced a stronger socio-economic gradient than inventories. As a final methodological covariate, controlling the results for age and sex leads to a slight increase of socio-economic gradient.

Contextual features affected the socio-economic gradient in depression. Studies from Europe showed a smaller gradient than others. Although North American studies had a steeper gradient than others in the univariate analysis, the coefficient was no longer significant in the multivariate regression, because of collinearity between the two main geographical dummies (table 2-5). Studies focused on women yielded more inequality. Unexpectedly, relative rank difference was not significant. This could be explained by the limited variance of this covariate (coefficient of variation of 0.18). Finally, the socio-economic gradient seems to be lowering over time. All these factors account for a third of the variance in socio-economic inequalities in depression. Removing the two studies with the greatest influence did not

change the sign of the coefficients; it merely increased the significance of the coefficients related to North America, psychiatric instrument and length of the reference period.

There was no evidence of publication bias. On one hand, the funnel plot (Figure 2-4) appears to converge and dispersion to decrease with higher sample size. A slight "bite" was apparent in the lower left corner, suggesting a small under-representation of studies favouring the lowest socio-economic group but the Kendall Tau coefficient was non-significant ($\tau=0.15, p=0.12$).

table 2-4. Regression coefficients for Ln(OR) of major depression of each socio-economic group compared regressed on with the highest group regressed on socio-economic status variables (number of years of education and relative income rank) : prevalence studies.

Model	β^*	See b [†]	B [‡]	t value [¶]
Education (years) (n=37)	-0.03	0.006	-0.34	5.31
Education+	-0.01	0.020	-0.15	0.73
Education ^{0.5}	-0.09	0.084	-0.21	1.03
Education+	-0.03	0.023	-0.34	1.49
education ²	0.00	0.008	0.00	0.00
Income (relative rank) (n=23)	-0.74	0.114	-0.53	6.52
Income +	-0.26	0.807	-0.19	0.33
Income ^{0.5}	-0.52	0.870	-0.35	0.60
Income +	-1.04	0.464	-0.75	2.25
Income ²	0.42	0.622	0.22	0.67

*unstandardised estimate; [†] standard error of the estimate ; [‡] standardised estimate= β *SE regressor / SE dependent ; [¶] ratio of β /See b

table 2-5. Covariates associated with the risk of the lower SES group of being depressed compared with the higher SES group*: results of the univariate and multivariate regressions with the 51 prevalence studies published after 1979

Covariate	Change in log Odd ratio per unit change in regressor :			Change in log Odd ratio per unit change in regressor :		
	Univariate regression (n=51)			Multivariate regression (n=51) R ² =0.34		
	β	See	p value	β	See	p value
Intercept ‡				0.168	0.383	0.17
SES measured by income versus other †	0.362	0.071	<0.01	0.64	0.132	<0.01
Diagnosis instrument versus inventory †	-0.121	0.051	<0.01	0.511	0.098	<0.01
Women (%)	0.408	0.274	0.03	0.457	0.315	0.04
Short period of ref. (below 6 month versus longer) †	0.324	0.052	<0.01	0.305	0.068	<0.01
European studies versus other †	-0.166	0.049	<0.01	-0.300	0.081	>0.01
Studies from North America versus other †	0.218	0.053	<0.01	0.057	0.104	0.15
Controlling for age and sex versus non-control †	0.042	0.025	0.02	0.047	0.039	0.06
Date (years)	-0.011	0.003	<0.01	-0.016	0.006	<0.01
Major depression vs. common mental disorder †	-0.096	0.053	0.02	0.015	0.068	0.21
Sample scope (national versus local) †	-0.097	0.031	<0.01	-0.013	0.038	0.18
SES measured by education versus other †	-0.255	0.05	<0.01	0.009	0.08	0.23
Mean age (years)	0.015	0.004	<0.01	0.001	0.005	0.21
SES measured by occupation versus other †	0.06	0.062	0.08	.	.	.
Prevalence of depression (%)¶	0.001	0.004	0.17	.	.	.
Relative rank of top group - relative rank of the bottom group	0.087	0.116	0.11	.	.	.

* Ln Odds Ratio is the dependent variable; † dummy variable coded 1 if true 0 otherwise; ¶ Imputation of the mean value for correlation studies. ‡ Mean value of the univariate intercepts is 0.518.

Figure 2-4. Funnel plot of the 51 prevalence studies related to the socio-economic factors of depression, published after 1979.

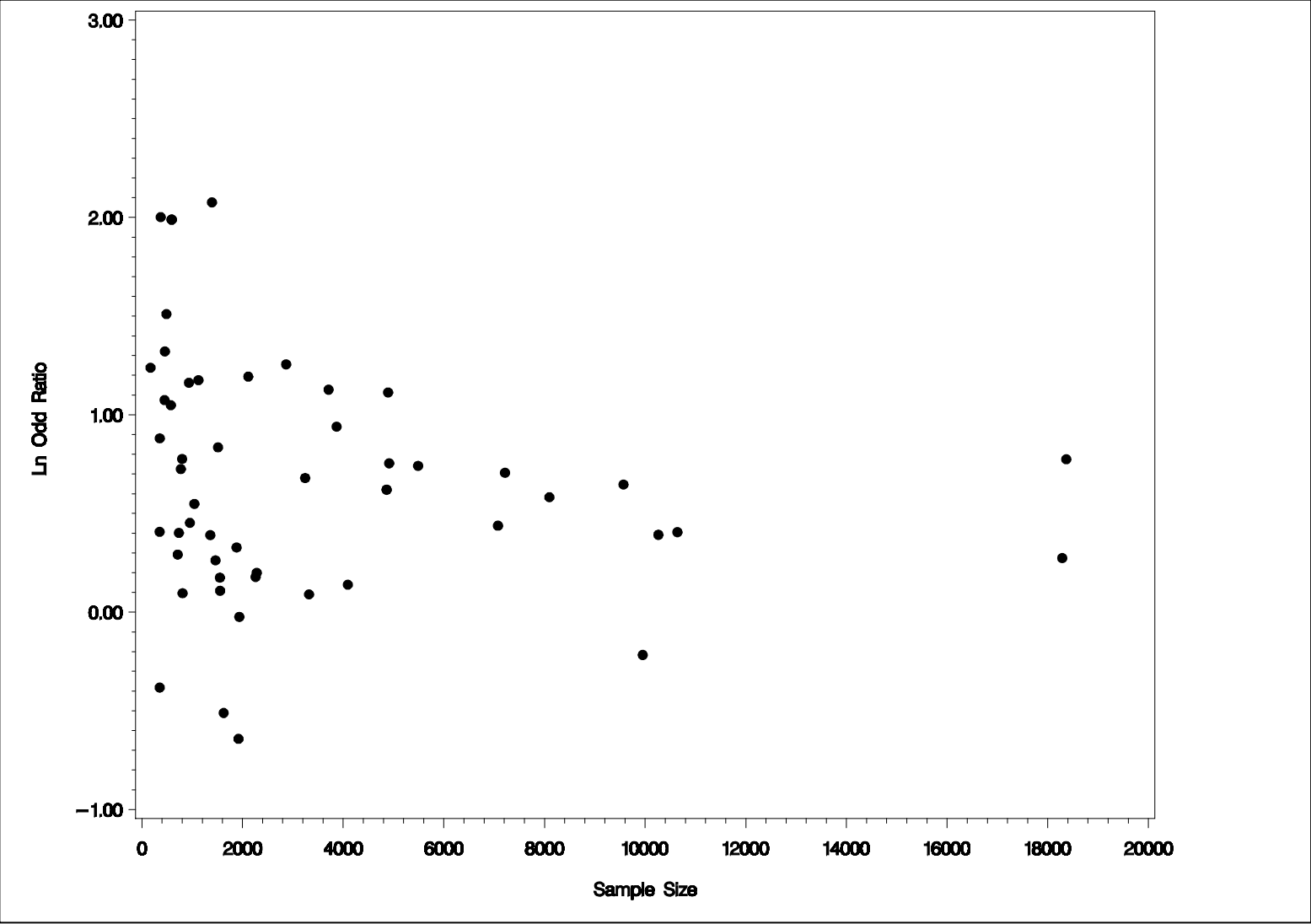
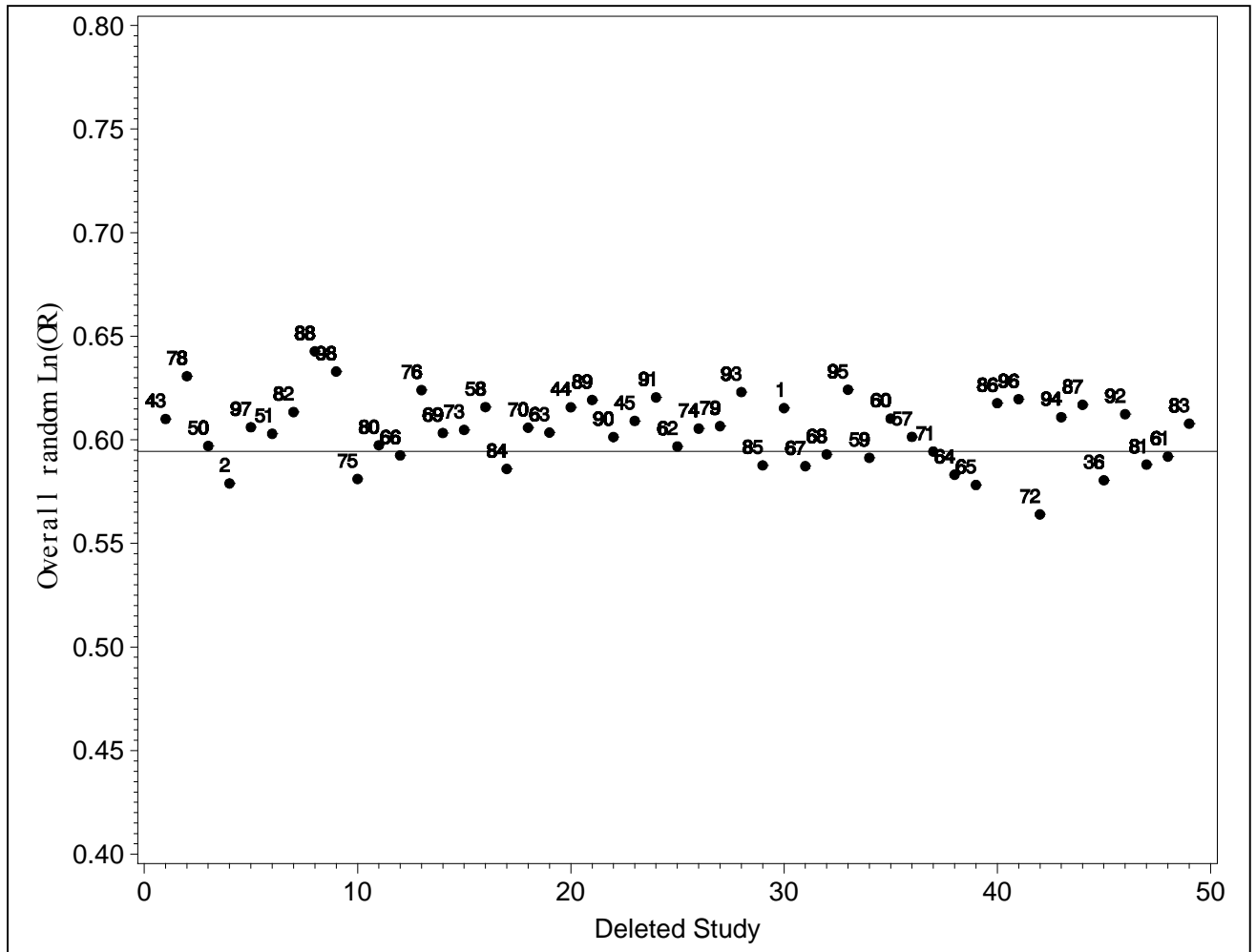


Figure 2-5. Sensitivity plot : change in the overall Odds ratio when removing each of the 51 prevalence studies.⁶



⁶ Legend to Figure 2-5. Each point provides the resulting overall random Odds ratio (ln value) when deleting a study. The identifier of the deleted study is mentioned above the point (see table 2-2 for details). The straight line provides the meta-analyse result for prevalence studies in log scale, ln(1.81).

2.4. Discussion

To the best of our knowledge, this is the first meta-analysis of socio-economic inequality in depression. More than thirty years after the Dohrenwends' landmark review (84), socio-economic status remains a moderate to strong prevalence correlate for depression. Low socio-economic status slightly increases the risk of episode onset and moderately increases the risk of the persistence of depression. Such an association is not limited to the bottom socio-economic group, but persists throughout the whole social stratification.

The nature of this association is not clear-cut. Regarding the direction of this association for depression, the results more consistently support the contention that causation (socio-economic status increases risk of depression) has the edge over selection (depression hinders social mobility), although both processes are at play (83) (152,180). Part of the difficulty in disentangling such processes is that causation and selection need to be settled on inter-generational comparisons. A recent inter-generational study, which was able to include parental psychopathology and socio-economic status, supported the causation assumption and rejected selection both within and between generations (272). Recent reviews suggest that causation and selection are not mutually exclusive explanations and may be combined over the lifecycle (93,180). The processes linking socio-economic status and depression divide broadly in two groups: stress and strain (306). The stress theory postulates that personal resources, such as coping style, self-esteem, mastery, and locus of control buffer the impact of stress on depression and that higher SES individuals are better endowed with such resources (41,345). The stronger relationship between persistent depression (compared to incidence) and SES, found in our meta-analysis is consistent with this stress theory. The strain theory addresses the impact of community features such as values, social welfare, social cohesion, infrastructure supply, and public health policy (205,273,306). This framework builds upon widespread between-country differences in socio-economic health inequalities observed for subjective health(322) or cause-specific mortality (189). The evidence for such contextual effects on mental disorders is, however, conflicting (87,89). A recent study showed that individual income and regional unequal distribution of income interacted in affecting the level of mental disorder (340). Our work also suggests that socio-economic inequalities in depression are stronger in some regions , but did not enable identifying any specific strain factors.

Our results may be affected by three limitations related to confounding bias, misclassification of outcome, and publication bias. Gender and age are well-known confounding factors in the SES-depression relationship: because women have a higher depression prevalence and lower socio-economic status, ignoring gender will exacerbate the socio-economic gradient. Conversely, overlooking age tends to suppress this gradient, because age has a U-shaped relationship with depression and a \cap -shaped association with income (242). Meta-regression suggests that controlling for age and gender might led to an increase in socio-economic inequalities in depression, possibly because the lowering age effect is higher than the exacerbating sex effect.

Physical disease might provide another potential confounding factor which is seldom considered in psychiatric epidemiology (82). Although the third DSM IV axis is devoted to somatic diseases, very few of the studies reviewed provided results controlling for physical health. There is empirical evidence, on the one hand, of the relationship between psychiatric disorder and physical diseases such as cancer and cardiovascular disorders (136) and, on the other hand, of the relationship between SES and physical diseases. However, the high prevalence of depression and the dose-response relationship makes it unlikely that physical disease greatly conflates the SES-depression relationship. Moreover, a previous study by Lynch and colleagues suggests that the overall impact of physical disease on the SES-depression relationship is slight (206).

This study may lack of specificity regarding depression, as we decided to include 30 studies of overall psychiatric disorders. Such decision was taken in order to gain statistical power and to reach a wide range of studies. We sought to assess the cost of such decision by undertaking a sensitivity analysis. Keeping only the 19 studies that focused on major depression had in fact very slight influence on the overall point estimates (results not shown) although some precision was lost. As the meta-regression also showed, there was only a small non-significant difference between those two kinds of studies. Thus, we felt more confident that misclassification of outcome is not a serious problem in this study.

The results are vulnerable to two sources of publication bias: positive results and availability. Some important psychiatric epidemiological studies have not addressed the question of the socio-economic distribution of depression: for example, the Mental Health Supplement in Canada (248) as well as the Munich study in Germany (350). A subsequent cross-national review indicated that education was related to mental health status in Ontario but not in Munich (6). A second form of bias occurs when studies yielding inverse results lack the information needed for being considered in the meta-analysis. Yet, all in all, the funnel plot and the rank correlation coefficient do not suggest a positive results publication bias. Nevertheless, an availability bias cannot be excluded, in particular regarding developing countries. When carried out, such studies are less likely to be published in peer-reviewed English-language journals. Taking a recent cross-national review of seven countries as a reference (6), none of the three original studies from developing countries had been published in peer-reviewed journals. We succeeded in including studies published in languages other than English, but an obvious paucity of works from Asia and Africa remains.

Nonetheless, we found compelling evidences of inequalities in depression, favouring the higher socio-economic groups. There is increasing recognition, within the public health agenda, that specific strategies are needed to tackle health inequalities (118,315). Our results suggest that one strategy would be to focus on decreasing the chronicity of depression among the lower socio-economic strata.

Chapter 3. Deprivation and mortality: the implications of spatial autocorrelation for health resources allocation⁷

3.1. Introduction

The high mortality found in small underprivileged areas has been an important issue in health inequalities literature. Studies have repeatedly shown an association between socio-economic deprivation and mortality in small areas (54,128,151,260). More recently, this approach has been extended to long term illness and standardised illness ratios (24,37,287). Such work has had a significant influence on the allocation of health resources. Deprivation indices are now taken into account in the allocation of health care resources. In the UK they have been used since 1990 for the distribution of resources to general practitioners through the Jarman index (78). Using data at the ward level, the latest revision of the Resources Allocation Working Party (RAWP) formula has led to the inclusion of socio-economic indicators in the allocation of resources to Regional Health Authorities in the UK (50). In this paper, we shed light on a specific issue related to such ecological work: spatial autocorrelation.

In recent years, there have been important methodological improvements in deprivation indices. New indices (such as the Townsend and Carstairs indices) have been created in order to correct some biases in the Jarman index, such as the underestimation of deprivation in rural areas (37,232,301); the socio-economic variables and their weighting scheme in such indices have been revised (105,119) and have been applied to smaller areas (51,132,214,232).

Despite these improvements, analysis of the relationship between deprivation and health has paid little attention to the spatial properties of the data, with the exception of the data aggregation problem (220). In particular, critics have pointed out that it is not reasonable to assume that mortality counts at a small area level can be treated as independent events (193). In fact, there is an increasing and recent body of evidence showing that health events are affected by spatial autocorrelation (61,310). Spatial autocorrelation indicates whether observations which are geographically close are related to each other, that is, are not statistically independent of one another. Positive spatial autocorrelation, meaning that nearby areas have similar levels of mortality, has been shown for cancer incidence in particular (296,309,336). Recent research has extended spatial correlation to other health problems such as paediatric lead poisoning (126) and asthma (145). Negative spatial autocorrelation means that areas with high mortality are contiguous to areas with low mortality.

When one is interested in relating mortality to various explanatory variables through a multivariate ecological model, spatial autocorrelation is a crucial issue. If found, it suggests that many statistical tools and inferences are inappropriate: correlation coefficients or ordinary least squares (OLS) estimators are biased and overly precise. They will be biased because the areas of greater concentration of events will have a larger impact on the model estimates; and they will overestimate precision because,

⁷ This chapter is a synthesis of three published works in Social Science and Medicine, in the Archives of Public Health and in the Revue d'Epidémiologie et de Santé Publique.

since events tend to be concentrated, there are actually fewer independent observations than are being assumed (62,271,310). Cliff and Ord showed that positive autocorrelation, which occurs for mortality and socio-economic factors, leads to overestimated precision (62), although the impact of positive spatial autocorrelation depends on the spatial layout (11).

In fact, various important formulae dedicated to health care allocation have been elaborated using ecological multivariate models (50,151). None has taken spatial autocorrelation into consideration (although multilevel modelling has been used to control for inter-regional variation). Hence it is valuable to assess how far the relationship between deprivation and mortality is affected by incorporating the spatial autocorrelation of the data.

In this paper, we measure the spatial autocorrelation of mortality and socio-economic variables in Belgium; such spatial concentration is also analysed for specific causes mortality which are known to be avoidable by primary and secondary prevention. We then compare two multivariate models of all-causes mortality: one ignoring spatial autocorrelation, the other one incorporating it. Our aim is twofold. First we seek to measure the magnitude of spatial concentration for several mortality causes which are vulnerable to primary and secondary prevention; secondly, we seek to investigate whether the relationship between mortality and socio-economic deprivation is affected by spatial autocorrelation of the ecological data. These two objectives will help us to assess the relevance of focusing health promotion programmes to some specific areas; it will also address the validity of the various ecological models which have driven health care allocation in various OECD countries.

3.2. Method

Model

Here we examine a simple problem with mortality as the dependent variable, while deprivation, other socio-economic variables, and morbidity are used as explanatory variables. There are two reasons for considering morbidity together with deprivation variables. First, as morbidity and deprivation are only partially correlated, this avoids taking deprivation as a poor proxy for morbidity (52). Second, ignoring morbidity will produce biased estimates to the extent that morbidity is correlated with both deprivation and mortality.

Mortality is not only related to deprivation but to many other socio-economic factors (288). Hence, we also take into account income inequality and population density. Income inequality focuses on relative deprivation and has been shown to be related to either health or mortality in numerous studies (168,177,346,347). Population density is a proxy for rurality, which has been shown to have a strong relation to mortality (287).

The data are analysed using two statistical models: a weighted least squares (WLS) model and a simultaneous autoregressive model (SAR). The first one (see equation 1 below) ignores the spatial autocorrelation of the data: mortality (y) is equal to a linear combination of explanatory variables ($X\beta$) plus an error term (ϵ).

In the SAR model (see equation 2), mortality is related to the spatially uncorrelated explanatory variable $(I-\rho W)XB$ and its spatial mean $(\rho W y)$, where ρ is the spatial autocorrelation coefficient and W an adjacency matrix. The elements of W are w_{ij} values, equal to 1 when zones i and j are adjacent, and 0 otherwise. Zones are assumed not to be adjacent to themselves, so the w_{ii} are equal to 0. Model 1 is estimated through ordinary weighted least squares (WLS), while the second model (SAR) uses a non-linear algorithm (see (125) for statistical procedures).

As municipalities have unequal population sizes, variance of mortality cannot be assumed to be constant. Areas with large populations provide more reliable standardised mortality ratios (SMRs) and, thus, should be given higher weights. Both WLS and SAR models use weights equal to the number of observed deaths, a good approximation of the inverse variance of $\log(\text{SMR})$ (263).

The Data

Mortality data were provided by the Belgian National Institute of Statistics for the 1985–93 period. Standardised mortality ratios (SMRs) were computed for 40 gender-age groups, using the 1991 Belgian population as a reference. SMR were estimated

$$y = X\beta + \varepsilon \quad (1)$$

$$y = (I - \rho W)X\beta + \rho W y + \varepsilon \quad (2)$$

for all-ages and for the 0–64 age group (a premature mortality). Specific causes mortality were computed. The causes should be vulnerable to primary and secondary prevention (317) and have at least 10 deaths by municipality on the period considered.

Deprivation was measured through the Townsend index, which is widely used in ecological analysis of deprivation and health (31,85,90,260,260). This index is the sum of four transformed and normalised variables: unemployed active people (%), overcrowded households (%), households without a car (%), and households not owner occupied (%). Details of the transformation and normalisation are presented and discussed elsewhere (105,155). The data were provided by the 1991 Belgian population census.

There are numerous indices for measuring income inequality (68,171). Previous ecological analysis of mortality data have used the Gini coefficient and the Robin Hood index (168,171,177,178). Municipal income inequality was measured through the Gini coefficient which increases with income inequality (see (289) for computational details). The income distribution for each municipality was provided by the Income Tax Statistics for all taxable households, for the years 1985–90 (INS Supermap database 1994). This source also provided the median available income per household.

Two proxies for morbidity were available at the municipal level: overweight prevalence and standardised hospital admission rate. The Belgian Armed Forces Medical Service provided annual data for 45 000 young men. The analysis was restricted to male subjects aged 18–25. The overweight prevalence (Body Mass Index equal to or above 25) was calculated for each consecutive group examined between

1985 and 1991. Prevalence was directly standardised for age, taking the Belgian male population aged 18–25 in 1991 as the reference. Standardisation was used to control the variation in the age-mix of examinees between municipalities.

Hospital admission rates have been shown to be a morbidity proxy for a few important illnesses, such as respiratory diseases and depression (257). Admission data were provided by the database of the Department of Health and the Environment covering the period 1989–92. Because of limited access to data, admission rate standardisation was limited to a mere six sex-age groups (male and female aged 0–15, 16–64, 65 and over).

These variables were computed for each of the 589 Belgian municipalities. Mortality data were not available for 32 very small municipalities with less than 30 deaths over the period being studied. Hence, the analysis was restricted to 557 municipalities representing 98.5% of the 1991 resident population.

Spatial autocorrelation and inequality indices.

There are various statistical methods for estimating spatial autocorrelation (61,62,334). The Moran's I statistic was chosen for this study because of its greater statistical power (335). Moran's I is similar to a Pearson correlation coefficient. Positive Moran I means that adjacent municipalities have similar levels of mortality, whereas a negative value means that municipalities with high mortality lie next to municipalities with low mortality. Computation of the Moran I coefficient and its standard error are presented and discussed elsewhere (62). The significant variation in population size of the Belgian municipalities violates the assumption of equal variance within each unit: smaller municipalities show greater SMR variance than large ones (334). Recently, various alternatives have been suggested to tackle the heteroscedasticity of mortality ratios. Oden Ipop proposed a spatial version of chi-square (247), Waldör used traditional Moran's I test with variances differing between areas and inversely proportional to the population at risk (Waldor, 1996); Assuncao suggested the use of an empirical Bayes index (18); Colonna suggested to use a random permutation test based on the multinomial distribution (66). This last method was used in this study.

Two indices of socioeconomic inequalities were computed, the Concentration index of illness (Cii) and the P90 / P10 ratio. The P90 / P10 is the ratio of the mortality SMR of the municipalities being in the highest percentile of deprivation of the municipalities being in the 10% least deprived municipalities. This ratio measures the inequalities magnitude on the extremes of the distribution. The Cii measures the inequalities magnitude on all the municipalities. This last index ranges from a value of -1 if all deaths would be concentrated in the well-off municipalities to a maximum of 1 if the whole mortality would occur in the most deprived areas. In case of no inequality, Cii takes the value of 0. This estimate is now widely used in the research on socioeconomic inequalities in health (322,330).

3.3. Results

table 3-1 shows the weighted mean, the standard deviation and the Moran's I for each variable. In all cases, these autocorrelations are significantly different from zero. Population density has a high spatial autocorrelation (I=0.67) meaning that dense municipalities tend to conglomerate. We observed positive and significant spatial autocorrelation for deprivation (I=0.40), income inequality (I=0.53), and median income (I=0.59). This means that wealthy municipalities tend to be located close to well-off municipalities, and, conversely, places with low income tend to be located close to other underprivileged areas.

table 3-1. Univariate and spatial statistics.

Variable	Mean	Std. Dev.	Moran's I ^b
Std mortality ratio (all ages) ^a	0.000	0.097	0.558**
Std mortality ratio (0–64) ^a	0.000	0.172	0.618**
Townsend index of deprivation (score)	0.000	0.019	0.399**
Income inequality (Gini)	0.335	0.022	0.531**
Median income (BEF)	388.91	29.40	0.588**
Population density (inhabitants/km ²) ^a	6.484	1.201	0.666**
Overweight prevalence (%)	0.185	0.045	0.451**
Hospital admission rate (%)	0.176	0.028	0.371**

^a in log base.

^b ** significant at the $\alpha= 1\%$ level.

All mortality and morbidity variables also have positive spatial autocorrelations, with adjacent municipalities having similar values for mortality or morbidity. Premature mortality has the highest spatial autocorrelation with an I of 0.62. All-ages mortality ratio has a slightly smaller spatial autocorrelation coefficient (I=0.56). The hospital admission and overweight prevalence rates have moderate autocorrelation values (I=0.37 and I=0.45 respectively).

Most of the specific mortality causes evidenced positive spatial autocorrelation (table 3-2). This means that nearby municipalities share similar degree of specific mortality. For men chronic pulmonary obstructive bronchitis, liver cirrhosis, road accident, and suicide are amongst the most spatially concentrated mortality causes. Spatial concentration is stronger for men than for women, except for fall.

Socioeconomic inequalities in mortality is higher for liver cirrhosis, fall and suicide :14% of liver cirrhosis deaths, 7% of fall or suicide deaths are unequally distributed in the municipalities with lower level of deprivation (Concentration index, table 3-2). The last column of the table 3-2 provides the ratio of mortality rate of the 10% more deprived municipalities to the ratio of the 10% least deprived municipalities. Again, for liver cirrhosis the more deprived municipalities have 2.1 times the mortality of the least deprived areas; similar inequalities are reached for fall (1.7) and suicide (1.5)

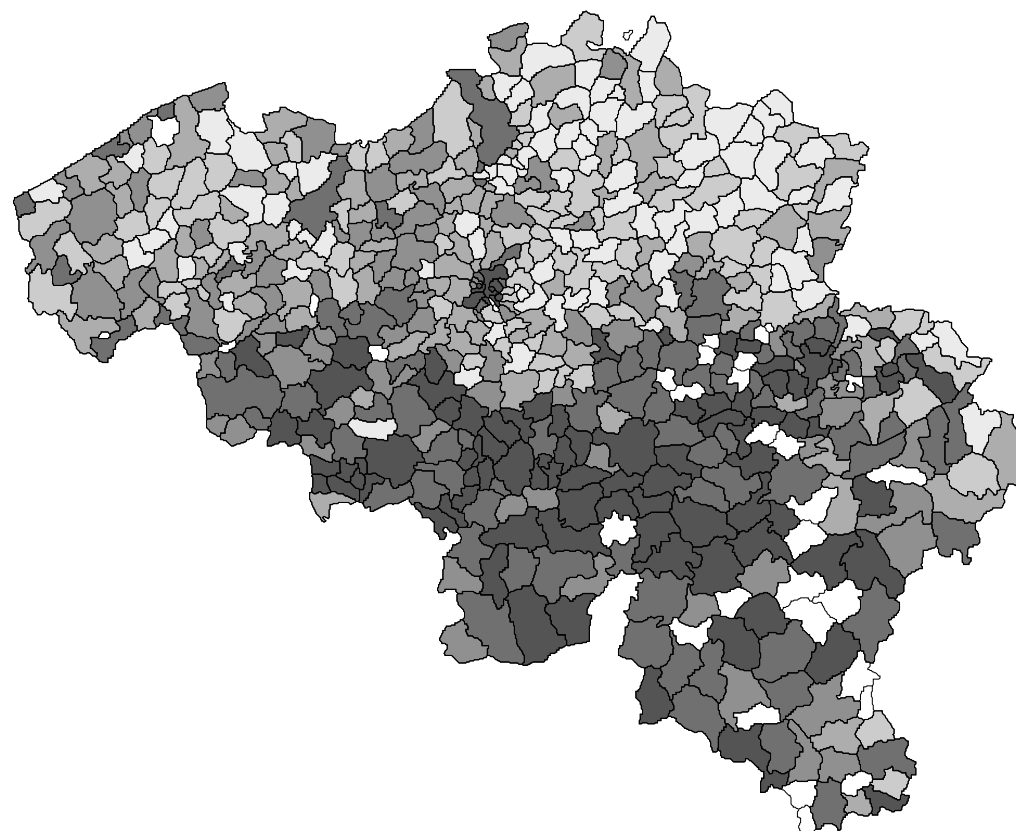
table 3-2. Specific causes mortality : spatial concentration and inequality indices.

Mortality cause	Moran I		Concentration index		P90/P10
	Men	Women			
SMR BPCO	0.506 **	0.28 **	0.033	[0.010 , 0.055]	1.16
SMR liver cirrhosis	0.43 **	0.282 **	0.139	[0.108 , 0.170]	2.13
SMR traffic accident	0.425 **	0.236 **	-0.037	[-0.056 , -0.017]	0.79
SMR fall	0.25 **	0.385 **	0.074	[0.051 , 0.098]	1.66
SMR pneumonia/influenza	0.26 **	0.26 **	-0.009	[-0.029 , 0.012]	0.87
SMR suicide	0.359 **	0.137 **	0.066	[0.042 , 0.090]	1.47
SMR ischaemic diseases	0.349 **	0.225 **	0.004	[-0.013 , 0.021]	1.05
SMR lung cancer	0.339 **	0.253 **	0.059	[0.045 , 0.074]	1.37
SMR stroke	0.306 **	0.301 **	-0.023	[-0.039 , -0.007]	0.85
SMR breast cancer	na	0.145 *	0.006	[-0.013 , 0.026]	1.01
SMR cervix cancer	na	0.114 *	0.029	[0.022 , 0.036]	1.07

The spatial distribution of the premature mortality ratio (see Map 3-1) shows that mortality is higher in the south of the country, in the large cities of the north (Antwerp, Ghent), centre (Brussels) and south of the country (Liège and Charleroi). A North-East/South-West gradient is also observed.

table 3-3 provides the spatial distribution for liver cirrhosis and suicide for men. Liver cirrhosis is specially high around Ath, around some big urban centres such as Brussels, Liège, Charleroi. There also seems to be an East-West gradient. Regarding suicide, a North-South gradient is clearer than for liver cirrhosis. The provinces of Liège and Hainaut presented a high level of suicide.

In order to assess the stability of mortality and morbidity, spatial autocorrelation over time, the Moran's I were calculated for 3 sub-periods (1985-87, 1988-90, 1991-93, results not shown). With the exception of overweight prevalence, the Moran coefficients were stable over time. This exception could be due to changes over time, in the geographical origins of army conscripts: the proportion of enrolees from the South of the country has been declining; the halter being more overweighed than in the North.



100 Km

Legend to the map

Map 3-1. Standardised premature mortality ratio: Belgium 1985-93.

- Mortality ratio increases from light grey (low mortality) to black (high mortality).
- Quintile method of categorisation used
- White municipalities have missing information.

table 3-3. Results comparing the two models.

Independent variables	Dependent variable : Standardised premature mortality ratio (0–64)				Dependent variable : Standardised all ages mortality ratio				VIF
	Model 1 : WLS		Model 2: SAR		Model 1 : WLS		Model 2: SAR		
	beta ^{a,c}	t stat ^b	beta ^{a,c}	t stat ^b	beta ^{a,c}	t stat ^b	beta ^{a,c}	t stat ^b	
Rho (spatial autocorrelation)	n.a.	n.a.	0.62	20.67	n.a.	n.a.	0.641	22.89	
Intercept	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Townsend index of deprivation (score)	0.46 **	13.53	0.266**	9.17	0.224**	5.09	-0.048	-1.30	2.63
Income inequality (Gini)	-0.023	-0.79	-0.068*	-2.27	-0.199**	-5.24	-0.11 **	-3.79	1.27
Median income (BEF)	-0.24**	-7.5	-0.291**	-8.31	-0.053	-1.29	-0.034	-1.13	1.55
Population density (log of nber of inhabitants / km ²)	0.018	0.54	0.134**	3.44	-0.072	-1.67	0.11**	3.67	2.80
Overweight prevalence (%)	0.268**	9.57	0.054	1.80	0.391**	10.86	0.088*	2.84	1.25
Hospital admission rate (%)	0.168**	5.79	0.171**	6.84	0.144**	3.79	0.157**	5.41	1.75
(pseudo-)R²	0.65		0.78		0.33		0.64		
Moran's I of the residuals^e	0.287**		-0.04		0.31**		-0.07		

^a standardised coefficients.

^b t statistic equals $\beta/\text{std. dev.}\beta$.

^e ** significant at the $\alpha= 1\%$ level; * significant at the $\alpha= 5\%$ level.

SAR: simultaneous autoregressive model; WLS: weighted least square.

n.a : not applicable.

VIF : Variance inflation factor (measure of collinearity among independent variables)

table 3-3 displays the results of both models for premature mortality ratio and all-ages mortality ratio. The table gives the results of the weighted least squares model (WLS) and the spatially-adjusted model (SAR) for each mortality ratio. For each model, the standardised regression coefficient (beta) and its t statistic (the coefficient divided by its standard error) are shown. The t statistic allows comparisons of the precision of the beta coefficient (as a rule of thumb, an absolute t value of 2 is considered as a minimum). The last column of the table gives the variance inflation factor (VIF), a measure of collinearity among the independent variables: the higher the VIF the higher the collinearity among the exogenous variables.

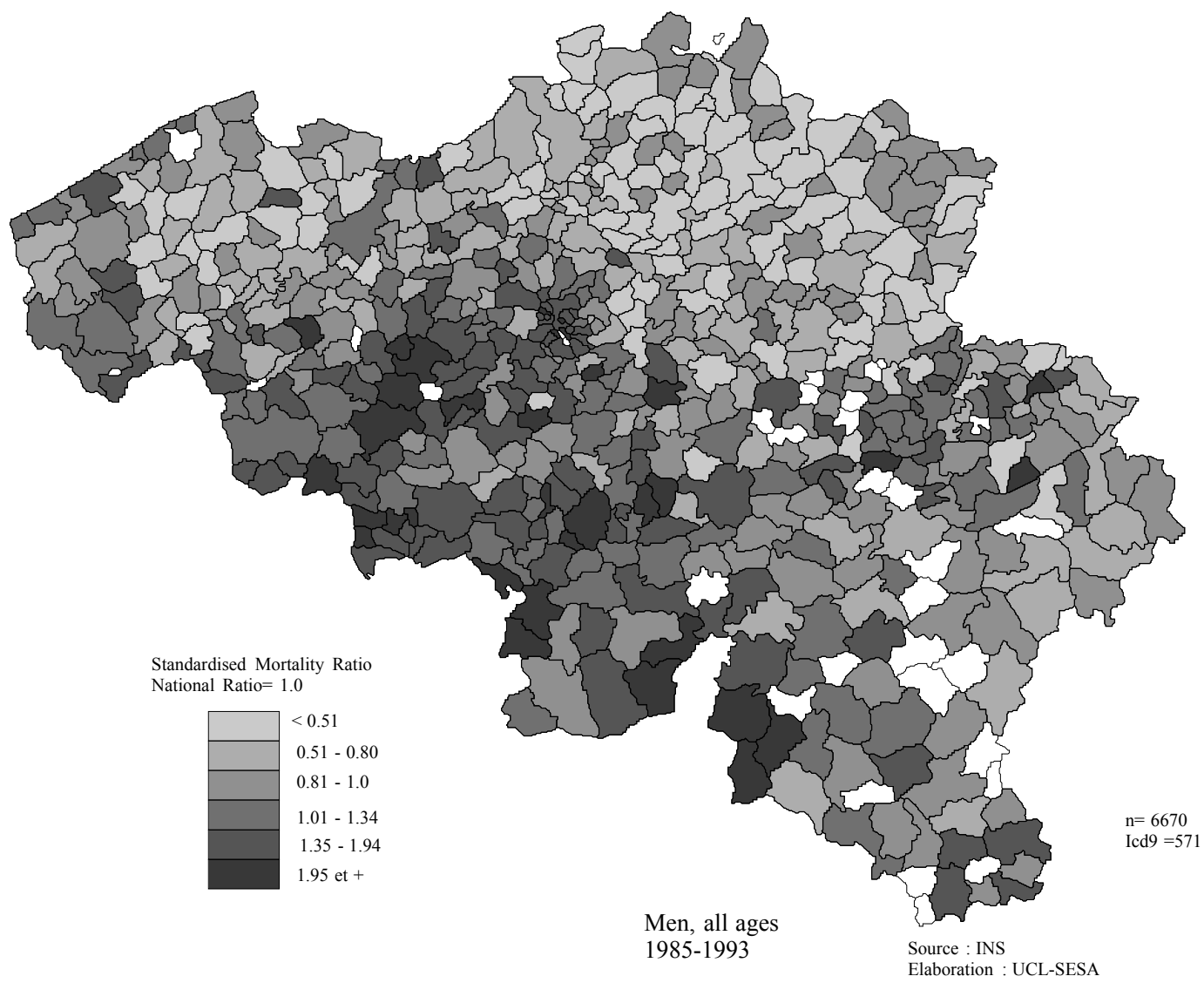
In the weighted least squares model, premature mortality ratio increases with deprivation (beta=0.46), admission rate (beta =0.17), and overweight prevalence (beta =0.27). It decreases as median income rises (beta = -0.24). In this model, the unequal distribution of income and population density are not significantly related to premature mortality. Switching to the SAR model leads to substantial changes. Deprivation has a beta coefficient of 0.27, almost half the value of the WLS model as well as a lower significance (comparing t statistics). Overweight prevalence is no longer significant. Surprisingly, some coefficients increased their absolute value in the SAR model. In this model population density and income inequality are significant predictors of mortality, with beta values of 0.13 and -0.07 respectively (although the sign of the income inequality coefficient is in an unexpected direction). Median income has a higher impact on premature mortality (beta=-0.29). The spatial autocorrelation coefficient indicates a moderate tendency for municipalities with similar mortality level to be contiguous ($\rho=0.6$ in table 3-3). Altogether, as measured by the multiple correlation coefficient R^2 , spatial autocorrelation accounts for 13% of the variability in premature mortality and 31% in all-ages mortality.

Changes of coefficients are more important for all-ages mortality ratio. When moving from the WLS model to the SAR, the deprivation coefficient becomes negative (from .22 in the WLS to -.05 in the SAR) and is no longer significant. A similar change occurs with overweight prevalence, whose beta coefficient is reduced from 0.39 in the WLS to 0.09 in the SAR model.

For both mortality ratios, it is noteworthy that the population density coefficient is significant and positive in the SAR model (beta of 0.13 for premature mortality and 0.11 for all-ages mortality) but not in the WLS. This suggests a negative confounding effect which disappears in the SAR. A spatial assessment of the maps shows around large cities (Antwerp, Ghent, Brussels, Charleroi, Liège, Namur, Mons), a negative centre-periphery relationships with mortality (because the periphery of the cities have smaller mortality rates than their centres) and positive centre-periphery relationship with population density (because the centres and peripheries share similar levels of density). This double relationship may account for the confounding effect.

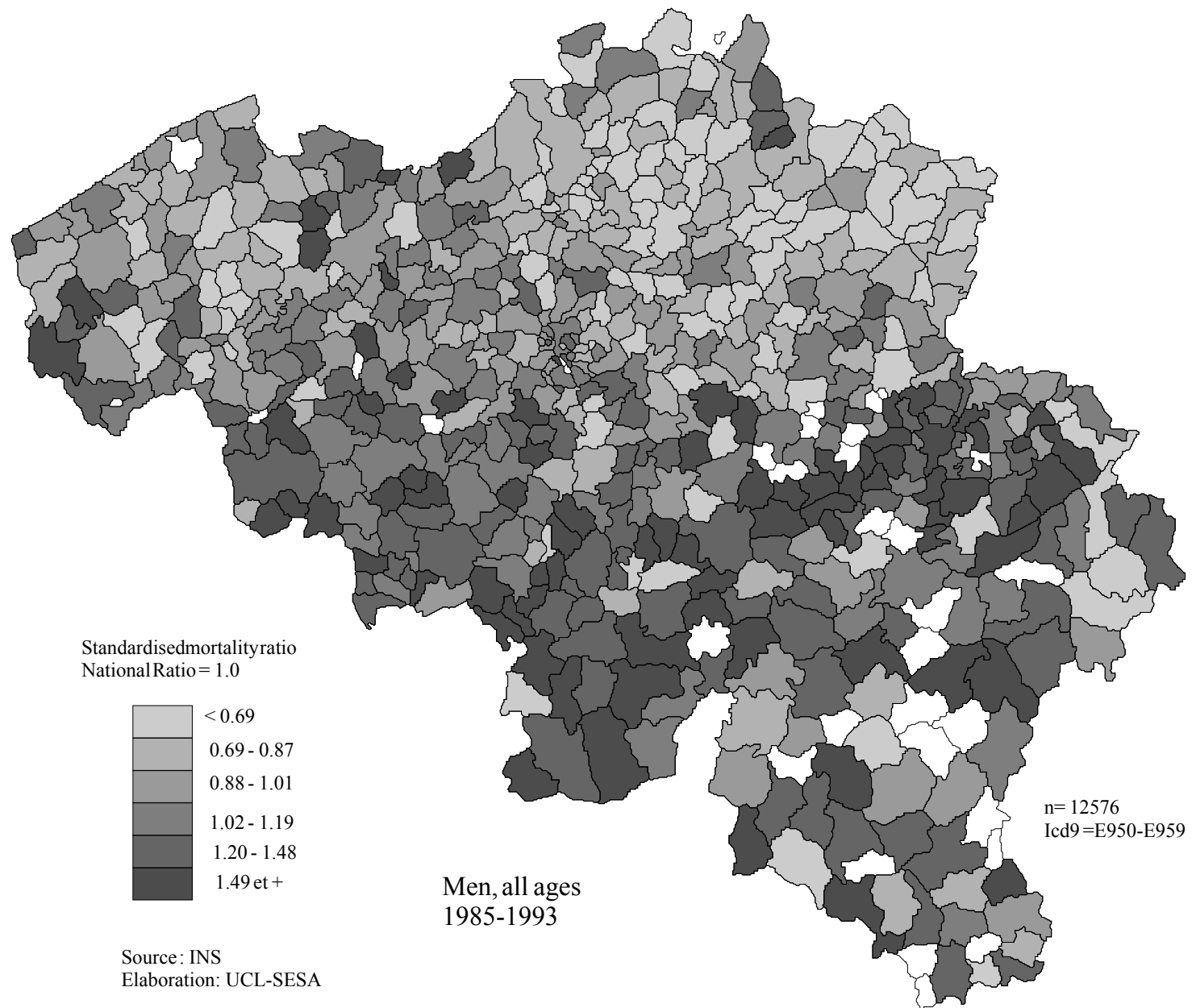
There is some collinearity, in particular for the Townsend deprivation index and population density. This is because the Townsend index includes two variables which are highly related to urban areas (proportion of households without a car and percentage of households not owner occupied).

For each model, the Moran's I is computed for the residual in order to assess remaining spatial autocorrelation. Both residuals of the WLS models present significant spatial autocorrelation ($I=0.29$ for premature mortality and 0.31 for all-ages mortality). The two SAR models have done an adequate job, as can be seen from the low and non-significant values of the autocorrelation of the residuals. As intended, the SAR models have removed the spatial autocorrelation.



Map 3-2. Standardised mortality ratio for liver cirrhosis : men , 1985-93.

Map 3-3. Standardised mortality ratio for suicide: men, 1985-93.



3.4. Discussion

This study shows that mortality, morbidity, and socio-economic status all show moderate-to-high spatial autocorrelation. Such spatial concentration is particularly strong for two mortality causes linked with substance abuse or poor mental health, liver cirrhosis and suicide. Moreover, incorporating such spatial autocorrelation in regression models has a significant impact on the apparent relationship between mortality and deprivation. The failure to take into account the spatial structure of the data can produce biased results and thus lead to different conclusions about the relationship between mortality and deprivation — a relationship which occurs when groups of adjacent municipalities have both high mortality ratios and high deprivation scores. Location acts as a confounding variable.

Several factors can account for such spatial autocorrelation such as environmental exposure (i.e. Radon in the South, toxic or industrial nuisances), lifestyle habits (smoking, drinking) or other unobserved socio-economic factors such as ethnicity, mining history, unemployment. Those elements are very likely to be spatially autocorrelated.

Previous studies have shown that spatial specification had a significant impact on multivariate models. Using data on lip cancer, it has been shown that location can act as a confounding variable on the relationship between cancer incidence and exposure leading to changes in the coefficient (and not only in the standard error) (61). This point has also been made more recently by a study relating blood-lead levels to socio-demographic factors; in particular, in a study from the USA, the proportion of the population from minority groups had a smaller relationship with blood-lead level after controlling for spatial autocorrelation (126). A recent study focusing on the relationship between the Townsend index and reported limiting long-term illness (LLTI) in Britain also found some spatial structure in the residuals, with over-prediction of LLTI in London and under-prediction in coal mining areas (37).

Other studies have used multilevel modelling or dummy variables to control for inter-regional differences of health and/or socio-economic status (268,286,293). The results of the new RAWP formula showed that 44% of the variance in the use of acute health services in Britain was attributable to inter-district variation and that allowing for such variation in the model produced significant changes in the coefficient values (50). In this study, the coefficients of the socio-demographic variables were usually smaller (in absolute value) in the multilevel models than in the ordinary least square models. Although the multilevel approach is a clear improvement, the studies referred to above still neglect intra-regional spatial autocorrelation and thus are still exposed to the risk of poor inference or biased results.

The negative values of the Gini coefficients imply that mortality decreases with unequal distribution of income. This may be in contradiction with studies showing increasing mortality in areas where income is less equally distributed (165,346), although the relationship between income inequality and mortality is still subject to discussion (178,321) and might depend on the social and political characteristics specific to each country (283). The negative relationship may also be due to a

confounding variable, the proportion of manual workers. We found that old industrialised municipalities had a higher proportion of manual workers and a more uniform distribution of income; they also had a higher level of mortality (which may suggest occupational exposure such as coal mining). Conversely, municipalities with predominantly service sector workers have a higher proportion of employees, a higher level of inequality of income and a lower level of mortality. Finally, the relevance of the Gini coefficient might be subject to discussion. A previous study by Kennedy et al. (1996) suggested that it acted as a proxy of extreme deprivation, while the Robin Hood index correlated much better with the share of income earned by most the population. However, we had access to data by income groups and not by decile. Moreover, comparing the various income inequality measures, Kawachi (171) concluded that the choice of income distribution measure was not of major importance

The morbidity variables we use have limitations. The standardised admission rate may be affected by non-morbidity factors, such as the density of doctors, procedure intensity and accessibility. Several studies have found correlations between admission rates and density of doctors, but the significance of such a relationship is not clear-cut. It might hide unobserved morbidity or accessibility variables (48,86,127). Furthermore, although socio-economic factors and supply may influence hospital admission rates, health status has been found to be the most important determinant of hospital utilisation (25). Finally, it is important to note that the second morbidity variable considered here, overweight prevalence, is computed only for a sub-group (young men) and is not necessarily representative of the whole population.

Our level of spatial aggregation is too high for urban areas. For instance, Antwerp, an important harbour city, and its suburbs account for 5% of the Belgian population. For such cities, the variance in the mortality ratio is reduced and this tends to increase the correlation between the mortality ratio and socio-economic variables (271). This problem, known as the modifiable areal unit problem (MAUP) has also been noticed for morbidity variables (126).

This study has evidenced cluster of mortality for several causes vulnerable to primary and secondary prevention. This has two implications. First, as some problems such as chronic pulmonary disorders, substance abuse, road accident and suicide present a high level of spatial concentration, it seems worthwhile to design and implement programmes in some specific areas. Belgium has two instruments to carry out such policy : the network of the primary mental health centres and the local health promotion centres. The accreditation, organisation and funding of such centres could take into account the spatial distribution found in this study.

A second conclusion of our work is that failure to take spatial autocorrelation into consideration might lead to different conclusions about the relationship between mortality and some socio-economic factors. In some OECD countries, the allocation of health care resources increasingly makes use of capitation formulae (269). Their main purpose is to achieve a more equitable allocation of resources between local health authorities (52,79,194). A few formulae, such as that of the Resource Allocation Working Party in the UK, are based on area-level data (53,255,293). Future ecological models may need to study the spatial properties of the data used, both within and between regions, in order to improve inference. In particular, the

spatial autocorrelation of the residuals may give valuable information about the adequacy of the model.

Although spatial autocorrelation should be considered in future explanatory ecological studies, it should not be excluded from health resources allocation : excluding spatial autocorrelation from resources allocation would imply that those unobserved factors have nothing to do with health or health care needs. This is a too restrictive assumption. Our study has helped to show that there is a need to integrate space in health care allocation.

Chapter 4. Socio-economic inequalities in common mental disorders : disability and severity

4.1. Introduction

Since the early work of Robert Faris and Warren Dunham in 1939, numerous studies have been dedicated to the relation between social class and mental disorders (84,252). These works have persistently shown a higher prevalence rate of mental disorders in the lowest socio-economic group. This socio-economic mental health gradient has been found in large population epidemiological studies using psychiatric diagnostic instrument (30,33,42,181,200) or symptom checklists (239,266,338). The socio-economic gradient in mental health is steeper for schizophrenia, anxiety disorders and substance abuse than for affective disorders (199,236). Psychiatric and non-psychiatric comorbidity seems to make the gradient much steeper (265). Such gradient is, however, highly vulnerable to the way socio-economic status (SES) is defined. Standard of living and material deprivation appear to be more potent risk factors than social class or educational status (6,200,265,338). Although most studies yield a bottom/top comparison which is statistically significant, there is some doubt about the linearity of the socio-economic gradient in mental health. Some studies showing borderline significance for the prevalence of intermediate socio-economic groups (236) or evidencing a \cap shaped relation (6,200).

In such issue, two aspects have not been given much attention : the severity of mental disorder and to the sensitivity of the socio-economic gradient to the disability entailed by mental disorder.

First, studies on socio-economic inequality in mental health mainly deal with diagnoses using the Diagnostic and Statistical Manual (DSM) or International Classification of Diseases (ICD) classification. Although one of the DSM axis deals with social functioning, previous results focused mainly on symptoms, overlooking the other important aspects of mental disorder, such as functional or social disability. Yet, depression is one of the highest disabling psychiatric disorder as evidenced by the WHO study on common mental disorders (251) and increase of disability occurs at each level of depressive symptom severity (160). Moreover, higher social groups have more resources (self-efficacy, social support, help-seeking behaviour) for coping with a depressive episode and buffer its disability impact (59,65,174,297). We can thus expect higher inequality in functional limitation and social well-being than in a symptoms-based approach.

Second, there is some recent evidence that depression is better defined on a continuum and that there is a real value in continuous level of measurement (13,176). Although categorical diagnosis has enormous strengths, they have been said to be more relevant for severe mental disorders and psychoses than for “neurotic” illness (111). Indeed, epidemiological studies have shown that subthreshold depression, compared with no depression, was associated with higher disability, absenteeism, services use and suicide (161,207). Such conceptual issues may affect the social class gradient of depression. One of the very first epidemiological psychiatric

investigations found that minor depression had a steeper socio-economic gradient compared to major depression (341). Two recent studies addressing the causation/selection issue in mental health have found opposite results depending on the categorical versus continuous mental health scale (202,226). Yet, recent measures of inequalities in common mental disorders still favour categorical approach of mental disorders (30,195,200,236,236). If severity is higher in low socio-economic groups both below and above caseness threshold, past studies would have understated socio-economic inequalities.

In this paper we aim to assess how socio-economic inequalities are sensible to the way mental health and inequality are defined and measured. In a first step, we will evaluate whether SES and mental health interact on disability, implying that poor mental health has a higher disability burden in the lower SES groups; in the second step, we will compare the inequality indices for the various definitions of mental health state. We expect that categorical and symptoms-based approaches of mental disorders will lead to smaller socio-economic inequality compared to continuous and disability-oriented measures.

4.2. Material and methods

Data

The present study is based on a cross-sectional household health interview survey carried out in Belgium in 1997. The individuals were selected through a multi-stage stratified sample of non-institutionalised resident individuals. Participation rate was 61%, yielding a sample size of 10 225 individuals. We restricted the analysis to the 7 378 individuals aged at least 25. The questions about health status and use of health care were collected through face-to-face interviews, whereas the lifestyles and mental health status were recorded through a self-administered questionnaire.

Measures

Mental health status was measured through the general health questionnaire 12-item version (GHQ-12). The GHQ-12 is a widely used self-administered mental health scale, assessing a wide range of psychological disorders in primary care and community setting, mainly anxiety and depression (109). It exhibits good psychometric properties, with a median sensitivity of 84% and specificity of 79% (113). The continuous GHQ was the sum of scores (increasing with poor mental health), whereas cases were defined for those scoring 3 or more (109).

Functional and social disability were measured through the Short Form-36 physical functioning scale (SF-36) and a single question on the number of days in the last 2 weeks the subject had not been able to carry out his or her usual activities for a mental health reason. The physical function SF-36 is a 10 item scale (increasing with functioning) asking subjects whether they were limited because of health problems during the last month in the following aspects : the kind of vigorous and moderate activities they were able to carry out, climbing stairs or walking uphill, bending, lifting or stooping, walking, dressing, bathing and using the toilet.

Following the CREDES methodology (196), individual socio-economic status was estimated from both individual and household characteristics. Each individual's SES was assigned a Nam-Powers socio-economic score made up of his/her income, education and occupational score (228). A similar procedure was used to evaluate household SES with the following variables: net disposable equivalent income of the household; mean educational level; proportion of low occupation level; housing ownership. Individuals were then assigned a socio-economic index, which was the mean of their individual and household socio-economic status (196). Finally, SES was standardised by 12 sex-age groups, in order to avoid any spurious relationship between socio-economic status and age or sex.

Statistical method

As the survey selected households, we face intra-household correlation which may affect the efficiency of the parameters. In order to control for such clustering and for the unequal selection probability, we used multilevel model procedures with PROC Mixed for the multivariate linear analysis and Proc NL MIXED for the logistic regression (204).

There have been recent and significant advances in measuring socio-economic inequalities in health (188,218,330). Two widely used indices have been computed, the illness concentration index (Cii) and the Bottom/top Ratio. The Cii is a measure of unequal distribution of health within the various socio-economic strata. The Cii ranges from -1 when all poor mental states are concentrated in the poor and +1 when all poor mental states are concentrated in the rich. It equals 0 in the case of no inequality. We used the computation method of Kakwani et alii (163). The bottom/top ratio is the ratio of the mental health state of the bottom socio-economic group (first quintile) to that of top group (last quintile)⁸.

4.3. Results

Socio-demographic and health status variables are presented in table 4-1. Mental health status is rather poor, with 24% of the sample scoring 3 or more on the GHQ, 8% declaring a depression in the last year and 3% having limited their activities in the last two weeks for a mental health reason.

⁸ On two aspects, the estimator of this chapter is differing from that used in the chapter 3 : first the bottom / top ratio used here is comparing the first and last quintiles while chapter 3 used first and last decile; second, in this chapter, stratification is carried on increasing socio-economic status while chapter 3 is carried out on increasing level of deprivation (townsend index) : hence the estimator here is a bottom/top meanwhile chapter 3 used a top/bottom estimator (p90/p10).

table 4-1. Descriptive statistics : sociodemographic.

	%	N		
Age (%)				
25-44	43.9	3239		
45-64	32.3	2382		
65+	23.8	1757		
Sex (%)				
Men	48.3	3562		
Women	51.7	3816		
Education (%)				
primary	19.4	1433		
secondary inf	21.3	1570		
secondary sup	27.1	2003		
Superior	17.2	1272		
University	9.8	725		
Equivalent Income (%)				
<20 000	6.8	503		
20-30	19.2	1413		
30-40	23.7	1749		
40-60	31.8	2345		
>60 000	13.8	1016		
Occupation (%)				
Inactive	12.6	928		
Manual	29.4	2167		
Self-employed	4.4	324		
Clerk	34.0	2510		
Executive	15.5	1141		
Others	4.2	308		
Health variables				
			Mean	Standard
			(or %)	Deviation
SF-36 physical functioning score (0-100, bad to good)			85.77	24.64
Self assessed health score (score, good to bad)			2.96	1.23
Long-term diseases in the last year (Nber)			1.46	1.85
GHQ-12 score in the last few weeks (score, good to bad)			1.66	2.70
Mental health disorder (% with GHQ-12 ≥ 3)			23.71	0.46
Declared depression in the last year (%)			8.2	0.27
Any activity limitation for mental health in the last 2 weeks (%)			2.8	0.16

The impact of mental health status on disability can be appraised from table 4-2 for the SF-36 score and for any daily activities limitation. Physical functioning was better for men (B=0.08) and for the two younger age groups (B=0.925 and 0.721). It decreases as the number of diseases or chronic conditions increases (B=-0.21). Common mental disorder has a moderate negative impact on physical functioning : a 10% increase of the GHQ-12 score leads to a 1.2% reduction of physical functioning score. Higher socio-economic groups benefit from an better physical functioning in two ways: first, each percent increase on the SES scale leads to a 0.09% increased SF-36 score. Moreover, the relation between the GHQ-12 score and the SF-36 is partly and positively buffered by SES (B=0.025) : as SES increases, GHQ will have a smaller effect on the functional limitation.

Similar results are observed for the likelihood of daily activities limitation. Such limitation increases with comorbidity (OR=1.46) as well as with the GHQ score (OR=1.18). Men are less likely to have such limitation. Socio-economic status has no direct influence but keeps a small interaction effect with the GHQ score (OR=0.98).

table 4-2. regression of disability on sex, age, comorbidity, mental health and socio-economic status : standardised coefficient of the linear regression and Odd ratios of the logistic regression.

Independent variables	Dependent : SF-36 (1)		Dependent : Daily activities limitation (2)	
	B	Significance	Odd ratio	Significance
Intercept	-0.377	**	0.025	**
Men	0.080	**	0.873	**
Age 25-44	0.925	**	1.072	
Age 45-64	0.721	**	1.067	
Comorbidity	-0.205	**	1.459	**
GHQ-12	-0.117	**	1.178	**
SES	0.094	**	1.0	
SES*GHQ-12	0.025	**	0.983	*
LRT	100.46		511.133	
P	<0.001		<0.001	

(1) Standardised Beta for the linear regression ; (2) odd ratios for the logistic regression. Coefficient significant at ** $\alpha=0.01$, * $\alpha=0.05$.

Socio-economic inequality in mental health is appraised in table 4-3 for the continuous GHQ caseness, GHQ score, any disability related to mental health, days of mental health related disability and self-declared depression. For all these variables, the negative value of the Cii means that mental health is more concentrated in the lower SES groups : 2% of mental disorder cases, 5% of the mental disorder score, 15% of any mental health related disability, 21% of disability days and 19% of declared depression are unequally distributed in the lower SES groups. The ratio of bottom to top socio-economic group produces a similar pattern, as the ratio is always and significantly greater than 1. Comparing with the top socio-economic group, the lowest quintile has 11% more cases of common mental disorder, a GHQ score 24% higher, 136% more disability cases, 263% more disability days and 125% more self-declared depression .

table 4-3. Inequality indices : illness concentration index and ratio of mental health in the first quintile to the mental health of the last quintile.

Mental health status :	Illness concentration index (Cii)	Ratio of mental health of the first quintile to the mental health of the last quintile
GHQ >=3 (%)	-0.024 *	1.11 **
GHQ-12 score	-0.049 **	1.24 **
Any disability for mental health (%)	-0.148 **	2.36 **
Disability for mental health (nber days)	-0.208 **	3.63 **
Self-declared depression (%)	-0.190 **	2.25 **

Coefficient significant at ** $\alpha=0.01$, * $\alpha=0.05$.

Cii range from -1 when all poor-health is beard by the poorer and 1 when all poor health is beard by the well off.

However, differences of inequality are striking. GHQ score has twice the inequality of GHQ caseness (Cii=-0.049 versus -0.024); mental health related disability is six times higher than GHQ caseness (Cii=-0.148 versus -0.024). Self-declared depression is 8 times the inequality of GHQ caseness (Cii=-0.19 versus -.024). Mental health related disability yield higher inequality than symptoms variables (GHQ score or GHQ caseness).

Continuous variables yielded higher inequality than dichotomous ones; this is true for the GHQ (-0.049 for the continuous scale versus 0.024 for the binary version) and for disability (respectively -0.21 and -0.15). This means that severity is higher in the lower SES groups. This can be observed from Figure 4-1. The GHQ score inequality curve is always above the GHQ caseness inequality curve; the same is true for mental health disability : the curve related to the number of days of disability for a mental health reason is located above the inequality curve of any disability.

Top and bottom comparisons (bottom/top ratio) exhibits higher inequality than the Concentration illness index. On the whole population 2% of GHQ cases are unequally distributed whereas the bottom quintile gets 11% more GHQ cases than top socio-economic group. This is true for all other mental health variables (GHQ score, disability and self-reported depression). Such differences arise because the ratio focuses only on the extremes of the socio-economic distribution.

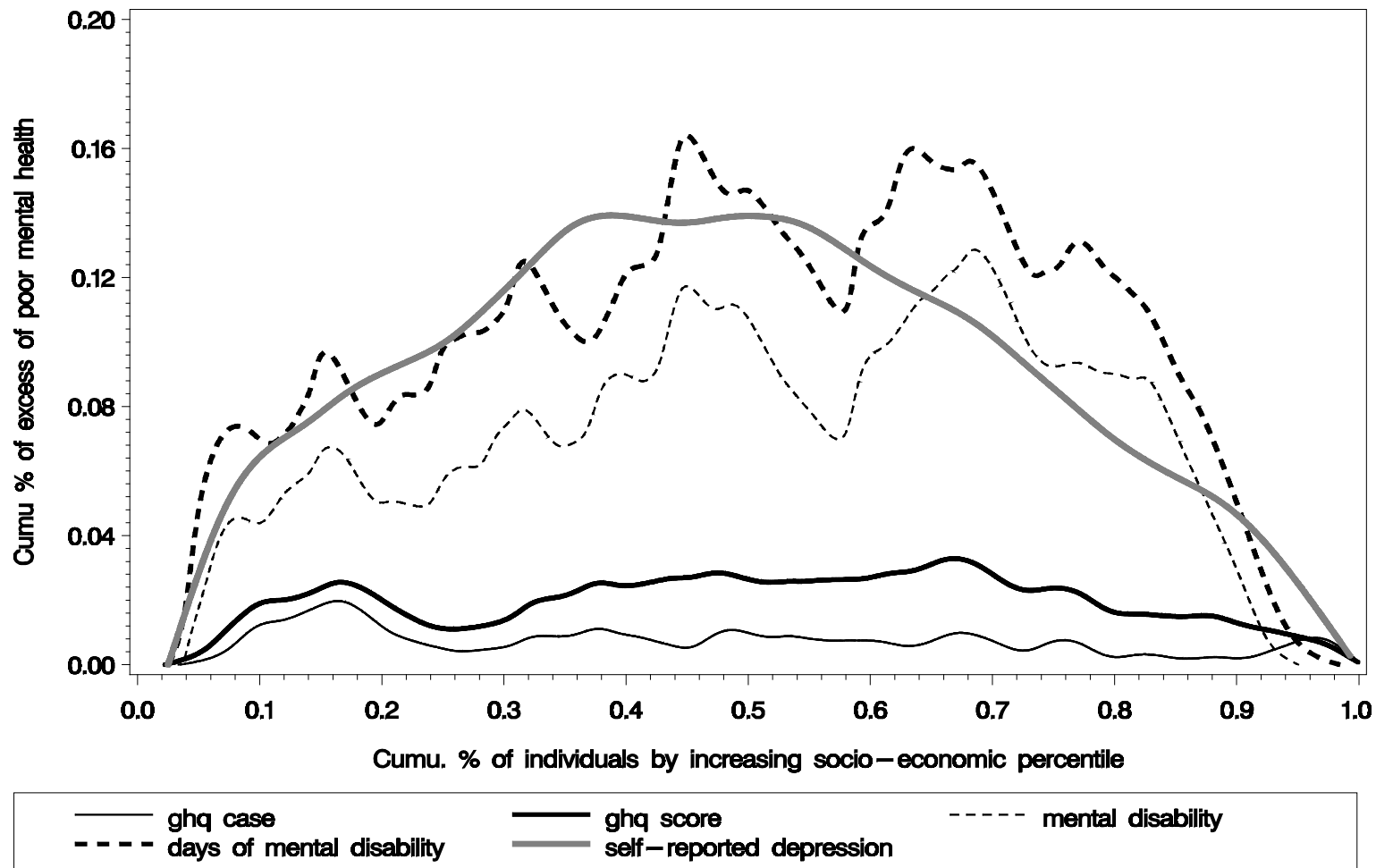


Figure 4-1. Inequalities curves.

Legend : Each curve provides the cumulative percentage of poor mental health excess, that is the cumulative percentage of the poor mental health minus the cumulative percentage of the population; one curve is plotted for each mental health variable : the GHQ caseness, the GHQ score, any mental health disability, days of disability for mental reasons and, lastly, self-reported depression.

4.4. Discussion

This work provides three principal major results. First, it shows that socio-economic status is buffering the effect of mental health state on disability, so that disability produces more inequality than a symptoms-based approach. Such interaction has been found in an other study (65). Recent epidemiological work confirmed that, at a given symptom level, lower social groups experienced higher dysfunction (22).

Three factors may explain such observation. First, for a given level of common mental disorder, disability might be lower in the well-off social groups, because they count with more social support and coping resources (311).

Second, psychiatric comorbidity may contribute to this difference. The WHO study showed that a significant part of the disability was due to psychiatric comorbidity (251). Previous epidemiological studies showed that the SES gradient is more pronounced for comorbid psychiatric disorders comparing with pure psychiatric disorders (33); this may increase socio-economic inequality in disability at a given level of common mental disorder. Last, there is some evidence that relapse and chronicity is higher in lower socio-economic groups (112,300). Such poor prognosis, at a given level of current common mental disorders, may increase disability in the lower socio-economic groups.

The second significant result of this study is that dichotomous appraisal of mental health tends to under-estimate inequality because it overlooks the unequal distribution of severity below and above the caseness level. Our results are concordant with a previous study showing that inequality in self-assessed health varied from $C_{ii} = -32\%$ to -3% when the threshold increased towards better health status (331). The longitudinal study of Dunedin, New Zealand, also found that association between mental disorder and social status was more robust using continuous symptom scales rather than categorical classification (226).

Last, the study confirmed that differences of inequalities may stem from the way health is defined. In particular symptoms based approach yield much less inequalities than a subjective or functional one. This was observed in the very first studies on health inequalities using the Blaxter classification (32) or in the more recent OECD studies (323). Various explanations have been advanced by Idler: subjective perception of health captures a wider array of symptoms, it represents a more comprehensive judgment about the severity of current illness, it reflects a dynamic estimate of health, including overall past and expected health trajectory; subjective health takes also into account the (lack of) resources to buffer the decline in health (149). Hence, because of its subjectivity, self-assessed mental health may provide a more comprehensive picture of health inequalities.

This work may be limited by GHQ under-reporting. A previous study, using Whitehall II data, found that the sensitivity of the GHQ-30 was lower in the lower occupational categories compared with higher occupational groups, although this difference was not statistically significant; if lower SES groups tend to under-report common mental disorder, this may lead to an under-estimation of GHQ-SES gradient (298). This study does not count with a psychiatric interview schedule enabling such

validity appraisal. It is thus possible that GHQ related inequality is under-estimated compared to the other functional mental health variables.

Our findings stress the need to assess mental health inequalities using a multidimensional and continuous approach. As functioning is part of the DSM multi-axial conceptualisation, it seems obvious to integrate it in the investigation of mental health inequalities. Yet, up to now, psychiatric epidemiology has given little attention to disability and functioning as far as socio-economic mental health inequalities are concerned. International comparisons of health inequalities make an increasing use of Blaxter three dimensions : a medical, a functional and a subjective model (32,323). This multidimensional approach reflects the now standard distinction that is made between disease (pathology), illness (subjective assessment of health status) and sickness (role limitation) (303). Research in health sociology and psychiatric epidemiology needs to consider those dimensions. As stated by Julie Mulvany, mental health sociologists have been loath to give attention to mental impairment and to the social barriers that people with psychiatric disorders have to face (235).

Chapter 5. Depression and socio-economic status : a longitudinal analysis

5.1. Introduction

Low socio-economic status (SES) is generally associated with high psychiatric morbidity, disability and poor access to health care. In countries where comparable epidemiological studies have been carried out, the lowest educational group had a higher risk of psychiatric morbidity (6). The outcomes of such higher mental morbidity are also unequally distributed. For the same level of severity, lower socio-economic groups faced more disabilities (22) and a poorer prognosis (339). In countries providing less generous welfare support, such groups also faced less favourable access to health care (166) and were less likely to use specialised mental care (2).

Although the relationship seems to go from socio-economic status to mental health, it has been difficult for cross-sectional data to disentangle the effect of socio-economic status from other confounding factors such as personality, neuroticism and other cognitive abilities (311). These limitations gave an impulse to longitudinal design, which, in the last decade, have addressed the social correlates of mental disorder onset, maintenance, remission or relapse (38,42,143,206,239,277,285,339). But they have yielded inconsistent results for both maintenance and onset of mental disorders. The relation of socio-economic status with the maintenance or remission of mental disorders has been evidenced by the studies of Romans and Weich (277,339). In a Belgian study, education predicted maintenance only for men. The ECA study of Sargeant had mixed results (285). The impact of SES on mental disorder duration was not found in the Stirling county, Canada (239). Regarding the risk of onset, the ECA incidence study did not find an increased risk of onset of major depression for low socio-economic groups (143) in opposition to the New-Haven ECA study (42). Weich and Romans found no difference for poverty or socio-economic status and a small effect for self-perceived financial strain (276,339). The Canadian longitudinal community sample showed that low SES increased vulnerability to depression (239).

However, very few studies have considered socio-economic status as changing across time and how such changes affect mental health with time. By focusing mainly on time-invariant socio-economic variables (such as education and occupation), those studies are vulnerable to the numerous confounding factors, such as personality, neuroticism and other cognitive abilities. Even those studies using time-varying covariates (income, unemployment) have failed to address the impact of such socio-economic variables, because they have taken the period mean covariate (26,206), the value at one period (339) or the number of times a certain threshold was crossed (206). None had really assessed longitudinally such covariate. This is a very important issue for policy makers. If policy aims at fostering income maintenance policies to promote mental health or to reduce socio-economic inequalities in depression, they must know whether decrease of deprivation is a significant protecting factor of depression, for given individual characteristics. This is what longitudinal analysis can deliver.

Nevertheless, the few previous longitudinal works had other limitations that we attempt to remedy. Most had a rather short period of reference of about 2 years (but see (26)), they have failed to take into account the unobserved differences between the individuals (heterogeneity), they have failed to account for the endogeneity of the lagged mental health state, and finally they have overlooked the attrition problem in panel data.

Heterogeneity arises when individuals are different regarding some unobserved factors influencing the dependent variable. Some of the previous estimates have –in the worst case- ignored completely the heterogeneity issue that affects panel data and have treated the observations as independent cases (38). Neglecting heterogeneity may lead to overestimation of the effect of socio-economic status on mental health, as far as those unobserved variables are likely confounders. These studies had another drawback because the SES/mental health dynamic relationship was analysed by including previous mental health status as a covariate in the model (339). Such estimation procedure leads to biased and inefficient estimations: the coefficient of the lagged dependent variable is biased upwards, while the coefficients of the other exogenous variables are biased toward zero (146). This is because the lagged dependent variable is correlated with the error of the dependent variable. Hence, previous longitudinal studies might have overstated the chronicity coefficient and understated the relationship between SES and mental health. As result of the overestimation (given heterogeneity) and under-estimation risks (given the lagged mental health), previous studies have failed to address properly to the relationship between socio-economic status and depression (38,277,285).

Finally, recent studies have suggested that status attainment might be less important than other psycho-social aspects such as social support, network, social capital, skill discretion and decision authority (94,297).

Hereafter, we investigate the relationship between several socio-economic covariates and depression onset over an 8 years period using a dynamic model that takes into account unobserved confounding factors. We aim at estimating the short term and long-term effects of socio-economic status on depression. We also test whether changes in socio-economic status is more important than absolute level of economic reward.

5.2. Method

The model

We consider the following dynamic panel data model where Y stands for depression, the X are time-invariant covariates (such as baseline age, education, sex, household type,...), Z is a time-varying socio-economic status variable and u is an error term.

$$y_{i,t} = \beta'X_{i,t} + \varphi Z_{it} + \delta \Delta Z_{it} + \lambda y_{i,t-1} + u_{i,t} \quad (1)$$

The lagged value of Y assumes that there is a behavioural dependence between health states across time. This is consistent with psychiatric research, which has long

evidenced that current psychiatric status was strongly determined by past psychiatric history, such as number and duration of previous episodes (97), severity (112), and initial functioning (174). Including the previous depression score serves also as a control for potential selection effect in which previous mental health state would influence current socio-economic status. The ϕ coefficient estimates the influence of the level of Z on mental health, while the δ catches the impact of change in socio-economic resources on the level of mental disorder.

However, as noted by Hsiao, serial correlation between the dependent variable and its lagged value (λ) may also be accounted for by unobserved variables influencing the probability of experiencing a poor health state at each time (146). Suppose, we are unable to observe sex, then depression in t would be highly correlated with previous state, because of the large gender difference in depression. But that does not necessarily imply that depression in t is acting on depression in t+1. Hence, such unobserved heterogeneity can induce spurious state dependence, inflating λ over time. With panel data, it can be accounted for by including an individual effect in equation 1 such that

$$\mu_{i,t} = \alpha_i + e_{i,t} \quad (2)$$

where $e_{i,t}$ is an error term with constant variance, independently distributed between individuals. The individual specific α_i terms highlights that some unobserved variables (such as personality, neuroticism, locus of control, social support, self-esteem, mastery) are likely predictors of mental health status. Using such individual effect will help to tackle such heterogeneity and avoid overstating the influence of the covariates as well as of the lagged dependent variable.

Previous studies have evidenced that long-term income or long-term economic hardship are better predictors of health status than current income (26,206). This is coherent with the chronic stress explanation of the socio-economic inequalities in health (43). This may also be explained by the volatility of income (187). But equation 1 allows for a distinction between the short term effect of –say– income (ϕ) and its long-term component which is equal to $\phi/(1-\lambda)$ provided $0 < \lambda < 1$. This suggests that estimating correctly λ is of paramount importance if we are interested in long-term effect of socio-economic status on depression.

Data

We used the 8 waves of the Belgian Households Panel, which were carried out between 1992 and 1999 on a representative sample of the Belgian population. The Belgian panel is part of the European Community Household Panel (ECHP). The ECHP is a multi-dimensional, cross-national and longitudinal survey. It is based on a standardised questionnaire that involves annual interviewing of a representative panel of households and individuals in each of the 16 participating countries. It covers a wide range of topics, such as income, health, health care, education, housing, demographics, employment characteristics, social relations, pensions and insurance, degree of satisfaction with various aspects of work and life. Details about survey design, questionnaires, sampling and other methodological issues can be found on the ECHP web site <http://forum.europa.eu.int/irc/dsis/echpanel/info/data/information.html>.

Definition of variables

Mental health and health status

Depression is measured using a modified version of the HDL-global depression scale. This self-administered symptom checklist is part of the Health and Daily Living Form (HDL) and was developed to tap the presence and severity of symptoms involved in obtaining a RDC diagnosis of major depression (233). The original scale encompasses 18 items which are related to the DSM-IV diagnosis criteria of major depression (3): feeling depressed, poor appetite or weight loss, sleeping trouble, loss of energy or feeling tired, being unable to sit, feeling slowed down, loss of interest or pleasure, feelings of guilt, diminished ability to concentrate, suicidal ideation or thoughts of death, crying, feeling pessimist, brooding about unpleasant things, feeling inadequate, feeling irritable, needing reassurance or help, physical symptoms. Although the scale is not very well known, it has a good construct validity with a Cronbach α of 0.90 and it has shown a correlation of 0.88 with the Beck Depressive Inventory (27). As suggested by others (38), we used a shorter 15-items version, excluding some items which were of dubious validity (physical symptoms), gender specific (such as crying) or not available (loss of pleasure in sexual activities). Respondents answering 'never', 'seldom' or 'now and then' were given a zero-score, while those answering 'fairly often' or 'often' were coded with 1. Alternative Likert scoring was tried, but did not affect the results. Considering the value of continuous scaling in mental health, the scale was defined as the sum of the 0-1 item scores. A dichotomous version was also considered : using the diagnosis criteria of the DSM-IV, individuals were classified as depressed if they had at least 5 positive responses among which the first item (depressed mood).

Overall health status is proxied by four self-rated questions : general health (5 categories), daily activities limitation due to a long-term illness (3 categories), any daily activities limitation due to a disease (2 categories), any handicap or impairment (2 categories). Such questions have been widely validated by the Health Interview Surveys in the UK, the Netherlands and in Belgium. They cover the three general approaches of health, the subjective, the medical and the functional model (32). Although subjective health may appear as a "soft" measure of health status, literature suggests that it is highly valid. In a recent review, Idler identified 27 studies using subjective health as a predictor of mortality, of which 23 evidenced a strong effect on survival, after controlling for known risk factors (149). Subjective health is also a valid and continuous measure of ill-health (216). Qualitative studies suggest that the consistency of subjective health questions may arise from the fact that it is an inclusive measure of health status, capturing a full array of illnesses, jointly with their severity, comorbidity, duration and restrictions caused by ill-health (149,215). To account for the ordinal scale of the polytomous general health and long-term illness limitation, a continuous latent variable with a log-normal distribution was assumed, as suggested by others (331). See appendix for methodological details.

Socio-economic status

Socio-economic status was measured by educational level, occupational status and income. Educational status is classified in six levels, according to the International Standard Classification of Education. Lower and upper secondary levels were split into general and vocational orientation, because compulsory education makes level of education less relevant. Occupation was coded according the ISCO-88 classification, which takes into account the tasks and duties related to an occupation and the relevant skills that are necessary for fulfilling the formal requirements (150). Only the major occupational groups were considered. Measurement of income is a rather tricky issue, because of the different units involved (household and individual), of the various components (labour, capital, transfer,...), and of the necessity to convert gross self-employed profits into net monthly incomes.

Work characteristics

Using the Job Strain model of Karasek, Stanfeld and colleagues suggested that work characteristics, such as decision latitude, control over work, work pace and conflicting demand, skill use and variety explained most of the occupational gradient in depression among men (297). Similar results were reached by Link and colleagues (202). In the present study, we included an index of decision latitude by the way of two questions regarding if the individuals supervised other workers/employees and whether they participate to wage and promotion decision. Overall job satisfaction was also included.

Social capital and social network

The causation-selection debate has mostly investigated the impact of socio-economic status on health. However, recent studies cast doubt about the relevance of such an approach and suggest that status attainment might be less important than other psycho-social aspects, such as social support, network and social capital (94). Drawing on the work of the French sociologist Emile Durkheim about suicide, social capital tries to catch the link between individual health status with social cohesion, particularly the connectedness and solidarity among groups in society (172). Measures of social capital cover structural measures, such as participation in organisation or institutional linkage, and cognitive features, such as trust and social support (130). In this study we counted with membership to a social organisation and being a civilian worker. Regarding social network, the frequency of contacts with friends, frequency of contacts with neighbours and the satisfaction of social life were converted into one index of social network through factorial principal component analysis.

Deprivation and financial strain

The index of deprivation elaborated by Weich and Lewis was computed. Each individual has one point for each of the following : having income in the first quintile, not having a car, living in a rented accommodation, no saving from income, being in the lower quintile regarding the number of appliances owned, being in the higher quintile in the number of house problems. Subjective financial strain was assessed by a question stating “With the income you have now, how easy do you manage these days? (from very easily to very hardly)“.

Missing data

There are two types of non-response : unit response occurs when no information is available from a sample unit, while item response occurs when a unit refuses to answer or fails to provide a valid response to a particular question. The Belgian panel has a unit response of 84% and performs well in comparison with other UE countries (259). However, it has a poorer performance for item non-response, particularly for income data (243). When individual or household income data were missing, we applied the Eurostat imputation procedures, which are a mix of two techniques : imputation by last observation carried forward (LOCF) and conditional imputation (95). Regarding non-income variable, we used a multiple imputation technique, through SAS Proc Mi and Mianalyse; multiple imputation has the advantage to account for the uncertainty of the imputation.

Estimation procedures

A first problem is related to the functional form of the α_i (equation 2) that can be defined as either fixed-effects or random effects. If we are not interested in making inference on the α_i and if we consider the individual as the basic unit of the general population, than random effects should be considered. However, random effects come with the additional assumption that the α_i are not correlated with the covariates, which is very unlikely, as unobserved variables (neuroticism, locus of control, mastery, self-esteem) are often correlated with socio-economic status (311). The Hausman m-statistic can be used to test whether a random effect is a realistic assumption. With a value of 184.02 ($p < .0001$), the random specification for the α_i is rejected. Although we do not wish to draw inference at the individual level, we must take into account the correlation between these individual specific effects and the covariates. In the remaining analysis of the paper, heterogeneity is thus tackled through fixed-effect models.

The presence of the lagged value of Y (equation 1) makes the Ordinary Least Square (OLS) estimator biased and inconsistent (21). This is because the lagged value is correlated with the error component. We used the instrumental variable method proposed by Hsiao and Andersen, using the lagged values of socio-economic status as instruments (146). In order to get rid of the α_i , the first step, each observation is taken in difference while the ΔZ are taken in double difference (equation 3.). But because the $y_{it}-y_{it-1}$ are still correlated with the $u_{it}-u_{it-1}$, we need to use an instrument of $y_{it-1}-y_{it-2}$. Hsiao suggests, in the second step, to use y_{it-2} as instrument. In the last step, the coefficient of the time-invariant covariates and of the α_i can be recovered by OLS applied on the equation 4. As if it is likely that the error term of equation 3 will be heteroscedastic, it is necessary to use GLS in order to estimate equation 3.

$$y_{it} - y_{it-1} = \lambda(y_{it-1} - y_{it-2}) + \varphi(Z_{it} - Z_{it-1}) + \delta\Delta^2 Z_{it} + u_{it} - u_{it-1} \quad (3)$$

$$\bar{y}_i - \lambda\bar{y}_{i-1} - \varphi\bar{z}_i - \delta\overline{\Delta z}_i = \beta'X_i + v_i + \bar{u}_i \quad (4)$$

The fixed effects model for the binary version of depression was implemented through a conditional likelihood approach which helps to get rid of the α_i . However,

such models are generally applied to panel with two waves. The cumbersome derivation of the conditional logit formulation for 8 waves follows the method of Maddala (212).

Attrition could complicate the estimation procedure, because loss during follow up has been shown to increase with psychopathology, poverty and low educational status (91). Although, the risk of attrition among disordered individuals is weak (74), with 8 waves, the sample is increasingly biased upward regarding socio-economic status and downward regarding depression. We tested the attrition bias by regressing previous socio-demographic and health variables on the probability of loss to follow-up at the next occasion and by including the number of observed waves as a covariate of mental health status (328). In order to adjust for such selection bias, we used the Heckman selection model (213). Formally, the error of the response equation (Y_i , mental health) is linked to the error component of the attrition equation (R_i , the probability of being observed in t). Then the expectation of Y_{i2} conditionally for the individual being present in the second wave is joint distribution of the response and the attrition.

$$\text{Prob}(R_i=1)=\Phi(A'F_i) \quad (5)$$

$$E(y_{it} | X_{it}, R_i = 1) = B'X_{it} + \pi_t \frac{\phi(A'F_i)}{\Phi(A'F_i)} \quad (6)$$

Hence, the problem of estimating the B conditionally on being observed ($R=1$) can be expressed by two equations. Equation 5 is a probit model, in which the probability of being observed is modeled as probit response of the F covariates (which can share similar variables with X), equation 6 the response equation corrected for attrition by the way of the inverse Mill ratio. The π coefficient is equal to the covariance between the error of Y and the error of R.

All the computations were carried with several SAS procedures such as TSCSREG for the Hausman test, VARCOMP for the variance components, PROC MIXED, NLMIXED and MODEL for the multivariate, instrumental and simultaneous estimations.

5.3. Results

Sample description

The sample comprised 11 909 individuals who participated to an average of 4.6 waves. Overall 49% of the individuals had some attrition during the 8 waves. The majority (81%) of the censored cases was monotonically missing. The proportion of individuals participating to 1-2, 3-4, 5-6 and 7-8 waves were respectively 39%, 12%, 10% and 38%.

Finally, the attrition found in the Belgian panel was similar to the other European countries panels (259).

table 5-1 provides several statistical estimates for the variables considered in the model: the mean value, the standard deviation, the number of valid cases, the ratio of within-individuals variance to total variance, the odds ratio of being censored in the next wave jointly with its statistical significance. The higher the within variance, the better the ability to make longitudinal inference about within individuals change over time. The lower the within-individuals variance, the less relevant our model. The more the OR departs from 1, the less likely is the assumption of missing completely at random (MCAR).

table 5-1. Descriptive statistics : mean (or %), standard deviation, within variance ratio and OR of attrition.

Label	Mean (std) or %	N	Within var.ratio □	Loss to follow up OR ‡
Depression score	1.58 (2.44)	54190	0.491	1.03***
Depression state (% yes)	0.07 (0.26)	54041	0.691	1.32***
Self-rated health (%)		54546	0.513	1.1***†
Very good	27.39			
Good	49.05			
Fair	18.16			
Bad	4.75			
Very bad	0.64			
Long-term disease (% yes)	15.68	54247	0.489	0.85***
Limitation for long-term disease (%)		47081	0.46	0.86***†
Heavily	4.75			
Slightly	12.1			
Not at all	83.16			
Individual net monthly income (€)	1174.82 (1418.29)	44202	0.652	0.51***
Household net monthly income (€)	2167.72 (2098.7)	54435	0.391	0.84***
Work control (score)	1.4 (1.02)	33649	0.247	0.87***
Unemployed (% yes)	0.07 (0.25)	54941	0.46	1.16*
Unemployment duration (months)	2.61 (4.86)	54941	0.931	1.03***
Occupational category (%)		37407	0.112	0.95*** (¶)
Senior Officials-Managers	6.35			
Professionals	19.1			
Technicians	12.87			
Clerks	19.74			
Service Workers-Sales Workers	10.63			
Skilled Agricultural workers	1.67			
Craft-Related Trades workers	9.82			
Plant-Machine Operators	6.56			
Elementary Occupations	13.26			
Activity status (% active)	50.03	54941	0.231	0.8***
Educational status (%)		54756	0.103	0.92*** (¶)
Primary or lower	18.97			

Label	Mean (std) or %	N	Within var.ratio □	Loss to follow up OR ‡
Lower secondary general orientation	8.89			
Lower secondary vocational orientation	15.08			
Upper secondary general orientation	10.93			
Upper secondary vocational orientation	15.14			
Postsecondary non-superior education	2.47			
1st stage of tertiary education non-univ	20.53			
1st stage of tertiary education univ.	6.11			
2nd stage of tertiary education	1.88			
Social capital (score)	0.49 (0.67)	54941	0.411	0.71***
Social network (score)	0 (1)	47804	0.454	1.1***
Financial strain (score)	3.88 (1.18)	54839	0.426	0.92***
Precarity (score)	1.33 (1.25)	54874	0.293	1.19***
Housing problems (score)	0 (1)	54814	0.596	1.02
Neighbourhood problems (score)	0 (1)	54814	0.462	1.04*
Household Size	2.45 (1.14)	54331	0.193	1.02
Partner (% yes)	0.78 (0.42)	54331	0.206	0.9**
Nber of child	0.28 (0.72)	54331	0.102	0.91***
Sexe (%)	0.51 (0.5)	54941	0.000	0.86***
Age (years)	46.23 (17.82)	53772		1.004***

¶comparing the three higher groups with the three lower ones; † treated as continuous

□ Ratio of the variance of within-individuals variance to total variance ; ‡ odd ratio of being loss to follow-up in successive panel waves.

Overall there is a good split of the variance within and between the individuals, particularly for depression, self-rated health, income, subjective financial strain, housing condition, social capital and social network. There is much less variation over time for education and occupational category as well as for demographic features. They will be thus considered as time-(quasi)invariant covariates.

As expected, loss to follow-up increased with depression score and poor self-rated health. It decreased significantly but slightly with income, higher educational and occupational groups. Women and younger age groups had a lower likelihood of dropping out. The lower the financial strain, the lower attrition rate; attrition decreased as the poverty index increases. The number of waves was also a significant covariate of depression status: for each missing wave, the risk of being depressed increased by 5% ($p < .0001$). However attrition had no relation with the depression score.

Model results

The results of equation 3 estimations are given in table 5-2 for depression score and in table 5-3 for the dichotomical version of depression. The univariate results with fixed effects are given in column 1, the multivariate dynamic fixed-effect results in column 2. Upper part of the table provides first stage estimation of the time-variant socio-economic covariate, while lower part of table gives the time-invariant covariates estimated in the second stage (equation 4). The delta variables are the ΔZ of equation 1.1. Quadratic terms appear when significant.

table 5-2. Models results : continuous level of depression.

	Univariate fixed effects	Multivar dynamic fixed	Std Estimate
Time-variant covariates (stage 1)	Estimate (std)	Estimate (std)	Estimate
Lagged value		0.07421 (0.014) ***	0.033
Subjective financial strain	0.026 (0.007) ***	0.01942 (0.004) ***	0.028
Delta subjective financial strain	-0.001 (0.004)		
Log income	-0.01 (0.02)	-0.03329 (0.014) *	-0.014
Delta income	-0.004 (0.011)		
Deprivation	0.012 (0.009)		
Delta deprivation	-0.005 (0.005)		
Social network	-0.049 (0.008) ***	-0.032 (0.005) ***	-0.043
Social network**2	0.004 (0.002) *	0.00474 (0.002) *	0.014
Delta social net	0.004 (0.005)		
Social capital	-0.007 (0.012)		
Delta social capital	0.003 (0.007)		
Active	-0.003 (0.024)		
Delta active	-0.027 (0.014) *		
Unemployed	0.005 (0.032)		
Delta unemployed	0.01 (0.019)		
Work control	-0.015 (0.014)	-0.016 (0.008) *	-0.01
Work control**2	-0.001 (0) *		
Delta work control	0.003 (0.009)		
Poor subjective health	0.11 (0.005) ***	0.066 (0.002) ***	0.164
Poor s.health **2	-0.003 (0) ***		
Delta s.health	-0.014 (0.003) ***		
LTI limitation	0.173 (0.026) ***	0.091 (0.012) ***	0.054
LTI **2	-0.001 (0) ***		
Delta LTI limitation	0.017 (0.015)		
R ² (F)		0.045 (227.8)	
Time-invariant (stage 2)			
Age (years)		-0.006 (0.001) ***	-0.059
Female		0.504 (0.044) ***	0.149
Nber of child(ren)		0.074 (0.028) **	0.031
Any partner		-0.14 (0.048) **	-0.039
Occupational status (ref=elementary occup)			
Senior Officials-Managers		-0.162 (0.09) *	-0.021
Professionals		-0.196 (0.072) **	-0.038
Technicians		-0.086 (0.072)	-0.014
Clerks		-0.197 (0.06) **	-0.04
Service Workers		-0.098 (0.07)	-0.016
Skilled workers		-0.586 (0.166) ***	-0.037
Trades workers		-0.164 (0.075) *	-0.025
Operators		-0.291 (0.086) **	-0.038
Educational status (ref=2 nd stage tertiary)			
Primary		0.72 (0.144) ***	0.169

	Univariate fixed effects	Multivar dynamic fixed	Std
Time-variant covariates (stage 1)	Estimate (std)	Estimate (std)	Estimate
Lower secondary general		0.648 (0.148) ***	0.113
Lower secondary		0.597 (0.144) ***	0.125
Upper secondary general		0.405 (0.145) **	0.072
Upper secondary vocational		0.413 (0.143) **	0.087
Postsecondary non-superior		0.578 (0.155) ***	0.078
1st stage of tertiary education non univ		0.284 (0.138) *	0.066
1 st stage of tertiary university		0.188 (0.152)	0.025
R2 (F)		0.05 (25.26)	
$\sigma_v/(\sigma_v+\sigma_e)$		0.35	

table 5-3. Models results : binary level of depression.

Time-variant covariates	Univariate fixed effects	Multivariate fixed dynamic effects	
	Estimate (std)	Estimate (std)	Odd Ratio
Lagged value			
subjective financial strain	0.243 (0.051) ***	0.1648 (0.0505) **	1.179
delta subjective financial strain	-0.076 (0.03) **		
Log income	-0.309 (0.142) *		
Delta income	0.027 (0.084)		
Deprivation	0.102 (0.064)		
delta deprivation	0.004 (0.039)	0.1278 (0.041)**	1.136
social network	-0.171 (0.061) **	-0.0843 (0.0261)***	0.919
social network**2	0.025 (0.014) *	-0.056 (0.019) **	0.946
delta social net	0.026 (0.038)		
Social capital	-0.032 (0.096)		
Delta social capital	0.014 (0.057)		
Active	-0.468 (0.183) **	-0.3484 (0.1137) **	0.706
deta active	0.016 (0.112)		
Unemployed	0.054 (0.212)		
deta unemployed	0.105 (0.131)		
Work control	-0.127 (0.119)		
Delta work control	0.059 (0.073)		
Poor subjective health	0.398 (0.035) ***	0.6818(0.0517)***	1.977
Poor s.health **2	-0.009 (0.001) ***	-0.5226 (0.0288)***	0.593
Delta s.health	-0.101 (0.018) ***	-0.1826 (0.0278)***	0.833
LTI limitation	0.745 (0.174) ***	0.5698 (0.1355)***	1.768
LTI **2	0.004 (0.001) ***	-0.496 (0.0285)***	0.609
Delta LTI limitation	0.321 (0.1) **		
Time-invariant covariates			
Age (years)		0.033 (0.01) ***	1.033
Female		0.786 (0.054) ***	2.195
Nber of child		0.157 (0.03) ***	1.169
Any partner		-0.21 (0.052) ***	0.811
Occupational status (ref=elementary occup):			
Senior Officials-Managers"		0.003 (0.106)	1.003
Professionals		-0.006 (0.075)	0.994
Technicians		0.175 (0.071) *	1.191
Clerks		0.172 (0.06) **	1.188
Service Workers		0.057 (0.072)	1.058
Skilled workers		-0.968 (0.252) ***	0.38
Trades workers		0.153 (0.08) *	1.165
Operators		-0.066 (0.099)	0.936
Educational status (ref=2 nd stage terciary):			
Primary		0.511 (0.068) ***	1.667
Lower secondary general		0.256 (0.078) ***	1.291
Lower secondary		0.253 (0.06) ***	1.287

Time-variant covariates	Univariate fixed effects	Multivariate fixed dynamic effects	
	Estimate (std)	Estimate (std)	Odd Ratio
Upper secondary general		0.012 (0.071)	1.012
Upper secondary vocational		-0.086 (0.061)	0.918
Postsecondary non-superior		-0.17 (0.139)	0.844
1st stage of tertiary		-0.225 (0.057) ***	0.798
University'		-0.371 (0.098) ***	0.69

In the univariate fixed effects model, financial strain slightly increased depression score. Income and deprivation had no effect on depression. Depression score decreased non-linearly as social network improved. Social capital had no relationship with depression. Neither activity nor unemployment had a relationship with depression. However, work control had a small protective effect. Depression is raised by poor subjective health and long-term illness limitation. As none of the delta coefficients were significant, suggesting that if socio-economic status had an effect this is in level and not in difference.

Including the dynamic effect yielded little change to the univariate results. Although the serial correlation between successive depression scores is high (0.59, $p < 0.001$), the lagged depression score had a small influence (0.074) on current depressive score, much lower than found in previous studies (38,339). This is the result of getting rid of heterogeneity, which creates spurious serial correlation owing to unobservable, and to instrumental estimation, which avoids the correlation between the error and the lagged mental health value. Hence, our results suggest that chronicity has thus been over-estimated up to now. Controlling for previous mental health status, socio-economic status remained a significant but weak predictor of depression score : for each percentage increase in social network, depression score decreased by 0.04% . Subjective health and long-term illness had an impact of 16% and 5% respectively.

Time-invariant covariates had a stronger influence. Depression score decreased with each additional year of age (-6%) and was higher for women (by 15%). Having a child increased depression score by 3% for each additional child, while having a partner had a smaller protective effect of -4%. Occupational category had an influence, but the lower score was found in intermediate occupational group (skilled workers). Educational status had a protective effect which was mostly linear. Compared with the top educational group, having at best a lower secondary degree raised the score by 10%.

Regarding depression status, the results were similar. For each additional point of subjective strain, depression risk increased by 18%. Deprivation had no effect in level but a small positive effect in difference (OR=1.14), hinting that change in deprivation is more important than the level of deprivation. The stronger the social network, the lower the risk of depression. Being active reduced by 35% the risk of being depressed. No unemployment effect was observed. Poor subjective health and long-term limitation increased depression risk. The time-invariant covariates indicated that women had twice a higher risk than men, for each additional children the risk increased by 17%, while a partner provides a small protective effect (OR=0.81). There were few and non-linear OR for occupational status, while educational level presented a rather monotone decreasing risk as education rises.

Including the correction for attrition had no significant impact on the estimates, neither for continuous nor for the binary version of depression. Nor multiple imputation of missing values did yield substantial changes in the results.

5.4. Discussion

Main findings

Time-varying socio-economic covariate had a weak effect on depression, much weaker than the time-invariant covariates such as education or occupation. Within the time-variant covariates, material deprivation, income and unemployment had mostly no effect, while subjective financial strain and social resources had. The relative importance of subjective strain compared with deprivation is consistent with a previous British study (339). It may be that subjective strain is merely a more accurate measure of deprivation and/ or could be driven by personality pattern embedded such as neuroticism, fatalism or external locus of control. This suggests that socio-economic inequalities in mental health are weakly related to economic deprivation as such, but more related to unobservable heterogeneity and to subjective strain and social network. This lack of influence of deprivation is not consistent with the numerous studies stressing the relevance of material deprivation (181,206,266,338) . Two elements may explain this divergence. First, divergences between symptoms inventory and diagnosis schedule are common (311),(202,226) suggesting that economic deprivation matters more for clinical depression than for sub-threshold depressive mood or demoralization in general. The second element concerns the treatment of individual specific effect which previous studies have overlooked or treated as a random (hence exogenous) effect. This is of course unrealistic and may have led to over-estimate the impact of socio-economic status as such. Few of the previous studies have been controlled for the important psycho-social risk factors, such as mastery, self-esteem, self-efficacy and locus of control. One cross-sectional study had shown, however, that such risk factors, by and large, wiped out the socio-economic gradient in depression (311). The limited number of psycho-social variables available in this study does not allow us to identify which are the confounders. However, the divergence between the time-varying covariates and time-invariant covariates suggests that individual heterogeneity is an important issue, likely to bias the results.

In our study, time-invariant socio-economic status predicts depression level, given previous depression state. This is consistent with those previous studies using shorter period (38,239,285,339). Our results, however, suggest that, as far as depression is concerned, chronicity (that is the risk of being depressed in t when having been depressed in $t-1$) is much lower than previously assumed. This is of considerable interest, because short term policy aiming at preventing or screening depressive disorders are more relevant if the risk of chronicity is high: if individuals are very likely to remain ill once they had an episode, than prevention or early screening has the edge over care, all else being equal. However, if such state dependence is largely spurious, then short-term public policy loses its comparative advantage over curative care (146). This is not to say that prevention would not be indicated or effective.

Third, we learned that, for a given level of socio-economic status, socio-economic change affects depression only very slightly. Hence, level of socio-economic resources is more important than change in such resources. This is also consistent

with 6-years panel of British Households showing that income change or volatility had few impact on the GHQ score (26).

This work may be limited by the instrumentation of depression and socio-economic status, by the attrition over time and by the statistical modelling. Several limitations in the instrumentation of the variables may affect the validity of this work, particularly regarding the measurement of depression, social network and capital variables. The mental health scale used cannot provide a diagnosis of depression. Our results are thus vulnerable to the drawbacks that some symptoms inventory share, particularly if they are not widely validated : limited specificity and criterion validity (117). There are also some risk that symptoms inventories might under-register symptoms in the lower socio-economic groups. A previous study, using Whitehall II data, found that the sensitivity of the inventory was lower in the clerical/support categories comparing with higher occupational groups, although this difference was not statistically significant (298). Hence, it is thus possible that socio-economic inequalities have been slightly under-estimated in comparison with a diagnosis schedule. Caution must thus be taken regarding clinical depression. Similarly, measurement of social network and social capital is rather crude and should be considered, in further researches, with more detailed instrumentation.

A second limitation arises from the panel nature of our data and, above all, the high attrition rate, which makes the sample increasingly upward biased regarding socio-economic status and mental health. However, for two reasons, this problem is not likely to affect considerably our results. Previous studies have found that attrition had a weak impact on overall results (74). Moreover, sensitivity analysis shows that considering a correction factor for attrition yields no significant changes in the significance of the coefficients.

A third limitation arises from the fixed-effect formulation, which allows for inference conditionally on the v_i individual effects. This yields very stable results, but at the cost of considering as exogenous all the unobserved individual variability. Yet, we are unable to state what are those unobservables and how they influence the response.

Two implications arise from this work, regarding the strategies aiming at tackling health inequalities and at mental health in general. First, because the effect of material deprivation on depression is rather limited, our results suggest that the vulnerability of depression level to income maintenance policies is not warranted. Policies aiming at fostering social network are, however, more likely to be effective in lowering depression level. Such conclusion does not exclude that income maintenance policies are not recommended for health inequalities in general or for other social objectives.

Second, given that the risk of chronicity of depression is also limited, the conclusion is that the long-term effect of material deprivation is equivalent to the short-term effect. In other words, early relief of material deprivation does not have the edge over long-term policies. It is not to say that prevention of depression is not indicated, but the comparative advantage of the preventive strategies over curative policies is somewhat reduced.

Chapter 6. Equity in outpatient mental care : assessing equal use for equal needs⁹

6.1. Introduction

Numerous studies have been dedicated to the relation between socio-economic status and mental disorder. These works have persistently shown a higher prevalence rate of mental disorders in the lowest socio-economic group (81). This socio-economic mental health gradient has been found in large population epidemiological studies using psychiatric diagnostic instruments (30,33,42,181,200) or symptoms checklists (239,266,338). The socio-economic gradient increases for shorter period of reference (181,265); it is steeper for schizophrenia and anxiety disorders than for affective disorders (30,181,265). Moreover, this gradient dramatically increases when depressive episodes are associated with any other psychiatric disorder (33). Comorbidity makes such an important difference that the relation between social class and major depressive disorder is mainly observed within comorbid psychiatric major depression (81).

Recent studies show that only a minority of persons with psychiatric disorders had any treatment, with coverage ranging from 22% in North America, 24% in France to 32% in the Netherlands (2,195). Regarding socio-economic status, early surveys showed that it was related to the choice of mental health provider but not to the likelihood of use (302,343). More recent cross-national comparison studies show that inequality of access to mental health care differs significantly between countries (166), with the Dutch delivery of mental care favouring a higher take-up rate by the lower socio-economic groups (2).

However, several OECD countries have some degree of health care inequity, particularly for speciality care (324), which is paralleling the unequal access to mental speciality care (2). The reverse is observed for the General medical sector which seems to favour the less well-off in overall health care (324), as well as in mental health care (2). It is thus unclear whether access to mental health care is different from access to overall health care. Our first objective aims at assessing whether mental health performs as well as overall non-mental care regarding equity.

Secondly, in the case of mental health care, there is a significant proportion of the population who does not match any diagnosis criteria but uses mental health care. In the Netherlands, for example, up to 8% of the population with no disorder used a mental health care in the last 12 months (6). The US has also a significant proportion of users with no DSM criteria disorder (167). Hence, although there may not be unequal access to mental health care amongst the population meeting DSM criteria, there may still be inequality of use amongst those with no disorder. This is what has been observed, for example, in the US, where income does not increase the risk of using any mental treatment among the individuals meeting a DSM criteria but does increase for those not meeting any DSM criteria (166). When assessing the fairness of

⁹ See papers published or submitted in Journal of Epidemiology and Community Health, in Psychiatric Services.

mental care, it is thus important to consider the use of mental care on the whole population with and without any needs of mental health care.

Finally, Belgium provides an interesting setting to measure equity in health care and mental health care; overall access to care in Belgium is relatively good. Social security grants 96.9% of the population with a health care insurance, an out-of-pocket health care expenditure share of 25% (258). It has also a high supply of general practitioners and psychiatrists in the curative sector (respectively 11.6 and 2.04 full-time equivalent per 10 000 inhabitants).

The purpose of this chapter is to compare equity in mental health care with equity in non-mental health care, considering the whole population needing or using any outpatient mental care. We seek to address the issue inequity with respect to three broad outpatients care (general practice, speciality care and medication) in a country with a good accessibility to health care.

6.2. Methods

The present study is based on a cross-sectional household-health interview survey carried out in Belgium in 1997. The individuals were selected through a multi-stage stratified sample of non-institutionalised resident individuals. Participation rate was 61% yielding a sample size of 10 225 individuals. We restricted the analysis to the 7 378 individuals aged at least 25. The questions about health status and health care use were collected through face-to-face interviews, whereas the lifestyle and mental health status items were recorded through a self-administered questionnaire.

Health care use

Health care use were assessed by the following variables: number of GP and specialist contacts in the last two months; number of hospitalisation days (in- and out-patient hospitalisation) within the last year; drugs (prescribed and over-the-counter) in the last two weeks.

For each contact with the health care system, the underlying health problem, self declared by the respondent, was coded using the International Classification of Health Problems in Primary Care (ICPC). We identified mental health care when an underlying psychological problem was mentioned for the GP contact, when a psychiatrist or a neuro-psychiatrist was consulted or when a hospitalisation was related to a psychological problem. The use in the last two weeks of any prescribed anti-depressant, anxiolytic or hypnotic drug was also registered.

Needs

We estimated needs for overall non-mental health care and mental health care, using the equity project methodology in which needs is computed as the use of care expected by the ill-health status (324). The following needs variables were considered as factors of non-mental care use : age, sex, the SF-36 physical functioning score, subjective health and the number of self-reported diseases. Additional dummies were added for the following self-reported diseases which were significantly related to

health care use: hypertension, heart disease, renal disorder, rheumatism, arthrosis, back disorder. The SF-36 is a generic health status measure widely used in health surveys (36). We used the 10 items related to physical functioning (337). Self-assessed health is a single question on health which has been shown to be a good mortality predictor (149). Regarding mental ill-health status, it was assessed by two variables: the GHQ-12 score and any self-declared functional limitation of activities for mental health reasons in the last two weeks.

As usual in health care studies, a proportion of the sample had no contact with health care services. In order to avoid the bias entailed by such censoring, a two-parts model is applied to non-mental health care, in order to compute expected non-mental health care use (213). Expected use of mental health care is computed through a logit regression, with the use of any mental health care as the dependent variable.

Socio-economic status

Considering recent reviews and works on social class and public health, socio-economic stratification (SES) was estimated from both personal and household characteristics (196,209). In a first step, each person's socio-economic status was assigned a score which was the mean relative ranking on his or her own income, educational, and occupational ranking, as done in some social psychiatry studies (265,311). The score is computed on the available non-missing answers. A similar average relative ranking was computed on the household socio-economic status variables: net disposable equivalent income of the household, mean educational level, proportion of low occupation level, and housing ownership. Socio-economic status (SES) was finally computed as the mean of their individual and household socio-economic status.

Equity

In health care, equity has a wide range of theoretical origins and definitions which have been discussed elsewhere (71,194). From the health care literature, the equity concept may have one of the following meaning : equality of access to health care, equal use for equal needs, equality of health.

Equality of access to health care is a popular stance in the equity debate, with Gavin Mooney as the main proponent of the idea that an equitable health care system should equalize access between individuals (231). There are four main definitions of access (71), access as utilization, access as the monetary and non-monetary cost of using care, access as the maximum quantity that an individual could afford to buy, and access as lost opportunity. The first difficulty of access (particularly for the first and second definitions) is that it disregards income differences, seeing individuals facing the same costs as having the same access, although their incomes could be very different. The second drawback of access is that it only worries about supply-side conditions (107), that it gives no guarantee that individuals with equal needs and equal access will use the same quantity of care, because patient behaviour preferences and physician incentives could lead to a very different quantity and quality of effective care. Belgian Social security grants 96.9% of the population with a health care insurance (69) with an out-of-pocket health care expenditure share of 25% in average(258). A high supply of general practitioners and psychiatrists in the curative

sector (respectively 11.6 and 2.04 full-time equivalent per 10 000 inhabitants) provide Belgian patients plenty of freedom to choose their provider. As a consequence, Belgium Health Care system can be considered as providing an overall good access to care.

The equal use for equal needs principle suggests that health care should be distributed in relation to needs and not by market forces. Such a point of view is very strongly settled in public health, epidemiological research, and medical ethics (104). One of the difficulties of such a standpoint is the question of how needs should be defined. Following the work of Culyer (71), needs can be defined as ill-health status, as the capacity to benefit from health care, or as the expenditures required to equalize health. The first definition of needs leads to attributing more weight to ill individuals and to choosing a social welfare function with a very strong curvature. If needs are defined according to capacity to benefit, then this, for the most part, yields a utilitarian perspective on health, where the objective is to maximise the result.

The theory of minimum standards suggests that a fair distribution should first grant each individual a minimum level of health or health care. Rawls' theory of justice suggests that all individuals should be brought up to the minimum level of health required for them to be normally functioning members of society. The minimum standard approach is also rooted in the libertarian stance of protecting natural rights by ensuring that minimum standards of health are achieved, such as granting individuals with a basic health care insurance.

Health cannot be considered as an ordinary commodity and is necessary for an individual to flourish as a human being (104). As a consequence, a final theory of justice in health care states that an equitable distribution of health care is simply one which gives rise to an **equal distribution of health** (71). This is consistent with the Health for All agenda of the World Health Organisation which puts as its first goal, equality of health(249).

We focused here on the second theoretical concept of equity, horizontal equity, i.e. the extent to which equal needs receive equal care (231). This definition is increasingly applied in the evaluation of equity in health care (75,322,324,325). Considering the cumulative proportion of care used against the cumulative proportion of the sample ranked by income, the diagonal represents an hypothetical fair distribution where the first x% of the socio-economic distribution share x% of the care use (see Figure 6-1) whereas C_u represents the observed distribution. Departure from the diagonal indicates unequal use. The space between the observed C_u curve and the theoretical diagonal indicates the degree of inequality in medical care use. Taking, by analogy, the cumulative proportion of expected use (which is the way we defined needs) against the cumulative proportion of the sample ranked by income, the space between the observed C_n curve and the diagonal indicates the degree of the needs concentration (C_n). As a result, the degree of inequity can be assessed by the space between the need and use concentration curves, measured by the Health Inequity index devised by Wagstaff, Van Doorslaer (HI_{wv} index) (324).

C_n and C_u range from -1 (need/use is concentrated in the poor) to 1 (need/use is concentrated in the rich). Because the inequity index (HI_{wv} index) is the difference between C_u and C_n , it has a minimum value of -1 in the case of inequity favouring the poor (all health care are used only by the poorer, for equal needs) and a maximum value of 1 for inequity favouring the rich (all health care are used only by the richer, for equal needs). The method of Kakwani et al. was used to compute these indices and their standard error (163). The details of the computational techniques for C_n , C_u and HI_{wv} are given in Appendix 2.

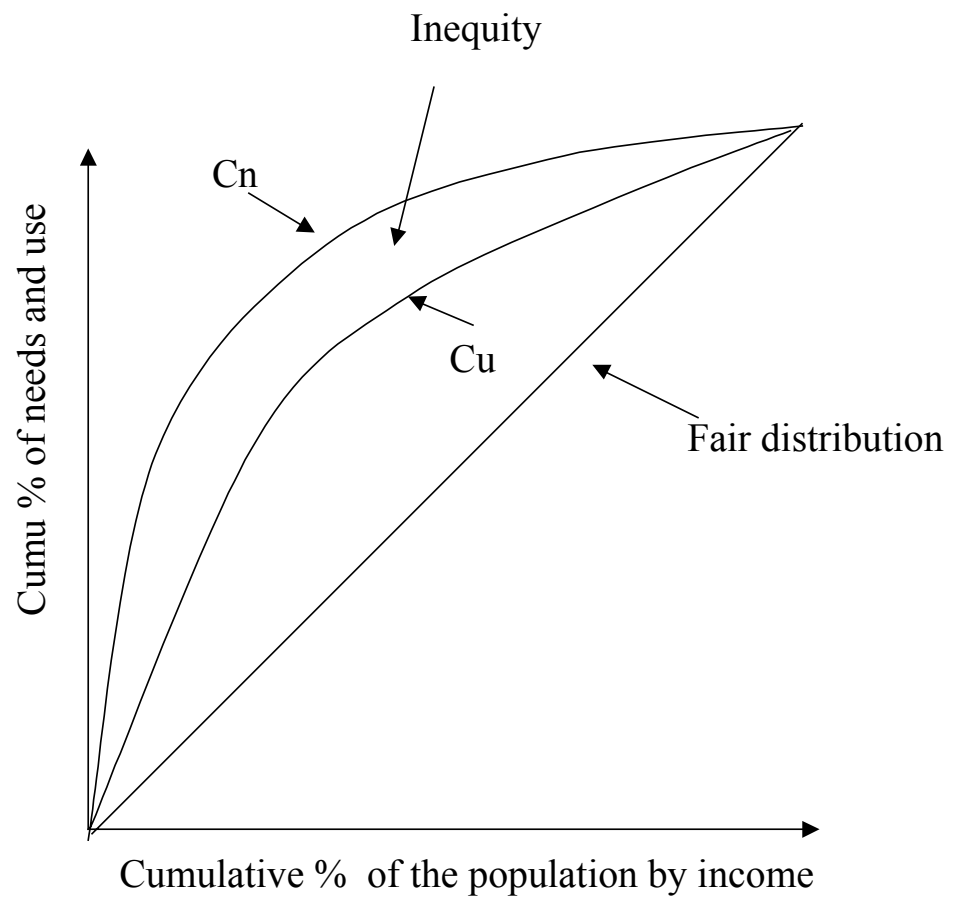


Figure 6-1. Use, needs and inequity curves.

6.3. Results

table 6-1 shows the socio-economic distribution of the health status, mental health status, non-mental care and mental care use. For each variable, the table provides the mean and its standard error for each socio-economic group. Significant top/bottom comparisons are indicated.

The GHQ indicates a rather high prevalence of mental disorder, with 24% of the subjects scoring 3 or more. Limitations on daily activities for emotional or mental health reasons in the last two weeks have only affected a small proportion of the sample (3%). Overall health status is poorer in the lowest socio-economic group for physical functioning, subjective health and number of long-term diseases.

Individuals have used, on average, 0.8 GP consultations and 0.4 specialist visits within the last two months. Contacts with a GP or a specialist for a mental health reason were more limited: 4% of the sample have consulted a generalist or (neuro-) psychiatrist for a mental health problem. However, the use of psychotropic drugs is important, with 9% of the individuals declaring use of a prescribed antidepressant, anxiolytic or hypnotic drug within the last 2 weeks. Overall, 13% of the individuals make use of some mental health care within the last 2 months.

table 6-1 also shows the socio-economic gradient in mental health and physical health. Considering the GHQ score or the proportion of GHQ cases scoring 3 or more, the lowest socio-economic group has a poorer mental health status. The same positive gradient holds for subjective health, physical functioning and comorbidities: the higher the socio-economic status, the better the health state.

A negative gradient is observed for the use of non-mental GP contacts, but there is no significant difference for specialist contacts, in-patient use or drug use. Turning to mental health care, the lowest socio-economic group appears to make more frequent use of physicians and of psychotropic drugs. When considering any mental health care, 17% of the bottom group had some use of mental health care in the last two months compared to 10% in the top group.

table 6-2 provides the results of the logistic regression of the use of any mental health care on various socio-demographic variables, and mental health status. Model 1 provides the univariate odds ratio (OR) of any use, whereas Model 2 provides the multivariate odds ratios, controlling for all other variables included.

table 6-1. Socio-economic status, health status and health care use.

Variable	Socio-economic status (tercile)							
	Bottom ^a n=2434		Medium n=2434		Top ^a n=2434		All	
	Mean (or %)	s.e. ^e	Mean (or %)	s.e. ^e	Mean (or %)	s.e. ^e	Mean (or %)	s.e. ^e
Health and mental health status :								
Sf36 physical functioning score (score 0-100)	81.42 **	0.56	85.92	0.50	89.79	0.41	85.71	0.29
Subjective health status (score)	2.66 **	0.03	2.99	0.02	3.22	0.02	2.96	0.01
Number of long term or chronic diseases	1.60 **	0.04	1.34	0.03	1.21	0.03	1.39	0.02
GHQ score	1.80 **	0.06	1.72	0.06	1.47	0.05	1.66	0.03
GHQ case (%)	25.73 **	0.91	24.74	0.89	20.73	0.83	23.71	0.51
Any activity limitation for mental health (%)	3.37 *	0.37	3.16	0.35	1.77	0.27	2.77	0.19
Health care use								
Number of GP contacts ^{c, f}	1.02 **	0.04	0.82	0.028	0.69	0.02	0.84	0.02
Number of specialist contacts ^{c, f}	0.39	0.03	0.34	0.02	0.41	0.02	0.38	0.01
Number of inpatient days ^{d, f}	1.57 *	0.14	1.50	0.15	1.14	0.12	1.40	0.08
Number of prescribed drugs use ^{b, f}	1.40	0.04	1.37	0.04	1.33	0.03	1.37	0.02
Any contact with a GP for mental health (%) ^c	3.99 **	0.40	3.08	0.35	2.18	0.30	3.08	0.20
Any cont. with a special. for mental health (%) ^c	1.56 *	0.25	0.90	0.19	1.11	0.21	1.19	0.13
Any antidepressant, anxiolytic, or hypnotic drug (%) ^b	11.50 **	0.65	9.12	0.58	7.11	0.52	9.24	0.34
Any mental health care (%) ^c	16.56 **	0.75	12.65	0.67	10.02	0.61	13.08	0.39

^a ** Top/bottom comparison significant when controlling for age and sex at $\alpha=0.01$; * at $\alpha=0.05$;

^b in the last 2 weeks ; ^c in the last 2 months ; ^d in the last year; ^e standard error of the mean; ^f excluding mental health contacts or drugs.

table 6-2. Socio-economic and mental health determinants of mental health care use, crude and adjusted odds ratios and 95% confidence intervals.

Covariates	Model 1 ^a use of any mental care : coefficients of the univariate logistic regression		Model 2 ^b Use of any mental care : coefficients of the multivariate logistic regression	
	Crude OR	CI 95%	Adjusted OR	CI 95%
Social group 1 quintile	1.83	[1.47 , 2.28]	1.69	[1.33, 2.16]
Social group 2 quintile	1.71	[1.35 , 2.16]	1.42	[1.11, 1.81]
Social group 3 quintile	1.23	[0.96 , 1.58]	1.20	[0.93, 1.54]
Social group 4 quintile	1.06	[0.82 , 1.37]	1.05	[0.81, 1.37]
Social group 5 quintile (ref)	1.00		1.00	
Age 25-44	0.42	[0.36, 0.50]	0.37	[0.31, 0.45]
Age 45-64	0.69	[0.59, 0.82]	0.71	[0.59, 0.85]
Age 65+ (ref)	1.00		1.00	
Sex men	0.54	[0.47, 0.63]	0.66	[0.57, 0.78]
Sex women (ref)	1.00		1.00	
GHQ-12 score	1.30	[1.27, 1.32]	1.38	[1.29, 1.47]
Functional limitation for mental health reason	13.16	[9.80, 7.55]	5.06	[3.57, 7.18]
No functional limitation (ref)	1.00		1.00	

OR – odd ratio; CI – confidence interval; * Univariate OR; ** OR controlling for the other variables included;

^a Crude OR of using any mental health care ; ^b OR of using any mental health care controlling for the other variables;

Socio-economic status and use of mental health care show a significant inverse relationship: as socio-economic status increases, the likelihood of use of any mental health care decreases monotonically. Men and young adults are less likely than women and older adults to make use of mental health care. Mental morbidity (GHQ and functional limitation) increase the likelihood of using any mental care.

Controlling for age, sex and mental health status slightly affects the likelihood of the lower socio-economic groups making use to mental health care. In the multivariate model, the lowest social group is 70% more likely to make use of any mental health care than the highest group. Young adults and men are again less likely to use any mental health care, even controlling for mental health status. Excluding the use of anxiolytic drugs from the analysis does not change this pattern of use.

table 6-3 enables to compare equity levels in the mental health care and non-mental health care sectors. The first two columns indicate that, by and large, the concentration of needs for mental health care is similar to the concentration of needs for non-mental health care. By contrast, use of mental health care is more concentrated in the lower socio-economic groups than use of non-mental health care. This is particularly true for mental health contacts with GPs, which are twice as concentrated in the lower socio-economic groups as non-mental health contacts with GPs ($C_n = -0.2$ versus $C_n = -0.09$). For all types of care, the distribution in the mental health sector entails a higher use by the lower socio-economic groups than the distribution in the non-mental health sector. As a corollary, inequity indices for mental health favours the lower socio-economic groups to a greater extent than inequities in non-mental health care. Whereas non-mental health shows an inequity favouring the better-off for specialist care and drugs use, there is no significant inequity in the mental health speciality sector and there is a pro-poor inequity in the use of psychotropic drugs. Hence, while we find an inequity favouring the poor in mental health care, there is an inequity favouring the rich in all non-mental health care (except use of GPs). Differences in use (rather than differences in needs) mainly account for these inequity differences.

table 6-3. Indices of needs concentration, use concentration and inequity for mental and non-mental health care.

	Needs concentration ^{a,b}		Use concentration ^{a,b}		Inequity ^{a,b}	
	C_n		C_u		HI_{wvp}	
	mental	non-mental	mental	non-mental	mental	non-mental
Nber of GP contacts	-0.05**	-0.07**	-0.20**	-0.09**	-0.15**	-0.01
Nber Special cont.	-0.06**	-0.04**	-0.04	0.04*	0.01	0.09**
Nber of drugs	-0.04**	-0.06**	-0.13**	-0.02	-0.09**	0.04*

^a negative value indicates that need or use is more concentrated in the lower socio-economic groups while a positive value indicates a concentration in the upper socio-economic groups.

^b ** coefficient significantly different from 0 at $\alpha=0.01$; * at $\alpha=0.05$

6.4. Discussion

Four major findings result from this study, regarding mental health status, use of mental health care, the setting of care and, finally, the comparison with non-mental health care. First, the proportion of individuals having poor mental health status is high. Such a result is consistent with previous studies using the GHQ in the UK (338) and the Netherlands (266); the proportion is, however, higher than was found in Australia (185).

Second, our study shows that the use of mental health care is fair regarding socio-economic status. Such results are not consistent with findings from USA studies where use increases with income, when psychiatric morbidity is controlled (166,342). However, they are consistent with findings from the Netherlands (304) and Ontario (313). These two studies found a higher use of mental health care in the lowest socio-economic groups, controlling for psychiatric status. Various factors may explain this result. Belgium has one of the highest ratios of physicians per inhabitant CITER and, like the Netherlands, has a comprehensive primary mental health care network with 1 centre per 50,000 inhabitants. Moreover, unlike some other OECD countries, universal access to health care facilities and physicians is assured through a quasi-market system which avoids the stigma of services targeted to poor individuals. A previous cross-national comparison study confirmed that Belgium, compared to a set of OECD countries, had a pattern of use of GP services, which favoured the less well-off (324). This over-consumption of GP services in the lower socio-economic groups may increase the likelihood of detecting mental disorders in these groups.

Third, inequity is affected by the care setting. Whereas mental health care by specialists shows an equitable distribution, GP care favours the lower socio-economic groups. This difference can be explained by the combination of two factors: the majority of diagnosed mental disorders is detected in primary care (110) and the use of GPs in Belgium has been shown to strongly favour the lower socio-economic groups (75,324). Hence, the greater use of primary care physicians by the lower socio-economic groups increases their likelihood of being treated in comparison with higher socio-economic groups making a more intensive use of specialist care. This result is concordant with other studies showing a higher use of primary care in lower socio-economic groups and a higher use of specialist care in more favoured social groups

Finally, mental health care in Belgium is more used by the lower socio-economic groups than non-mental health care. This is true for GP and specialist care, and particularly for medication. This would suggest that mental health is more responsive to equity than other health care sectors. Two factors may explain such a situation. First, adding to the already high physician density, each Belgian region has a specific and far-reaching mental health policy and programmes encompassing prevention, networking, referral, care and outreach activities. The fact that higher socio-economic groups substitute GP care with specialist care (324) may constitute a second explanation, since the majority of psychotropic drugs are prescribed by GPs (70% in our sample) and that most mental disorders are detected in primary care (110). Moreover, the beliefs of better-educated individuals tend to favour a non-medical approach to mental health, whereas lower educational groups have a more favourable opinion of the use of medication for mental health problems (159). Such reluctance to

use psychotropic drugs may explain the present results, particularly those related to medication.

Some limitations in the data on need for and use of mental health care, and in the definition of equity, may have led to an under-estimation of socio-economic inequity. Recourse to psychologists was not registered in the Health Interview Survey because, until very recently, there was no legal protection of the title of psychologist. Some studies have shown that psychologists are more often used by higher socio-economic groups (99). Moreover, as the reference period for contact with a physician was the last two months, it seems that specialist contacts, such as psychiatrists, were less likely to be registered than general practitioner contacts. This bias would affect our inequality estimation, in so far as higher socio-economic groups tend to use more specialist care.

Second, the definition of mental care needs may be restrictive. According to the methodology in equity studies, need is not measured directly as the mental health status but as the expected use by mental health status. If poor overall delivery of mental health services reduced the relationship between use and ill-health, we would underestimate the concentration of need and, thus, inequity. However this does not appear to be the case, because mental health variables are always related to use. Moreover, using the GHQ-12 as a direct need variable does not affect the equity scores (results not shown). A second restriction on the measurement of needs may arise from the use of the GHQ as our main mental health indicator. It does not provide a psychiatric diagnosis and is limited to common mental disorders. Although the survey registered alcohol consumption, we have no indication of substance abuse. Again, our inequity might be slightly underestimated if substance abuse is higher in lower socio-economic groups and leads to a lesser recourse to mental care. Finally, this study did not use any indicator of self-assessed mental health, which may have led to under-estimation of mental health care needs. Indeed, several studies have stressed the difference between perceived needs and needs as defined by the mental health professionals (157). This gulf between public and professionals is evidenced by the importance of perceived need for mental care and self-rated mental health in explaining use of mental care (167).

This work may be also limited by GHQ under-reporting. In their landmark social psychiatry study, Brown and Harris (1984) found that a few women tended to over-report symptoms. A previous study, using Whitehall II data, found that the sensitivity of the GHQ-30 was lower in the clerical/support occupational categories, compared to higher occupational groups, although this difference was not statistically significant. If lower socio-economic groups tend to under-report common mental disorders, this may generate another bias, leading to an under-estimation of the GHQ-socio-economic status gradient (298). This study does not include a psychiatric interview schedule allowing such validity appraisal. It is thus possible that GHQ-related inequality is under-estimated.

This work shows that, as far as Belgium is concerned, there is little evidence that mental care delivery may be disfavoured the lower socio-economic groups. Within our framework of equity, it seems that the mental sector is performing well and even better than the other sectors of care and that setting of care is a factor influencing fairness.

Chapter 7. Is psychiatric inpatient care increasing inequalities in mental health?¹⁰

7.1. Introduction

The relationship between social class and mental disorder has been a longstanding issue in social psychiatry and psychiatric epidemiology (84,184). Research has repeatedly shown a higher prevalence of mental disorders in the lower socio-economic groups. This socio-economic mental health gradient has been found in large-population epidemiological studies using psychiatric diagnostic instruments (30,181,200) or symptom checklists (266,338). Although mental disorders remain largely untreated both in North America and Europe, several studies have evidenced few socio-economic inequalities in mental care among subjects with psychiatric disorders (2).

Most previous studies addressing inequalities in mental care have assumed that a fair distribution of care is achieved when individuals of equal ill-health status use the same quantity of care, disregarding differences in quality of care and disparities in outcome (107). As far as mental health is concerned, however, there is some evidence of unequal quality and outcome of care. Lower socio-economic groups use less specialised care (2), while medication use and dosage are also less appropriate in such groups (354). In addition, some population studies have shown that poverty and low socio-economic status (SES) increase the duration of episodes for a given baseline clinical status (285,339). Among these small patient studies, some have evidenced poorer clinical course for low educational groups (278).(300)

There have also been some studies addressing socio-economic inequalities in outpatient or primary care (2,67,100,166,304,313). But very few have addressed inequalities within inpatient psychiatric wards. Several pieces of research have attempted to predict the length of stay (115,147). Others have evidenced a higher rate of psychiatric admission for individuals of low socio-economic status (17) or living in deprived areas (77,87). Very few studies have addressed socio-economic disparities in admission, treatment, and outcome of psychiatric inpatient care (17,237).

This study addresses socio-economic disparities in psychiatric inpatient care. With the help of the comprehensive Psychiatric Case Register introduced in Belgium in 1996, we seek to assess whether patients admitted to a psychiatric ward have been treated fairly regarding their socio-economic status.

Belgium provides an interesting setting for such issue. Overall access to care in Belgium is relatively good. Social security grants 96.9% of the population with a health care insurance, an out-of-pocket health care expenditure share of 25% in average (258). It has also a high supply of general practitioners and psychiatrists in the curative sector (respectively 11.6 and 2.04 full-time equivalent per 10 000

¹⁰ Being considered for publication in *Acta psychiatrica scandinavica*

inhabitants). There is no referral gateway to the psychiatrist or to inpatient services. Moreover, patients have a large ability to choose their hospital as there is no catchment area and because the country is small. Finally, Belgium has a higher density of psychiatric beds (1.7 per 1,000 inhabitants) giving patients plenty freedom to choose.

7.2. Method

Data

Since 1996, all psychiatric admissions, treatments and discharges have faced a mandatory registering on a unique format, the Minimum Psychiatric Summary (MPS). This psychiatric case register is a comprehensive record of all psychiatric inpatient activities covering admissions, treatment and discharge (56). It is organised around 12 sections counting with 300 items. It covers information on the five DSM-IV axis, socio-economic background, previous living arrangement, referral process, ward and hospital identification, psychological symptoms at the beginning and at the end of the treatment, functioning at the beginning and at the end of the stay, evaluations, treatments and medications delivered. Each hospital has a MPS administrator, controlling the quality of the data. Training of the administrators and quality control are provided by a supervisor belonging to one of the seven participating Universities.

In this research, we used the 166 839 discharges occurring in 1997-1998 period; we excluded the episodes of Psychiatric Community Care (PCC) or from psychogeriatric wards (n=1971); all episodes having their principal diagnosis defined on the second DSM-IV axis were excluded (n=17 674). After exclusion of missing values, we remained with 144 754 discharges, accounting for 87% of the total psychiatric discharges.

Variables definition

Clinical status was assessed by the diagnosis on the five DSM-IV axes. The diagnoses on the first axis were grouped in the following categories : substance related disorders, mood disorders, schizophrenia and other psychotic disorders, dementia and other cognitive disorders, others. The second axis categories were grouped in personality disorders or mental retardation. In the third axis, the medical conditions were coded according to the ICD-9 and the number of somatic comorbidities was computed. For the fourth axis, we computed the number of psychosocial and environmental problems (3). The fifth axis is the Global Assessment and functioning scale (GAF), a widely used instrument to assess overall functioning on a continuum ranging from 1 to 100 (3). Lastly, the MPS counted with a scale of 29 items registering the presence of DSM-IV psychological symptoms, such as suicide ideation, threats of auto-aggression, hostility, depressive mood, etc. We computed the number of symptoms.

Socio-economic status was defined by combining educational status, occupational level, and activity status. Each individual was received a score equal to its mean relative ranking on these three variables. Individuals were then grouped in five

quintiles. Such composite index has been previously used in psychiatric epidemiology (265,311).

Inequalities were assessed for three main domains, admission setting, treatment received and the outcome of the stay. Five features indicating a less favourable admission were considered: mode of admission (mandatory versus voluntary), the hospital type (psychiatric hospital versus general hospital with a psychiatric ward, non-teaching hospital versus teaching hospital), hospital performance in terms of length of stay (Long stay hospitals versus normal stay hospitals) and, finally, the average severity of the patients cared in the same ward where the patient is admitted (average GAF score of the ward). Psychiatric wards of general hospitals and teaching hospitals have better staff/patient ratio, and better reimbursement for psychotropic drugs (229). Compulsory admission was also considered as a less favourable admission arrangement because of the risk of criminalization of the mentally ill, particularly for misdemeanour offences, and, conversely, the psychiatrization of the social exclusion such as the homeless individuals (55,224). As long psychiatric stay is associated with detrimental effects on recovery (174), suicide rate (262) and quality of life (197), we also considered as unfavourable the admission to an hospital which was poorly efficient in terms of hospital length-of-stay. Hospital performance was estimated by Bosmans and Fecher method (35) (see Appendix 3, Appendix 4, Appendix 5, Appendix 6 for details). Those hospitals being in the lower 15 percentile (out of 132) were classified as Hospitals with Unexpected Long Length of Stay (HULLS).

For the three main groups of diagnosis, adequate treatments were defined according to current guidelines : antidepressants and psychotherapies for mood disorders, surveillance of withdrawal and relapse for the substance related disorders, and neuroleptic drugs for schizophrenic and other psychotic disorders (4). The delivery of anxiolytic drugs was also considered because such drugs can have detrimental effect on cognitive functions and can generate addiction.

Four outcome variables were defined. The evolution of the Global Assessment and functioning scale score (discharge score - admission score), the evolution in the number of psychological symptoms, readmission and in-hospital mortality rate.

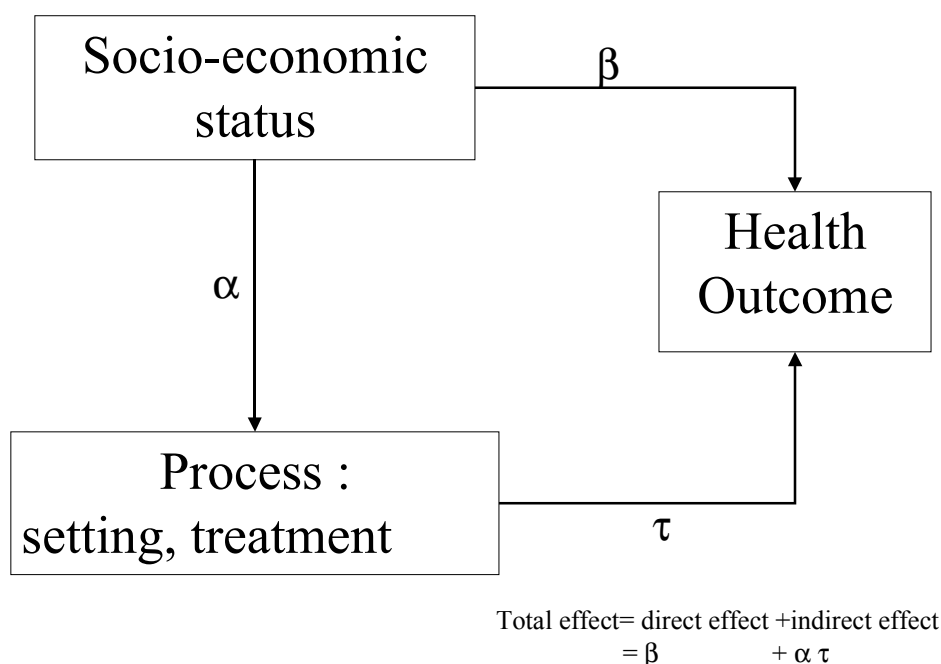
Statistical analysis

Multiple logistic regression was used for binary dependent variable (mode of admission, hospital type, treatment, readmission and mortality) and a general linear model for continuous responses (GAF score, number of symptoms). All regressions estimations were controlled for the five DSM-IV axis diagnosis, number of psychiatric and somatic comorbidities, number of psychological symptoms, previous psychiatric history, age and sex. Because the link between mental health and socio-economic status has been shown to be disorder-specific (83,152), the risk factors are also presented for five main groups of mental disorders.

Inequalities in the setting and/or inequalities in the treatment received might explain socio-economic inequalities in outcome. As a consequence, the total relationship between socio-economic status and health outcome can be separated in two components (see Figure 7-1) : i) a direct effect (β) linking SES and mental health

outcome, ii) an indirect effect which is made of the product of SES/Process relationship (α) and the Process/outcome relationship (τ). The extent to which process variables (such as hospital type, use of psychotherapy, ...) mediates the socio-economic inequalities in outcome is then estimated by the ratio of $\alpha\tau/(\beta+\alpha\tau)$ (211).

Figure 7-1. Mediation analysis : total, direct and indirect effect of socio-economic status on mental health outcome.



7.3. Results

Substance, affective and psychotic disorders accounted for three quarters of all discharges (see Table 7-1). Comorbidity is frequent with more than one third of the episodes having a personality disorder comorbidity, another axis-1 comorbidity and somatic comorbidities. The most frequent diseases were epilepsy, diabetes, chronic liver and cirrhosis, hypertension, obesity, cerebral degeneration, and chronic bronchitis. On average, an episode presents 1.7 psychosocial and environmental problems. Overall GAF score reaches score of 44. A third of the patients discharged had previous psychiatric history.

Half of the episodes concern adults between 35 and 64 years old. This is partly due to the exclusion of PCC and of other psycho-geriatric wards where most elderly patients are cared. A small proportion of the episodes have been admitted on a mandatory basis. Discharges are divided equally between general hospitals with psychiatric ward and psychiatric hospitals, with a small proportion of the episodes being cared in teaching hospitals or in hospitals with long length of stay. Between admission and discharge, the GAF score improved by 12.9 (effect size=0.82) and the number of psychological symptoms was reduced by 1.4 (effect size=-0.58). Readmission and mortality rate reach 34% and 0.8% respectively.

The socio-economic risk factors of unfavourable admission features, unexpected treatment, and outcome are set out in table 7-2. Each coefficient is controlled for axis-1 group disorders, axis-2 group disorders, number of psychiatric comorbidities, number of somatic comorbidities, number of psychosocial problems, admission GAF score, number of psychological symptoms, previous inpatient psychiatric history, age, and sex. As socio-economic status increased, there was a slight monotonic decrease in the likelihood of being admitted mandatorily (1st quintile OR=1.22). Lower SES groups were more likely to be admitted to a non-teaching (OR=1.17) or psychiatric hospital (OR=1.47). Admission to hospitals with unexpectedly long stay also decreased with SES. A monotonic decreasing relationship was observed with respect to the overall functioning of patients in the ward: the higher the SES, the better the mean GAF score of the ward where the patient was cared for. Hence, for most of the admission features, increasing socio-economic status was associated with more favourable circumstances.

Unexpected care was linked to socio-economic status. Among patients with mood disorders, the lowest SES group was more likely not to receive neither antidepressant drugs (OR=1.66) nor psychotherapy (OR=1.51). Such under-provision decreased monotonically with SES. Among patients with substance abuse-related disorders, a slight under-provision of withdrawal surveillance was observed for the lowest SES group (OR=1.10). There were few socio-economic differences regarding the provision of neurotic drugs for psychotic patients. There were no over delivery of anxiolytic drugs to the lower SES groups, for none of the three group of disorders (result not shown).

Table 7-1. Univariate statistics.

	% or mean	Nb discharges
Clinical status		
Diagnosis on the 1st Axis (%) :		
Substance related disorders	33.3	48333
Mood disorders	27.9	40569
Schizophrenia and other psychotic disorders	14.4	20939
Dementia and other cognitive disorders	3.6	5172
Other	20.8	29890
Diagnosis 2nd Axis (%) :		
Personality disorder	37.7	54624
Mental retardation	4.2	6117
No diagnosis on axis 2	58.0	84013
Psychiatric comorbidity (%) ¹	36.0	52100
Physical comorbidities (%) :	26.9	38946
Number of Problems on the 4th axis (Mean and SE)	1.709 (0.004)	144754
Global Assessment of Functioning (Mean score and SE)	43.647 (0.04)	144244
Having previous Psychiatric history (%)	36.2	52387
Socio-demographic covariates		
Sex (%) :		
Men	51.2	74167
Women	48.8	70587
Age (%) :		
0-14	1.5	2230
15-34	30.0	43449
35-64	57.6	83382
65+	10.8	15693
Socio-economic status (%) :		
1 st quintile	20.0	28447
2 nd quintile	26.4	37271
3 rd quintile	14.3	20147
4 th quintile	19.5	27544
5 th quintile	19.8	27990
Care Setting		
Mode of admission (%) :		
Voluntary	88.1	127567
Mandatory	11.9	17187
Teaching Hospital (%) :		
No	95.0	137529
Yes	5.0	7225
Hospital Type (%) :		
General Hospital with a psychiatric ward	50.1	72469
Psychiatric hospital	49.9	72285
	% or mean	Nb discharges

	% or mean	Nb discharges
Hospital performance (%):		
High	88.4	127912
Low	11.6	16842
Outcome : mean (or %) and standard error		
GAF Improvement score (Discharge score - admission score)	-12.887 (0.04)	137189
Nber of psychological symptoms (# at discharge-# at admission)	-1.388 (0.01)	137909
Readmission (%)	33.8 (0.1)	147029
Mortality (%)	0.8 (0.02)	144754

† On axis I only

table 7-2. Risk of less favourable admission, of unexpected treatment, and of outcome for psychiatric inpatient care: odds ratios and beta coefficient by socio-economic quintile.

	Socio-economic groups				
	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile (ref)
Unfavourable admission features					
Mandatory admission (OR)	1.22 (0.019) ***	1.21 (0.017) ***	1.08 (0.02) ***	1.05 (0.018) **	1
Non-teaching hospital (OR)	1.17 (0.029) ***	1.10 (0.026) ***	1.21 (0.029) ***	1.08 (0.028) **	1
Psychiatric hospital (OR)	1.47 (0.044) ***	1.50 (0.04) ***	1.31 (0.045) ***	1.33 (0.041) ***	1
Long-stay hospital (OR)	1.2 (0.027) ***	1.10 (0.026) ***	1.21 (0.029) ***	1.08 (0.028) **	1
Severity of the cases in the ward (β)	-1.63 (0.08) ***	-1.21 (0.075) ***	-0.84 (0.086) ***	-0.27 (0.079) ***	0
Unexpected treatment					
No antidepressant drug for patients with mood disorder (OR)	1.66 (0.042) ***	1.23 (0.041) ***	1.16 (0.048) **	1.05 (0.044)	1
No psychotherapy for patients with mood disorder (OR)	1.51 (0.034) ***	1.47 (0.032) ***	1.34 (0.038) ***	1.17 (0.034) ***	1
No withdrawal surveillance for patients with substance disorder (OR)	1.10 (0.032) **	1.00 (0.029)	1.02 (0.032)	0.97 (0.029)	1
No neuroleptic drugs for psychotic patients (OR)	0.98 (0.077)	0.85 (0.077) *	1.01 (0.086)	1.01 (0.085)	1
Outcome					
GAF evolution (discharge score – admission score) (β)	-3.57 (0.12) ***	-2.81 (0.12) ***	-1.94 (0.13) ***	-1.14 (0.12) ***	0
Symptoms evolution (# symptoms at discharge – #symptoms at admission) (β)	0.22 (0.02) ***	0.17 (0.02) ***	0.14 (0.02) ***	0.1 (0.02) ***	0
Readmission (OR)	1.04 (0.03)	1.35 (0.03) ***	1.21 (0.03) ***	1.16 (0.03) ***	1
Mortality (OR)	1.79 (0.15) ***	1.32 (0.15)	0.96 (0.18)	1.19 (0.16)	1

OR: Multivariate odds ratio from the logistic regression; β : Multivariate unstandardized regression coefficient from the linear regression; standard error of the estimate in parenthesis; *** significant at 0.001, ** at 0.01, * at 0.05; Each coefficient is controlled for axis 1 group of disorders, axis 2 group of disorders, number of psychiatric comorbidities, number of somatic comorbidities, number of psychosocial problems, GAF score, number of psychological symptoms, previous psychiatric history, age, and sex.

Regarding outcome, there was a monotonically decreasing benefit from hospitalisation as SES increased, with respect to GAF score and psychological symptoms. The lowest SES group improved its functioning to a lesser extent ($\beta=-3.57$) and was left with more residual symptoms ($\beta=0.22$) when compared with the highest group. The readmission rate was greater in the second-lower socio-economic group (OR=1.35). There was a significantly higher risk of mortality for the lowest SES group (OR=1.79). Mortality did not, however, present a monotonic decreasing relationship with SES.

The outcome differences were further analysed by groups of disorders (table 7-3). In order to limit the number of coefficients, two SES groups were formed, dividing the sample into two groups of equal size. Again, all the results were controlled for the clinical and demographic variables presented previously. No unique ranking of the disorders was found. Considering GAF and the number of psychological symptoms, schizophrenia and substance disorders showed more unequal results, while affective disorders and dementia evidenced the least unequal distribution of outcome. Turning to readmission risk, the groups of disorders showed very similar socio-economic inequalities, except for dementia. Inequalities in mortality risk were significant and were stronger for substance-related disorders and other disorders.

Using educational level instead of the composite indicators led to slight differences (results not shown). Regarding admission, inequalities were more marked for some variables (use of non-teaching hospitals, admission to hospitals with unexpected longer length of stay, severity of the patients cared in the same ward, non-psychotherapies) and smaller for others (mandatory admission, psychiatric hospitals, no anti-depressant drugs). Differences in outcome were generally smaller, while differences in mortality were wiped out.

The contribution of each variable of setting and treatment feature to socio-economic inequalities in GAF score was assessed by the way of multivariate models. Admission setting features, treatment delivered and hospital were successively introduced in the model. Their contribution to socio-economic inequalities in GAF improvement is presented in Figure 7-2, for four groups of disorders. Setting features had a small explaining contribution for most of the disorders, except for dementia and related cognitive disorders. Inequality of treatment explained about a third of the socio-economic inequalities in GAF score. Finally, hospital had a small contribution to such inequalities, ranging from 4% for mood disorder to 21% for organic disorders. The majority of the socio-economic inequalities in GAF score remained unexplained by such process features. It is noteworthy that process variables had a heavier influence on socio-economic inequalities regarding dementia and other cognitive disorders and a smaller contribution for schizophrenia. This suggests that the vulnerability of socio-economic inequalities to the delivery system is disorder-specific: psychiatric care is more able to deal with socio-economic inequalities for dementia and related disorders than with schizophrenia.

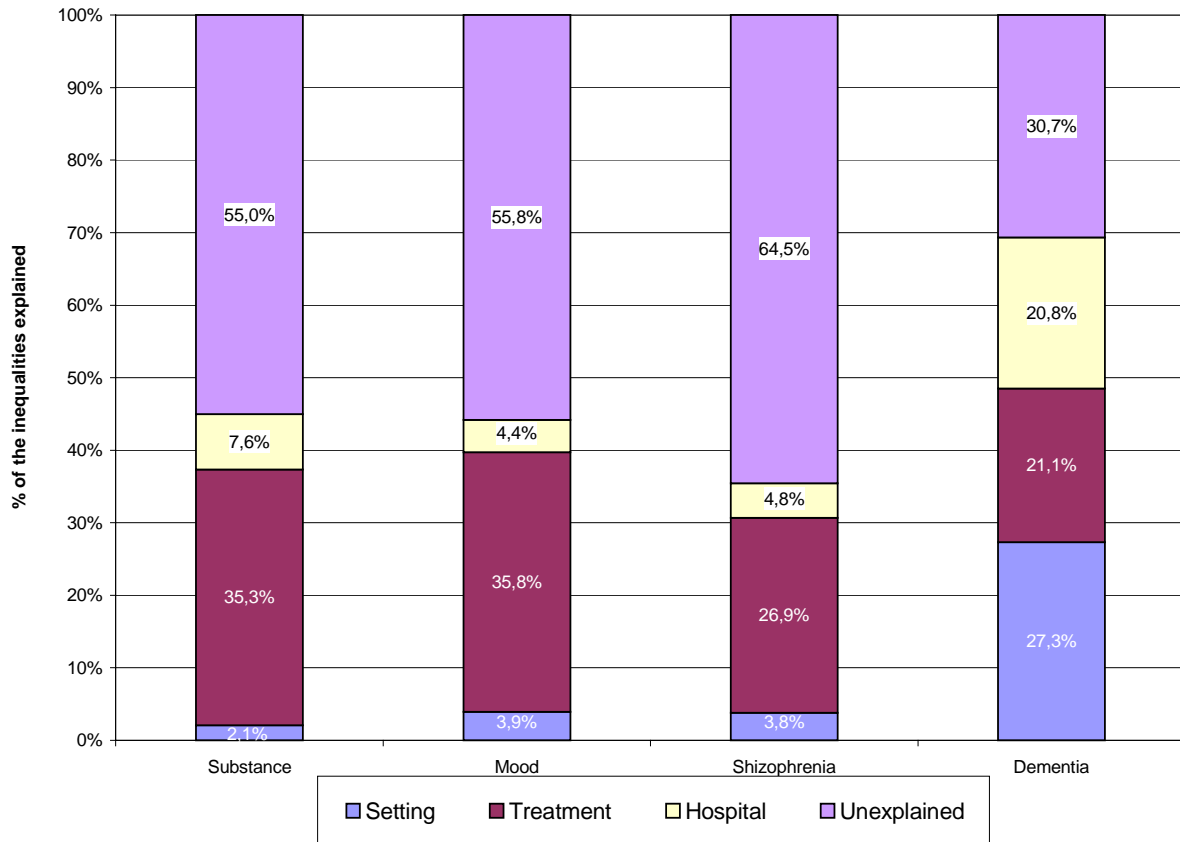
table 7-3. Socio-economic risk of less favourable outcome of psychiatric hospitalisation by DSM groups: odds ratios and beta coefficients of the lower 50 percentile compared with the higher 50 percentile.

Outcome	Outcome of the lower SES group compared to the upper group : Odd ratio or Beta coefficient				
	Substance	Mood	Schizophrenia	Dementia	Others
GAF evolution (discharge score – admission score) (β)	-2.09 (0.14) ***	-1.3 (0.15) ***	-1.91 (0.21) ***	-1.27 (0.46) **	-1.73 (0.18) ***
Symptoms evolution (# symptoms at discharge –#symptoms at admission) (β)	0.07 (0.02) ***	0.09 (0.02) ***	0.16 (0.03) ***	0.12 (0.07)	0.04 (0.02)
Readmission (OR)	1.09 (0.03) **	1.17 (0.03) ***	1.18 (0.04) ***	1.35 (0.13) *	1.12 (0.05) *
Mortality (OR)	2.06 (0.19) ***	1.06 (0.18)	0.93 (0.16)	1.51 (0.15) **	1.91 (0.32) *

OR: Multivariate odds ratio from the logistic regression; β : Multivariate linear regression coefficient; S.E.: standard error of the estimate in parenthesis; *** significant at 0.001, ** at 0.01, * at 0.05; Each coefficient is controlled for axis 1 group of disorders, axis 2 group of disorders, number of psychiatric comorbidities, number of somatic comorbidities, number of psychosocial problems, GAF score, number of psychological symptoms, previous psychiatric history, age, and sex.

These estimates compared the lower 50 percentile to the upper 50 percentile.

Figure 7-2. Contribution of hospitalisation setting, treatment and hospital to socio-economic inequalities in GAF improvement.



Legend: bars show the $\frac{\alpha\tau}{\beta+\alpha\tau}$ value for each group of mediating variable, setting, treatment and hospital. Unexplained variance is equal to $1-\sum(\frac{\alpha\tau}{\beta+\alpha\tau})$.

7.4. Discussion

Our results show that psychiatric hospitalisation is associated with inequalities in terms of access to more favourable settings, adequate treatment, and outcome. First, the likelihood of benefiting of more favourable settings for inpatient mental care increased with socio-economic status: lower SES individuals were less likely to be admitted to a teaching or general hospital, and they had a higher likelihood of being admitted through mandatory admission, of finding themselves in a more severe case-mix ward, and of being cared for in hospitals with unexpectedly long length of stay. Secondly, lower SES groups with mood disorders received both less psychotherapy and antidepressant drugs. This is particularly worrying regarding clinical guidelines that tend to support the combination of both drugs and therapies. Third, we found evidence that lower SES groups achieved less improvement in their functioning and their psychological symptoms. This implies that psychiatric hospitalisation is associated with low to moderate inequalities in mental care and health.

Several elements can - tentatively – shed light on the unequal treatment within the psychiatric ward : psychotherapies require some cognitive and verbal abilities which might not be distributed uniformly in all social strata; there are also some indications that higher socio-economic groups prefer psychotherapies over drugs and conversely for lower SES groups (158); third, as the cost of psychotropic drugs is rising, psychiatric hospitals may find increasingly difficult to balance their current account. In fact, financial analysis of psychiatric hospital shows that pharmacy current account deficit has been increasing during the 90thies, which may have put managers and clinicians under strain regarding the prescription of psychotropic drugs(229). Finally, increased social support in the higher SES groups might foster clinicians to deliver better care and outcome to higher SES patients because of the expectations of their relatives (and expectation might increase with income, number of family dependents, employment status).

The present study could be affected by three sources of bias, related to confounding, self-selection, and accuracy. Although this study counts with several clinical variables, we did not have a severity score. There is, hence, a risk that severity may confound the relationship between SES and admission setting, treatment, or outcome. Previous studies have suggested that lower-SES patients presented more severe symptoms, yielding a less favourable outcome(33). For two reasons we feel rather confident that our estimations would not be strongly affected. Firstly, our results are controlled for functioning, which is linked to severity; secondly, the level of inequalities was similar when comparing severe major depression (296.23) with moderate (296.22) or mild major depression (296.21), or when comparing alcohol abuse (305.00) with alcohol dependence (303.9). However, in the absence of a validated score (such as a Hamilton), the role of severity cannot totally be ruled out. Other sources of confounding could alter our results. Help-seeking behaviour, referral patterns and financial barriers could influence the inequalities in access. It is well known that individuals of lower socio-economic status use more GP, meanwhile higher SES individuals give major emphasis on specialty mental health care (2). Preferences for psychotherapeutic approach in the treatment of mental health might also explain that higher SES groups received more psychotherapies (158). Ethnicity –

a variable not registered in the MPS- has also been shown to influence referral and help-seeking behaviour (305). Finally, family support, coping style, verbal IQ are other possible confounding factors that we do not count with. All these covariates might explain the inequalities found in this study.

Self-selection could arise in this study. Psychiatric hospitalisation concerns only a small proportion (around 5%) of all psychiatric patients (29). Hence, the present findings cannot be extrapolated to all mental care, as they refer to more chronic, severe, and comorbid disorders than those treated in ambulatory setting (29). Localisation of the hospitals in urban centres could also favour a higher use by lower SES groups. However, it is unlikely that the SES gradient would be accounted for by the localisation of hospitals. First, hospitals do not have a catchment area and patients can roam freely between hospitals. Moreover, Belgium counts with a high density of psychiatric hospitals within a small territory. Finally, most of teaching hospitals or psychiatric wards of general hospitals are located in urban centres, so that one type of hospitals is not spatially more accessible than another type. Hence, we think that localisation is unlikely to be a strong determinant of the observed inequalities.

A final self-selection issue owes from the lack of unique patient number, providing revolving-door or chronic patients with more weights. As such patients are over-represented, there is a risk of a slight over-estimation of the inequalities because chronic patients have generally a lower SES. Although we have been able to stifle out part of such confounding factor by controlling for previous psychiatric hospitalisation, there is still a risk of a slight over-estimation of the inequalities because previous psychiatric history is likely to be under-estimated.

A final limitation of this study is due to the type of data used. This information is not registered by researchers and may lack accuracy, as has been shown by studies of discharge registers (44,329). Although the MPS has never been used to capitate resources for psychiatric hospitals, many clinicians in fact feared such a prospect, which may have led to over-scoring of patients. Indeed, when focusing on GAF scoring we found a small interaction effect between diagnosis on the first four DSM axes and hospital, implying that some hospitals tend to score a higher or lower GAF for a given level on the first four DSM axes. Some previous studies have raised doubts about the validity and reliability of the GAF, particularly for measuring functioning (234). However, although any such unreliability may affect inter-hospital comparisons, it is unlikely to influence the socio-economic gradient observed in this study. Moreover, the GAF still belongs to the DSM-IV multi-axial diagnosis, and recent studies have shown that it performs well in comparison with alternative measures of functioning (135). Overall, the GAF appears to be reasonably valid, with moderate reliability (114,156).

Our results are consistent with previous studies addressing socio-economic inequalities in outpatient care. A recent cross-national comparison study showed that higher socio-economic groups used more specialised care, while lower-SES individuals used primary care providers (2,304). Evidence of unequal treatment, for a given setting, is slight. A recent study has shown that depression recognition by GPs was dependent on socio-demographic correlates (179,246). There is also some indication that better-educated individuals favour a psychotherapeutic approach, whereas those in lower educational groups have a more favourable opinion of the use

of medication for mental health problems (159). Regarding outcome inequalities, this study is consistent with the Hampshire depression results. This project showed that, for a given baseline score, employment status as well as area-level of deprivation predicted both remission and improvement of depression at 6 weeks and 6 months (253).

As far as psychiatric inpatient care is concerned, there remain some moderate socio-economic inequalities. Whereas most of previous studies have focused on access to mental health care, our study suggests that inequalities do not only affect access, but also treatment and outcome. In fact, inequalities in access are rather limited. The work carried out hints that inequalities also arise in the way patients are cared for, once admitted in a psychiatric inpatient setting, and in the outcome of psychiatric hospitalisation.

This may have important implications for the financing and delivery of mental care and for clinical practice. Firstly, the study provides a double rationale for a review of the current financing scheme. The unequal allocation of resources by hospital type entails an unfair distribution of resources for patients with equal needs. As higher SES groups are more able to use better-financed hospitals (teaching and general hospitals have better staff/beds ratios and drugs reimbursement), this implies that the current system promotes a regressive allocation of resources. This is particularly true for the new –and costly– atypical antipsychotic drugs : a patient admitted in better financed hospitals might be more likely to receive such drugs. However, even if hospital resource allocation were made according to clinical status, the resulting capitation system would be unfair and would disregard the unequal capacity to benefit of the lower socio-economic groups. Because these groups exhibit not only a poorer health status but also a poorer prognosis, an allocation scheme based on ill-health status would still be unfair. In some countries, hospital resources are distributed according to the socio-economic background of the population cared for, for a given clinical status (293). Taking account of socio-economic status within the allocation scheme would be one way to increase fairness. Secondly, as this study has shown, increasing fairness within the psychiatric inpatient setting will not eradicate inequalities. It is, thus, the delivery of psychiatric care as a whole that needs to be examined. Belgium has almost twice the average European supply of psychiatric beds (0.93 par 1,000 inhabitants), showing a heavy emphasis on big psychiatric hospitals. This is not what the WHO has been advocating. Belgium is still far from the WHO recommendations of integrating mental health within the general sector, scrapping big psychiatric hospitals, and developing community mental health services (250). Finally, the under-provision of psychotherapies to lower-SES individuals in this inpatient setting is worrying. If psychotherapies are effective, then efforts should be developed to improve their clinical delivery to different SES groups. This issue should be given thorough attention by clinicians in order to promote equal use of indicated treatment within psychiatric inpatient wards. Caution must be taken in interpreting such results. In particular, there is no evidence that such inequalities owed to a clinical bias in treating patients of lower socio-economic status. Treatment preferences, cognitive abilities, IQ, clinical status, detailed psychiatric history, patients/staff ratios, type of psychotherapies and drugs available in each hospital, financing rules are some examples of demand-side and supply-side factors that future research should try to disentangle.

CONCLUSION

1. Recapitulation: the issues

Mental health is a major public health issue: because of the prevalence of mental illness, its consequences in terms of invalidity, comorbidity, and mortality, and because it is vulnerable to several curative and screening strategies. In the course of a single year, almost one person in four is affected by mental health problems (6). The WHO estimates that disability, comorbidity, and mortality due to these conditions account for 13% of total losses of years of life without disability (250). There are good evidences that some drugs, cognitive psychotherapies and early screening offer cost effective solutions (250,261) As a result, this care sector accounts for 28% of total direct expenditure on health care (223).

Paradoxically, a number of studies show that only a minority of those affected make use of mental health care services, while a sizeable minority of the population with no clear-cut diagnosis does turn to these services. This under- and over-utilisation can be explained in various ways, but it has the effect that mental health care is, overall, inequitable.

The epidemiological importance of psychiatric disorders is all the more worrying because these disorders are very unevenly distributed in the population. A review of the literature shows that the least prosperous social group presents a prevalence two to five times higher than the most prosperous social group (184). This unequal distribution is a problem because these inequalities are completely contrary to the principles of social justice of our democratic societies. It is also a problem of efficiency, as these inequalities are persistent or growing (219), even though they are regarded as public health priorities on the WHO's agenda (249), as well as in a number of OECD countries, such as Canada, France, the United Kingdom, and the United States (120,133,241). It is also a clinical problem, as these inequalities suggest that care is not always adapted to the different social groups.

Belgium offers an interesting field for examining the problem of social inequality in health and health care, because of the high level of accessibility of health care services in the country. On the one hand, health care insurance covers 97% of the population and keeps patients' expenses at a moderate level, both relatively and overall (25%) (69). Furthermore, the country has a high medical density both in general practice and in psychiatry (11.6 and 2.04, respectively, full-time curative equivalents per 10 000 inhabitants). Finally, with 17 psychiatric beds for every 10 000 inhabitants, the Belgian hospital sector is one of the densest both on the European continent and on the planet (250). However, this high level of accessibility does not necessarily mean that the services are in fact used in an equitable manner by all social levels of the population.

Against this background, the thesis sets out to measure the extent and the factors underlying socio-economic inequality in mental health and in the utilisation of mental

health services in Belgium. Five questions have guided the analysis of social inequality in mental health and in mental health care.

- Are the assessments of social inequalities affected by the methods used to define and measure mental health?
- Does the geographic context has an influence on the scale of social inequalities in mental health?
- What are the longitudinal influences of socio-economic factors on mental health?
- Is mental health care used equitably in the various social sectors of the population?
- What are the factors influencing an equitable distribution of mental health care services?

2. Main findings

The assessment of mental health inequalities varies according to the measure of mental health. The inequalities are much more pronounced when mental health is looked at from a subjective point of view or in terms of resulting disability, rather than in terms of its symptoms. Moreover, these inequalities are greater when mental health is looked at in a continuous rather than in a dichotomous way. These results are consistent with other studies (65). In particular, the epidemiological survey carried out in the United Kingdom confirms that individuals in a less prosperous social class experience more functional limitations for a given clinical category (22). This could be due to receiving less social support (311), to higher psychiatric comorbidity (33), or to more frequent relapses (300).

Social inequalities in mental health are influenced by the geographic context. Compared to the rest of the world, European studies show less socio-economic inequality in depression, of the order of 35% (chapter 2). The study does not make it possible to specify the causes of this better European performance, but a number of hypotheses can be advanced in explanation of it, in particular access to health care, which is more equitable in Europe than in the USA (324), and income distribution, which is also more egalitarian in Europe (19). As to mortality, the study shows that the relationship between material deprivation and all-causes mortality holds at the ecological level and that this relationship is influenced by unobserved (social, environmental...) characteristics peculiar to certain geographic zones.

The meta-analysis suggests that socio-economic inequalities in depression are greater in terms of the persistence of disorders than in terms of their incidence. In other words, social factors have more effect on the duration or the chronicity of depression than on its occurrence. One of the first psychiatric epidemiological surveys in the USA, the ECA, showed no relationship between socio-economic factors and the incidence of depression (143). These results are also consistent with British studies using longitudinal data for a panel of households (339).

It turns out that there is limited influence of material deprivation and of income on depression level or onset. The subjective perception of financial difficulties, a person's social network, and place in the professional hierarchy have a weak influence. This result is consistent with the experience of the Income Maintenance Experiment carried out in Seattle and Denver (306) and with a recent longitudinal British study (26). It is not confirmed by other longitudinal studies on deprivation and mental health (339), but this is due to differences in the statistical methodology used (see the discussion in chapter 5).

Is this result consistent with the very many cross-sectional studies that show that poor individuals are generally at greater risk of depression? Yes, because cross-sectional and longitudinal studies tackle slightly different questions: in the first case, the question is along the lines of "are rich individuals less at risk of depression than poor individuals?", while in the second case the question is "does variation in income have an influence on the risk of depression for given individual characteristics?" Our study tends to support a positive response to the first and a negative reply to the second. How can we explain these differences? On the one hand, the results obtained on the basis of the cross-sectional health survey by interview show that inequalities in common mental health disorders in Belgium are less than those revealed by other studies using the same GHQ in the Netherlands (266) and in the UK (338). So it is possible that Belgium presents less inequality in health than other countries. A second explanation may arise from the type of instrument used. The HDL used in the panel survey (like the GHQ in the Health Interview Survey) is a list of symptoms that do not in themselves offer a clinical diagnosis of the kind provided by diagnostic instruments such as the DIS or the CIDI. Our meta-analysis suggests that diagnostic instruments show inequality to be 54% greater than shown by the lists of symptoms. So, it is possible that the extent of inequality may be under-estimated by the tool used. Finally, a third explanation arises from the difference between cross-sectional analysis and

Main Findings

- Socio-economic inequalities in mental health are much more pronounced when mental health is looked at from a subjective point of view or in terms of resulting disability.
- Social inequalities in mental health are influenced by geographic context. Europe has a gradient 35% less pronounced than North-America. There are also within country differences in socio-economic inequalities in mortality, suggesting the influence of contextual effects.
- Social factors have more of an effect on the duration or the chronicity of depression than on its occurrence.
- For given individual characteristics, change of material deprivation does not affect the level or the risk of depression while social network does slightly.
- In terms of mental health services uses, inequalities arise in the setting where care is delivered : less well-off use more primary care and less specialised care, are more likely to be admitted in less favourable inpatient settings.
- Among psychiatric inpatients, the lower the socio-economic status, the less likely individuals with mood disorders are treated adequately.
- The outcome of the hospitalisation, in terms of overall functioning and in terms of psychological symptoms are less favourable for the individuals of lower socio-economic status.

longitudinal analysis. The latter makes it possible to eliminate the influence of variables that are both unobserved and relatively stable over time. If these variables are related both to socio-economic status and to depression, cross-sectional studies will produce biased results, unlike longitudinal methods. Some cross-sectional studies suggest that the relationship between socio-economic status and depression may be partly confounded by cognitive resources such as self-efficacy, locus of control, self-esteem, and assertiveness (312).

In terms of the utilisation of health services and for given needs, the less prosperous social sectors use more general practice, while the more well-off use more specialised medicine, medicaments, and primary and secondary prevention. This finding is consistent with other studies, in particular with the Ecuity project (324). For given mental health needs, the less prosperous social sectors used more general practice and psychotropic drugs. This result tallies with other studies carried out in the USA, the Netherlands, and Canada. An international comparison suggests that the more prosperous social sectors make more use of specialised medicine for mental health problems, whereas the less prosperous social sectors turn more to general practice (2).

The use of health care in a psychiatric hospital setting presents several kinds of inequality. In the first place, the use of structures with less favourable financing scheme (non-university hospitals and psychiatric hospitals) shows monotone growth as the social level falls. On the other hand, treatment for mood disorders in psychiatric hospitals shows less use of antidepressants and of psychotherapies for patients from less prosperous social sectors. This relationship is in general one of monotone growth: the higher the patient's socio-economic status, the more appropriate the treatment received.

Looking at the results in terms of health, the outcome of psychiatric hospitalisation is more favourable where socio-economic status is higher: overall psychosocial functioning and the number of symptoms present on leaving hospital become more favourable in comparison to the situation at admission, according to the social level of the individual. The least prosperous social group has a risk of in-hospital mortality 80% higher than that of the most prosperous social group, all other things being equal.

Our results enable us to point to a number of factors that can affect the degree of inequality: care setting, pathologies, and care institutions. It seems in fact that inequality varies according to the care setting. For equal needs, general practice is thus more used to the less prosperous social sectors than is specialised medicine, and the psychiatric services of general hospitals and the university hospitals are less used by the less prosperous social sectors.

Health inequalities resulting from the hospitalisation, in terms of mood disorders, can be explained in part by treatment differences and effects peculiar to the hospitals. The extent of social inequality in the results of hospitalisation varies according to the diagnostic categories: it is higher for substance-related disorders and for schizophrenia. The hospital effect on social inequality is, however, much more pronounced for dementia and other cognitive disorders.

3. Limitations

The juxtaposition of several databases makes it possible to approach the subject from various angles (outpatient, hospital, cross-sectional, longitudinal), but it adds up the shortcomings of each base and method. The limitations of this dissertation can be grouped under three headings: the validity of the tools, the underlying hypotheses, and the reliability of the data.

Validity of the instruments

The measurement instruments used in this study are, for the most part, lists of symptoms, which do not offer a clinical diagnosis. Dichotomisation of the score produces pseudo-clinical categories that are generally short on specificity. This is particularly the case with the two instruments arising from population surveys: the GHQ of the 1997 health survey (109) and the HDL included in the eight waves of the households panel (1992-1999) (233). As for the clinical data of the Minimum Psychiatric Summary, the reliability of the Global Assessment of Functioning (GAF) is open to question and has been widely questioned in the literature. Nonetheless, the GAF is part of the multi-axial DSM-IV; some recent studies tend to show that the GAF offers satisfactory validity and reliability in comparison with other instruments used to measure functioning (114,135,156,156). However, we feel confident that such limitations do not affect significantly our results. The GHQ, the GAF and the DSM-IV are all three very known and validated instruments. They might show less reliability because they are self-reported (in the case of the GHQ) or are filled by clinician (GAF and DSM-IV). But there is no indication that reliability of the GHQ is reduced by self-reporting (109). If lower socio-economic groups tend to under-report common mental disorders, this may generate another bias, leading to an under-estimation of the GHQ-socio-economic inequalities. A previous study, using Whitehall II data, found that the sensitivity of the GHQ-30 was lower in the clerical/support occupational categories, compared to higher occupational groups; but this difference was small and not statistically significant (298). Nevertheless, it cannot be excluded that GAF and DSM-IV reporting evidence a clinician-effect : we test such an effect by considering a random model in which DSM-IV first, second, third and fourth axis values were regressed on the GAF score with a hospital specific slope. The covariance estimator was significant (although very low) suggesting there is a slight creeping effect, entailing that, for given diagnosis on axis 1 to 4, some hospitals ranked higher than others. Such a results would affect between-hospitals comparisons but we can feel secure that it would affect very slightly between-social strata comparisons.

The results of hospitalisation were evaluated by the difference between discharge and psychiatric admission in terms of global functioning and in terms of psychiatric symptoms. We do not have at our disposal out-of-hospital data on what became patients, nor do we have evaluation scales such as the Hamilton Scale. So the section on the results of psychiatric hospitalisation need to be approached with caution. As the Minimum Psychiatric Summary is currently being revised, it could be interesting to include more validated and reliable scales as well as post-discharge outcome : Belgium is, for example, still lacking post-discharge mortality.

There were some gaps in the records of consumption of mental health services, both in the interview-based survey and in the Minimum Psychiatric Summary. In outpatient care, psychiatric consumption was derived from the International Classification of Primary Care (ICPC) classification, from the type of speciality availed of, or from the class of medication prescribed. In general, surveys of consumption of psychiatric care take a more direct approach, by asking whether the individual has availed himself of care for mental or emotional problems. So it is quite probable that the outpatient data underestimated real consumption of mental health services, and particularly for general practice and specialists. As most of cognitive, behavioural or psychodynamic psychotherapies are delivered by psychologists or psychotherapists, which were not registered in the Health Interview Survey, it is likely that inequity in outpatient mental care has been understated as far as such care is more used by higher SES groups. The issue is made more acute by the lack (until very recently) of legal protection of psychologists and psychotherapists.

The RPM's intended exhaustive nature is rather inadequate when it comes to the sections concerning care: there are no details on pharmacological consumption, and in particular no way of distinguishing medicaments within a particular class. As for social inequality in the treatment of schizophrenia, it would have been particularly interesting to distinguish the new types of medication such as atypicals, which present fewer side-effects (and thus lead to better compliance by patients), but whose higher costs risk accentuating the problem of access for less well off patients (208).

The chapter 6 makes extensive reference to the notion of needs which has been defined by expected care for given ill-health status. The information we had were, however, rather limited. Empirical studies of equity generally use subjective health as a predictor of needs (324). This is justified by the validity of this indicator, which is able to gather with one question the functional and pathological dimension of health status, severity, comorbidity, and the risk of mortality (149). As far as mental health is concerned, an earlier study suggests that subjective perception of a need for psychiatric treatment also has an influence on the consumption of care over and above that of the psychiatric disorders diagnosed (167). Our measure of equity is, thus, limited by the lack of information on subjective mental health needs. The same holds for other elements of mental health which might influence the use of mental care such as relational or emotional well-being of an individual. Use of mental care can also be related to the needs of other persons such as relatives or friends. The bias in the measures of equity, however, can only arise with social differences between subjective measures (or other needs features) and clinical measures of mental health status, something that has not been confirmed by recent studies (324).

Defining and measuring equity

Equity in terms of health care cannot be reduced to a question of method: its study requires theoretical and normative choices. Our results concerning equity, accordingly, are dependent on these choices, the methods used, and the data available. After recalling briefly the main theories of justice (see Appendix 7 for more details), we will outline the theoretical implications of the method used, before dealing with the methodological limitations. The theoretical discussion draws on works of

economic philosophy in the area of health care (104){Le Grand 1991 1132 /id}(71)and on a recent synthesis dealing with the subject (348).

- **In the utilitarian** theory, a fair allocation of resources is achieved when total utility is maximised. There is no preference between individuals. Because of its indifference to distributive issues, this theory is sometimes considered as focusing on efficiency.
- **Theories of needs** suggest that health care should be distributed in relation to needs and not by market forces. Such a point of view is very strongly settled in public health, epidemiological research and medical ethics (104). The obvious hurdle of such stance is the definition of needs. If needs is defined by ill-health status, regardless of care, it follows that the theories of needs attribute more weight to ill individuals and have a strong **inequality aversion**. Conversely, if needs are defined according to capacity to benefit from health care, then it yields a **utilitarian perspective** on health, where the objective is to maximise the result.
- In the **desert theory**, some individuals or some groups are seen as being more deserving. This could apply, for example, when the allocation of health care is intended to compensate individuals for any health disadvantage they suffer through no fault of their own, but not for disadvantages they suffer as a result of their own free choices.
- **The theory of minimum standards** suggests that a fair distribution should first grant each individual a minimum level of health or health care. This is in fact how Rawls has considered health in his theory of justice.
- **Equality of access** insists that an equitable distribution of health care should equalise, between individuals, the monetary and non-monetary cost of using care, or (another contending definition) the maximum quantity that an individual could afford to buy.
- Health cannot be considered as an ordinary commodity and is necessary for an individual to flourish as a human being (104). As a consequence, a final theory of justice in health care states that an equitable distribution of health care is simply one which gives rises to an **equal distribution of health** (71). This is consistent with the Health for All agenda of the World Health Organisation which puts as its first goal, equal health(249).

The present work took as its main theoretical benchmark equity as the distribution of health care according to needs, which is equality of use for equal ill-health status. This choice and the data used to apply such model have several limitations :

1. Horizontal equity postulates equal utilisation where needs are equal. The method chosen defines needs as consumption predicted by health status. One limitation of this method is that needs are estimated on the basis of the relationship observed between consumption and health status. The weaker the relationship between "health status" and effective utilisation, the less expected consumption can be regarded as satisfactory. Let us imagine a situation where psychiatrists' fees were reimbursed at a rate only one-tenth that for general practitioners, leading to under-utilisation by the least prosperous social sectors. This situation would result in a weakening of the relation between "health status" and "utilisation", with the result that expected use would be a poor indicator of real needs.

2. In the health delivery analysis, needs are defined in relation to expected care for a given ill-health status. If we assume that the statistical relationship provides a good proxy of overall current medical technology, then such a method would imply that needs are defined as a sort of capacity to benefit. If, on the contrary, expected care has a weak link to capacity to benefit, then this would imply a definition of needs as ill-health status. In the first case, our method would have implied a rather utilitarian theory of social justice, while the second assumption would drive us towards a more egalitarian theory, with unequal weight given to ill and non-ill individuals (348).
3. The chapter on longitudinal analysis and that on the Minimum Psychiatric Summary have a slightly different approach to equity, dealing as they do with health results and not with health care. Again, the assumption that the future course of health, whether generated inside or outside the health care system, should be equal for all individuals either requires that individuals would have the same capacity to benefit or (which is more likely) that society is ready to accept a trade-off between equity and efficiency.
4. The chapter 6 (Equity in outpatient mental care : assessing equal use for equal needs) is designed on assumption that care have an uniform quality and health enhancing ability regarding social strata. The fact that, within the outpatient, inequity differs according to the setting (primary care versus speciality care) hints that the type of care matters. At the light of chapter 7, this assumption seems clearly too restrictive. Data on quality of care and health outcome are thus needed in future studies on equity in health.
5. The lack of data on individual expenditures on mental health care does not make it possible to deal with vertical equity in terms of funding. This is mainly determined by the progressive nature of individual payments for health care (333), either indirectly via taxation or social levies, or directly via payments for care or through complementary insurance premiums. It is difficult to determine the vertical equity for a particular category of health care. As most funding comes from (progressive) taxation, social security levies (which are slightly progressive, given the exemption of the least well off categories and the absence of a ceiling for higher pay levels), and finally from direct payments for care (whose regressiveness is moderated by fiscal and social exemptions), some authors have suggested that the Belgian system is slightly progressive when it comes to the funding of health care services (320).
6. Fifth, this dissertation has made the implicit assumption that mental care is superior to no mental care. This could be questionable for three reasons : first mental care is very heterogeneous (for psychotherapies for example) and thus has a varying population return. Second, some studies cast doubt about the size effect of mental care. A meta-analysis of anti-depressant trials suggest that only a quarter of the improvement observed in the drug-treated group is due to the active medication, the remaining three quarters being accounted for by natural history (one quarter) and placebo effects (two quarters) (7). The issue is also raised at the population level, as evidence by the Nemesis study : mental care did not make any difference in the duration of depression,

whatever the type of care used (294). Third, there are some indications that mental care could be detrimental, for example for long-length of stay in psychiatric hospital making patients cautious about the use of psychiatric care (174,197,262). The argument is, however, risky and fragile. It is risky because it fuels a strong anti-egalitarian policy framework which runs against social insurance, better access to health care and equal health goal (102). Moreover, it seems odd to raise the efficiency argument to discard equity concern for a sector of care accounting for a more than a quarter of the public health care budget. The argument clearly makes little case of the increasing recognition by Public Health Task Forces, Clinical Guidelines and the World Health Organisation that the use of mental care should be increased. Third, this argument is obliterating several issues: the fact that a significant part of mental care is aiming at caring not curing (consider for example schizophrenia or mental retardation), that lack of evidence of therapeutic effect is not evidence of no effect, that there is high variability in the effect of mental care affecting the risk of an effect for a given average effect expectation (however low it is). Finally, such concern of efficacy (and risk of) does not smooth the concern for equity. It makes it increasingly relevant to assess equity in terms of appropriateness of care health as well as in terms of health results.

7. A final conceptual assumption is related to use/access issue. Several equity models, such as Rawls maximin or Sen capabilities insist that the chance of use should be equalized and not the effective use. In the Rawlsian view, equity is thus a much ex-ante concept leading, for example, to a basic health insurance scheme. Some authors have defined equity in health care in terms of equalization of access to health care disregarding effective use (231). By focusing on effective use of mental care, this dissertation has assumed that preferences, values and culture of help-seeking lead (or should lead) to the same quantity of care for given ill-health status. This is obviously a very strong choice. There is a very important body of researches evidencing the role of preferences, culture, help-seeking models and symptoms perception and adjustments in mental health and care (144). These are very important factors to explain the use of care as well as the type of care used.
8. Even if psychiatric inpatient was homogeneous along social strata, the marginal health outcome would be still be unequal, entailing, in fact, a regressive allocation of health outcome. Hence, equal use is not a sufficient condition to reach equal health marginal outcome. This is partly because equal use hides heterogeneous care but also since- presumably - social strata do not have the same capacity to benefit from the care. As a consequence, equality of health should be considered as golden benchmark to assess equity in health care. This requires much more detailed information about setting and quality of care, capacity to benefit and outcome.

4. Utility

On several points, the results provide useful indications for policy-making and clinical practice. They could help formulate policies aimed at tackling health inequalities, at organising and financing health care, at designing better clinical practice and at producing relevant informations.

Tackling health inequalities

This study has shown evidences of spatial clusters of mortality for several causes and it shows that such clustering interacts with socio-economic inequalities in mortality. As some problems, such as chronic pulmonary disorders, substance abuse, road accidents, and suicide, present a high level of spatial concentration, it seems worthwhile to investigate further such area-specific factors and to design and to study the need to implement programmes in such areas. Belgium has several instruments for carrying out such a policy: the network of primary mental health centres (Centres de Santé Mentale), the Mental Health Coordination Centres (Plateformes de Santé Mentale), and the local health promotion centres (Centres Locaux de Promotion de la Santé). The accreditation, organisation, and funding of such centres could take into account the spatial distribution found in this study.

If true serial correlation between repeated measurements of mental health episodes is weak, then it follows that preventing mental health episodes or promoting very early intervention will not reduce the long-term burden of illness or expenditures on such care. The weak relationship we found between repeated measurements of depression suggests that policies aimed at preventing first episodes do not have the edge over curative policies. The idea that short-term policy is justified because of the long-term benefit does not seem to apply to depression. This is not to say that early screening is not effective. A recent modification of the AHCPR preventive guidelines has called for routine screening of depression disorders, showing that early treatment reduced persistent depression by 13% (261).

It is very unlikely that policies aimed at relieving financial strain would lead to a lowering of mental health inequalities. Although the Acheson report suggests that relieving poverty would make a significant contribution to the reduction of health

Utility

- Reduction of socio-economic inequalities in mental health would be better achieved by improving social network than by reducing material deprivation.
- Area-specific inequalities could be given more attention through the promotion of Health Zones areas.
- There is more argument to address inequalities in persisting depression than in tackling inequalities in onset of depressive disorder.
- Improving use of mental health speciality care by the lower socio-economic group is needed.
- Mental care resources should be redistributed from psychiatric inpatient care to outpatient settings, such as primary care or home care.
- There is a need to foster better use of effective psychotherapies to lower socio-economic individuals.

socio-economic inequalities (118), our study does not support this expectation. This is not to say that there are no health inequalities in depression. Nor that income maintenance policies are not sound. But policies seeking to address mental health inequalities should focus less on improving economic standards and more on fostering social networks. Other studies have suggested that the lowering of socio-economic inequalities in mental health could be achieved by tackling differences in personal resources such as self-esteem, self-efficacy, and locus of control (312). This has been shown with very specific groups, such as unemployed individuals (240,264) and remains to be tested on a the population as a whole.

The qualitative and quantitative reviews make it clear that socio-economic inequalities are more pronounced for the persistence of common mental disorders than for their onset. Hence, policies seeking to reduce health inequalities would be more efficient at helping deprived individuals to face a depression episode. This is also consistent with the recent changes in the AHCPR screening guidelines for depression, calling for routine screening of depression disorders in primary care. Based on a recent meta-analysis, these guidelines suggest that early treatment reduced persistent depression by 13% (261). How could the organisation and funding of mental health care take this into account ? Are there any clinical implications?

Organising mental care

Fairness is one of the major goals of any health care system (353). This is not only a normative stance promoted by the first objective (equality of health) of the Health For All policy framework (249). Policy-makers are also willing to trade-off overall health improvement and its distribution among the population (201). The equity-performance of the primary care suggests that this sector of care could be a more sensible tool to promote equity. Several studies show that screening and treatment of mood disorders in general practice could be cost-efficient (261); adding that the WHO has made a strong advocacy to move resources from psychiatric hospitals to community and primary care settings, and we have a clear argument of fostering a more active stance of the GP in mental health.

Within hospital settings, individuals are treated unfairly. Individuals of lower socio-economic status are much more likely to receive lower quality of care and to have a poorer outcome. Part of the problem may stem from unequal financing and treatment of hospitals and in-patients (see below). However, as this study has shown, increasing fairness within the psychiatric inpatient setting will not eradicate inequalities. It is, thus, the delivery of psychiatric care as a whole that needs to be examined. With 17 psychiatric beds per 10 000 inhabitants, Belgium has almost twice the average European supply of psychiatric beds (9.3 per 10 000 inhabitants), and has a heavy emphasis on big psychiatric hospitals. This is not what the WHO has been advocating. Belgium is still far from the WHO recommendations of integrating mental health within the general sector, scrapping big psychiatric hospitals, and developing community mental health services (250).

Funding of health care

A fair allocation of resources is an important tool of achieving fairness in health and health care. A fairer allocation could be achieved by reducing inequalities within the

psychiatric hospital setting and by considering socio-economic status in resources allocation.

The study provides a double rationale for a review of the current financing scheme of psychiatric hospitals. The unequal allocation of resources by hospital type entails an unfair distribution of resources for patients with equal needs. As higher SES groups are more able to use better-financed hospitals (teaching and general hospitals) or speciality care, this implies that the current system promotes a regressive allocation of resources. However, even if hospital resource allocation were made according to clinical status, the resulting capitation system would be unfair and would disregard the unequal capacity to benefit of the lower socio-economic groups. Because these groups exhibit not only a poorer health status but also a poorer prognosis, an allocation scheme based on ill-health status would still be unfair. In some countries, hospital resources are distributed according to the socio-economic background of the population cared for, for a given clinical status (293). Taking the socio-economic status into account within the allocation scheme would be one way to increase fairness.

In some OECD countries, the overall allocation of health care resources increasingly makes use of capitation formulae (269). Their main purpose is to achieve a more efficient and equitable allocation of resources between plans, sickness funds or local health authorities (52,194,319). At the federal level, Belgium has implemented a similar procedure since 1995, in order to make the sickness funds more responsive to health accounts deficit (88). In 2001, the sickness funds were held accountable of 30% of the health expenditures and could face fines (in case of deficit) up to 2% of their overall budget. Our work suggests that socio-economic status should be included in the risk adjustment models for several reasons : lower socio-economic groups have a poorer health status, they tend to substitute GPs to specialists, they are hospitalised in settings with poorer financing, and they exhibit lower outcomes. Moreover, the findings of moderate to strong spatial autocorrelation yield a request to include geographical features in the health care allocation. In an international review of approaches to capitation and risk adjustment, Rice and Smith found that 8 countries out of 20 made allocation of resources on the basis of some geographical features (269). Although the objective of the Belgian “clé de repartition entre organismes assureurs” may pursue to goal of getting rid of space, this study suggests that it should grant it more attention.

Clinical implications

The finding that socio-economic inequalities are stronger for persistent depressive disorder than for incidence has some interesting clinical implications. This could owe to under-use of care, failure to be detected, poor delivery of drugs and psychotherapies, poorer outcome or higher disability, or poor compliance of patients.

The present study does not support that lower SES groups are dumped regarding outpatient care. Our study and cross-national comparison studies (2) evidenced that the issue is not so much of the use of any care but of the type of care used : lower SES groups use more primary care, while high SES groups use more specialty care. Nevertheless, mental health care remains, by and large, under-delivered for about 70 to 80% of the patients (see chapter 1).

A second explanation could be that recognition rate of depression is poorer in lower SES groups. This is not supported by empirical data either. Several studies had shown that the recognition rate of depression is improved for those individuals having some social problems (246,264,307), suggesting that for a given contact with a GP, lower SES individuals are at improved risk of being diagnosed.

Is there any problem of delivery of drugs and psychotherapies ? While primary care physicians are entitled to deliver psychotropic drugs, their abilities to supply efficient psychotherapies (such as cognitive and behaviourist therapies (270)) are reduced. It is unclear but unlikely that GPs foster referral to mental health care specialists. Thus, the stake would be how to deliver psychotherapies in or through primary care in Belgium. The findings that, even in a very controlled setting such as psychiatric inpatient, psychotherapies are under-delivered is an evidence of poor delivery of lower SES groups. We are not advocating for a very large increase in psychotherapy delivery, as whole. Nor are we pushing for an increase in the number of psychologists or psychiatrists. Such issue is beyond the scope of this dissertation. This should be considered more from a distributive standpoint of view. The fact the lower SES groups would be adverse to psychotherapies is only part of the story; we need to understand why is it so.

Psychiatric or non-psychiatric comorbidity might worsen the prognosis of lower SES individuals. As the chapter 4 suggests, poor mental health yielded higher disability in lower SES groups, and disability inequalities were stronger than inequalities in symptoms. Previous epidemiological studies showed that the SES gradient in psychiatric disorder is more pronounced for comorbid psychiatric disorder comparing with pure psychiatric disorder (33). UK data confirmed that, at a given symptom level, lower social groups experienced higher dysfunction (22). The US ECA of Baltimore showed that lower educational groups had higher 1-year depression persistence, and that such association faded away once comorbidity, severity and prior episodes number and duration were taken into account (285). This issue should be given thorough attention by clinicians. But it also suggests that the question of equal treatment for equal needs should not overlook another issue, that is how unequal needs are treated unequally. Treating a mood disorder with substance abuse comorbidity is not the same as treating a pure depressive disorder. We have not addressed such vertical equity issue in delivery.

Finally, chapter 7 shows that outcome is poorer in the lower socio-economic groups, which confirmed the Hampshire depression project in an outpatient setting. This project showed that, for a given baseline score, unemployment status as well as area-level of deprivation came with a lower improvement at 6 weeks and 6 months (253). Difference in compliance to mental care should be investigated further.

Data production

When it comes to producing data, Belgium has certainly made significant improvements to the quantity of information : since 1997 we count with a regular Health Interview Survey which allows for a very broad and accessible database on health and health care; since 1996 the Minimum Psychiatric Summary provides a case register for all psychiatric inpatient admission and discharge; finally, the panel of the

Belgian households provides a unique opportunity to make longitudinal analysis of some issues in health and health care.

Regarding the RPM, we have however some doubt whether the epidemiological aims of the RPM (see http://www.uia.ac.be/mpg/fr/handl/omktek/DOEL_2.htm) is realistic and consistent with what a case register can achieve. At least our literature review does not support that idea that a inpatient case register is a reliable source for epidemiological or needs analysis. Second, it is mostly impossible to know where some items or scales do come from and what were their purposes. The RPM Manual (56) or the official website <http://www.uia.ac.be/mpg/> are of no help to clarify such theoretical and methodological issues. This is, for example, true for the 4th section (psychological signs and symptoms) for which we haven't been able to find the original scale or the supporting methodology, for the 5th and 6th sections related to mental care, for which the scoring is difficult to interpret. Finally, we bemoan the lack of link with specific psychotropic medications, with the procedures recognized by the National Institute of Health and Invalidity Insurance (INAMI/RIZIV) or with billing information. The MPS needs to be redesigned around more specific and realistic objectives, to be simplified and to provide more reliable items.

If equity is to be considered among the main objectives of data collection, additional information related to the attributes, the quality and the outcome of care should be considered in further studies. As vertical equity is also an important social justice principle, we should also have more information about individual expenditures of health care.

5. Future researches

Future researches on mental health inequalities and inequities could be extended in two directions : first it would be interesting to assess the stress and coping theory in a longitudinal framework, in order to understand how socio-economic status, coping strategies and mental health ebb and flow other the lifecycle, and to what extent coping strategies are confounders of the SES/mental health relationship.

Secondly, there is a need to go beyond the question of use of health care and to analyze quality and outcome of health care both in outpatient and inpatient settings. This would help address the issue of vertical equity in the delivery of health, that is how unequals are treated unequally. This is a conceptual and methodological challenge.

The degree of socio-economic inequalities can also be assessed at a more micro-level of the patient-physician relationship. There has been a lot of sociological work about the relation between the patients and physician. But patient preferences are generally considered as given, providing a rather static view of the provider-patient relationship. The way the preferences of the patients are being formed and the reasons for favoring some type of clinical providers or treatments are still rather answered questions. Why some patients do prefer psychotherapies above medication, and how the clinician negotiate such treatment package are questions needing to be addressed if health care is to be more responsive to patients. The fact that low socio-economic groups tend to substitute GP care to specialty care meanwhile the reverse is observed for higher SES groups remain to be understood in a more anthropological framework. It would lead

us to shed light on several factors such as the referral and support network, the sickness role, the type of agency relationship, and the value of information, risk and self-reliance.

The spatial heterogeneity in health inequalities is an opportunity to investigate those contextual factors of health inequalities. This is a very active body of research. Most of the studies have focused on the relationship between within-country health inequalities and income inequalities, with controversial results (168,169,177,178,210,332). Few research have devoted to within-area social cohesion factors.

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Appendix

Appendix 1 : Transformation of the health variables

The values of the lognormal health latent variable has been computed in 3 steps. Firstly, by applying the inverse of the normal cumulative function (Φ) to the cumulative percentage in order to find the thresholds (α) : n_j is the frequency of the j category, while N is the total number of cases. Secondly, the Z scores are estimated using the second equation, where ϕ is the standard normal density function. Finally, where lognormality is assumed, taking the negative of the exponential leads the final solution, y_j .

$$\hat{\alpha}_j = \Phi^{-1} \left(\sum_{i=1}^j n_i / N \right), j = 1, 2, 3, \dots, J-1 \quad (0.5)$$

$$\hat{z}_j = (N / n_j) [\phi(\hat{\alpha}_{j-1}) - \phi(\hat{\alpha}_j)] \quad (0.6)$$

$$y_j = e^{-\hat{z}_j} \quad (0.7)$$

Appendix 2. Estimating Cn, Cu and Hi

Following Kakwani and Van Doorslear, Cu, Cn and Hi can be estimated applying an OLS to the equation 1 (for Cu), 3 (for Cn) and 5 (for Hi) (163,324). Multiplying the corresponding OLS β coefficient by 2 times the variance of the ranking variable yields the Cu, Cn and HI coefficient. The computation of the standard error is a bit more demanding but can be resolved by the way of equations 7-9.

$$(1) \quad \frac{m_i}{m} = \alpha_1 + \beta_1 R_i + \varepsilon_i$$

$$(2) \quad Cu = 2\beta_1\sigma_R^2$$

$$(3) \quad \frac{ni}{n} = \alpha_2 + \beta_2 R_i + \mu_i$$

$$(4) \quad Cn = 2\beta_2\sigma_R^2$$

$$(5) \quad \left[\frac{mi}{m} - \frac{ni}{n} \right] = \alpha_3 + \beta_3 R_i + \zeta_i$$

$$(6) \quad HI_{wvp} = 2\beta_3\sigma_R^2$$

$$(7) \quad Var(HI_{wvp}) = \frac{1}{N} \left[\frac{1}{N} \sum (a_i - a_i^*)^2 - HI_{wvp}^2 \right]$$

$$(8) \quad a_i = \frac{m_i}{m} (2R_i - 1 - C_u) + 2 - q_{i-1} - q_i$$

$$(9) \quad q_i = \frac{1}{m} \sum_{\lambda=1}^i m_\lambda f_\lambda$$

m_i is the health care (or mental care) use of individual i , ni is the need (measured by the expected use) of individual i , R_i is the relative rank of i , σ_r is the standard deviation of the relative rank variable, f is the sample frequency and m is the overall mean.

Appendix 3 : Computing Hospital performance

The construction of the hospital performance (0-1) is performed in three stages. First as a simple GLM regresses the Length of stay (L) for each discharges j of each hospital I on K independent variables as well as n dummies for the n hospitals.

The hospitals dummies are then added to the intercept and put on 0-1 scale.

$$L_{ij} = \beta_0 + \sum_{l=1}^k \beta_l X_{ij}^l + \mu_i + \varepsilon_{ij}$$

$$\hat{\alpha}_i = \beta_0 + \mu_i$$

$$P = e^{(\hat{\alpha}_{\min} - \hat{\alpha}_i)}$$

The k independent X^l variables considered include the five DSM -IV axis, Nber of psychological problems, age, sex, previous psychiatric history, psychiatric and somatic comorbidities.

Appendix 4. Additional table : Risk of less favourable setting for psychiatric inpatient care : odds ratios and beta coefficients.

Covariates :	Mandatory admission		Non teaching hospital		Psychiatric hospital		Longstay hospital		Severity of the cases in the ward	
	OR §	s.e. †	OR	s.e.	OR	s.e.	OR	s.e.	β §	s.e.
Axis 1 group of disorder:										
Substance disorder	1.501 ***	0.029	1.334 ***	0.017	1.216 ***	0.04	1.303 ***	0.026	-0.42 ***	0.075
Affective disorder	0.752 ***	0.032	1.016	0.017	0.802 ***	0.039	0.861 ***	0.028	0.323 ***	0.076
Schizophrenia	1.911 ***	0.031	2.681 ***	0.021	0.958	0.045	1.665 ***	0.029	-2.64 ***	0.089
Dementia	1.716 ***	0.052	2.339 ***	0.038	1.894 ***	0.121	2.026 ***	0.047	-8.74 ***	0.161
Other (ref)	1	.	1	.	1	.	1	.	0	.
Nber psy. comorbidities‡	1.063 ***	0.014	0.762 ***	0.01	0.828 ***	0.021	0.71 ***	0.015	0.64 ***	0.041
Axis 2 disorders:										
Personality disorder	0.784 ***	0.019	1.402 ***	0.012	1.862 ***	0.029	1.191 ***	0.018	-1.26 ***	0.053
Mental retardation	0.723 ***	0.046	1.632 ***	0.029	3.012 ***	0.091	1.679 ***	0.037	-1.76 ***	0.123
No axis -2 diagnosis (ref)	1	.	1	.	1	.	1	.	0	.
Nber somatic comorb.	0.98	0.014	0.819 ***	0.009	1.385 ***	0.025	0.964 **	0.014	-0.78 ***	0.04
Nber problems 4th axis	1.083 ***	0.006	1.042 ***	0.004	0.998	0.009	1.016 **	0.006	-0.32 ***	0.018
GAF score (5th axis):										
<20	4.699 ***	0.141	0.909	0.06	0.632 *	0.202	4.158 ***	0.142	-16.5 ***	0.264
20-39	2.76 ***	0.14	0.795 ***	0.058	0.473 ***	0.198	3.463 ***	0.141	-13.2 ***	0.254
40-59	1.36 *	0.14	0.989	0.058	0.407 ***	0.197	2.999 ***	0.141	-9.94 ***	0.253
60-79	1.275	0.144	0.908	0.06	0.67 *	0.203	2.961 ***	0.143	-6.31 ***	0.261
80+ (ref)	1	.	1	.	1	.	1	.	0	.
Nber psycho. symptoms	1.07 ***	0.003	0.967 ***	0.002	0.879 ***	0.005	0.955 ***	0.004	-0.09 ***	0.011
Previous psy. history	0.763 ***	0.018	0.981	0.011	1.145 ***	0.026	1.025	0.017	-0.59 ***	0.049
Age group :										
0-14	0.55 ***	0.095	0.811 ***	0.051	0.52 ***	0.095	0.792 **	0.079	0.511 *	0.223
15-34	1.196 ***	0.035	0.862 ***	0.023	0.577 ***	0.056	0.786 ***	0.033	1.246 ***	0.098
35-64	0.941	0.034	0.927 ***	0.021	0.739 ***	0.054	0.859 ***	0.03	1.948 ***	0.091
65+ (ref)	1	.	1	.	1	.	1	.	0	.
Sex :										
Men	1.177 ***	0.018	1.308 ***	0.012	1.069 *	0.027	1.251 ***	0.017	-0.86 ***	0.051
Women (ref)	1	.	1	.	1	.	1	.	0	.
Socio-economic status:										
1st Quintile	1.222 ***	0.019	1.170 ***	0.029	1.474 ***	0.044	1.2	0.027	-1.63 ***	0.08
2 nd Quintile	1.205 ***	0.017	1.102 ***	0.026	1.502 ***	0.04	1.104 ***	0.026	-1.21 ***	0.075
3 rd Quintile	1.078 ***	0.02	1.210 ***	0.029	1.305 ***	0.045	1.211 ***	0.029	-0.84 ***	0.086
4 th Quintile	1.052 **	0.018	1.080 **	0.028	1.325 ***	0.041	1.08 **	0.028	-0.27 ***	0.079
5 th Quintile (ref)	1	.	1	.	1	.	1	.	0	.
-2Log Likelihood										

§ OR : Multivariate odds ratio; β Multivariate unstandardized coefficient; † standard error of the estimate; *** significant at 0.001, ** at 0.01, * at 0.05; ‡ excluding comorbidity on the second axis; ¶ each coefficient is controlled for all other covariates

Appendix 5. Additional table : Correlates of unexpected treatment for three groups of disorders : odds ratios .

Covariates :	Mood disorders					Substance abuse			Schizophrenia			
	No Antidepressant drug		No psychotherapy			No Withdrawal			No Neurotic drugs			
	OR §	s.e.	OR §	s.e.	OR §	s.e.	OR §	s.e.				
Nber psy. comorbidities‡	1.019	0.023	0.908	***	0.018	1.09	***	0.015	1.179	***	0.043	
Axis 2 disorders:												
Personality disorder	0.804	***	0.028	0.855	***	0.022	0.923	***	0.02	1.007	0.05	
Mental retardation	0.97		0.07	1.04		0.057	0.995		0.051	1.095	0.108	
No axis -2 diagnosis (ref)	1	.		1	.		1	.		1	.	
Nber somatic somorbidities	0.924	***	0.022	1.152	***	0.017	1.033	*	0.016	0.95	0.043	
Nber problems on 4th axis	1.054	***	0.011	0.945	***	0.009	0.933	***	0.007	1.051	**	0.016
GAF score (5th axis):												
<20	0.578	***	0.156	0.6	***	0.146	0.953		0.16	0.81	0.536	
20-39	0.489	***	0.151	0.454	***	0.142	0.892		0.158	0.908	0.533	
40-59	0.489	***	0.15	0.438	***	0.142	0.917		0.157	1.242	0.533	
60-79	0.737	*	0.154	0.807		0.145	1.191		0.16	1.575	0.54	
80+ (ref)	1	.		1	.		1	.		1	.	
Nber of psych. symptoms	0.952	***	0.006	0.999		0.005	0.968	***	0.004	0.936	***	0.009
Previous psy. history	0.866	***	0.027	1.084	***	0.021	1.041	*	0.02	0.839	***	0.046
Age:												
0-14	7.1	***	0.164	0.562	***	0.166	0.628	*	0.205	0.898	0.393	
15-34	2.458	***	0.049	0.839	***	0.037	0.466	***	0.052	0.657	***	0.085
35-64	1.414	***	0.045	0.859	***	0.031	0.514	***	0.05	0.665	***	0.08
65+ (ref)	1	.		1	.		1	.		1	.	
Sex:												
Men	1.394	***	0.028	1.161	***	0.022	0.861	***	0.021	0.891	*	0.047
Women (ref)	1	.		1	.		1	.		1	.	
Socio-economic status:												
1st Quintile	1.662	***	0.042	1.506	***	0.034	1.096	**	0.032	0.978	0.077	
2nd Quintile	1.229	***	0.041	1.469	***	0.032	1.004		0.029	0.845	*	0.077
3rd Quintile	1.161	**	0.048	1.336	***	0.038	1.024		0.032	1.011	0.086	
4th Quintile	1.054		0.044	1.174	***	0.034	0.97		0.029	1.01	0.085	
5th Quintile (ref)	1	.		1	.		1	.		1	.	
-2Log Likelihood												

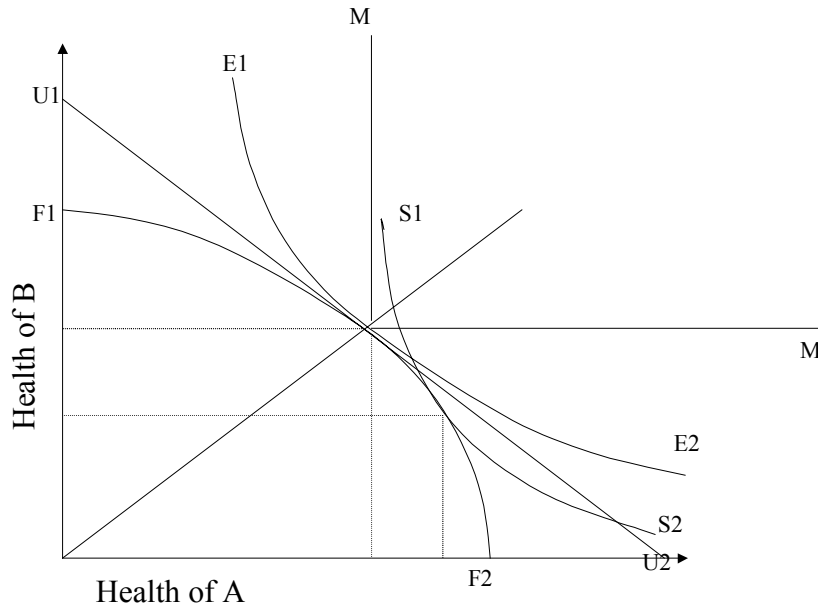
§ Odds ratio; ‡ the symptoms are specific to each group of disorder and care. † standard error of the estimate; *** significant at 0.001, ** at 0.01, * at 0.05; ‡ excluding comorbidity on the second axis; ¶ each coefficient is controlled for all other covariates

Appendix 6. Additional table : Correlates of less favourable outcome of psychiatric hospitalisation : odds ratios and beta coefficients.

Covariates :	Gaf improvement			Symptoms improvement			Readmission			Mortality	
	Beta §		s.e.	Beta		s.e.	OR §		s.e.	OR§	s.e.
Axis 1 group of disorder:											
Substance disorder	0.297	**	0.12	0.09	***	0.02	1.39	***	0.03	0.92	0.15
Affective disorder	2.169	***	0.12	-0.16	***	0.02	1.36	***	0.03	1.00	0.14
Schizophrenia	-2.5	***	0.14	0.14	***	0.02	1.46	***	0.03	2.86	*** 0.14
Dementia	-13.0	***	0.25	0.40	***	0.03	0.80	***	0.06	5.20	*** 0.14
Other (ref)	0	.	.	0	.	.	1	.	.	1	.
Nber psy. comorbidities‡	0.893	***	0.06	0.04	***	0.01	1.06	***	0.02	0.80	*** 0.07
Axis 2 disorders:											
Personality disorder	-1.1	***	0.08	0.07	***	0.01	2.22	***	0.02	1.09	0.08
Mental retardation	-2.14	***	0.19	-0.01		0.02	1.91	***	0.04	1.36	0.17
No axis -2 diagnosis (ref)	0	.	.	0	.	.	1	.	.	1	.
Nber somatic comorb.	-1.33	***	0.06	0.04	***	0.01	0.91	***	0.01	1.51	*** 0.04
Nber problems 4th axis	-0.68	***	0.03	0.09	***	0	1.07	***	0.01	0.96	0.03
GAF score (5th axis):											
<20	34.49	***	0.41	-0.40	***	0.05	0.28	***	0.14	27.5	*** 0.2
20-39	22.62	***	0.39	-0.26	***	0.05	0.34	***	0.14	14.6	*** 0.19
40-59	13.28	***	0.39	-0.33	***	0.05	0.38	***	0.14	8.8	*** 0.2
60-79	5.052	***	0.4	-0.19	***	0.05	0.46	***	0.14	6.7	*** 0.2
80+ (ref)	0	.	.	0	.	.	1	.	.	1	.
Nber psycho. symptoms	-0.28	***	0.02	-0.60	***	0	0.99	**	0	1.01	0.01
Previous psy. history	-1.36	***	0.08	0.11	***	0.01	.	.	.	0.88	* 0.07
Age group :											
0-14	-1.03	**	0.34	0.61	***	0.04	1.40	**	0.11	0.09	*** 0.59
15-34	0.109		0.15	0.27	***	0.02	1.05		0.03	0.10	*** 0.14
35-64	1.404	***	0.14	0.08	***	0.02	1.53	***	0.03	0.24	*** 0.09
65+ (ref)	0	.	.	0	.	.	1	.	.	1	.
Sex :											
Men	-1.51	***	0.08	0.13	***	0.01	0.96	*	0.02	1.72	*** 0.07
Women (ref)	0	.	.	0	.	.	1	.	.	1	.
Socio-economic status:											
1 st Quintile	-3.57	***	0.12	0.22	***	0.02	1.04		0.03	1.79	*** 0.15
2 nd Quintile	-2.81	***	0.12	0.17	***	0.02	1.35	***	0.03	1.32	0.15
3 rd Quintile	-1.94	***	0.13	0.14	***	0.02	1.21	***	0.03	0.96	0.18
4 th Quintile	-1.14	***	0.12	0.10	***	0.02	1.16	***	0.03	1.19	0.16
5 th Quintile (ref)	0	.	.	0	.	.	1	.	.	1	.
-2Log Likelihood											

§ Odds ratio, B beta coefficient ; † standard error of the estimate; *** significant at 0.001, ** at 0.01, * at 0.05; ‡ excluding comorbidity on the second axis; § Baseline score. ¶ each coefficient is controlled for all other covariates

Appendix 7 : Theories of social justice



This graph presents the combination of the health states of individuals (or groups of) A and B. The F1-F2 function is the possibility frontier determining the maximum improvement of Health A and Health B that can be achieved given medical (or health promotion) technology and budget constraint. The choice between the Health A and Health B values is also influenced by the preferences that society would have regarding the distribution of its health care budget between A and B. Different social justice theories yield different social maximand. Those maximand express the preferences of the society (according to each theory of justice) regarding the Health of A and B. The intersection point between the maximand and the health production frontier yields the optimal distributive point of Health A and Health B.

In the utilitarian theory, a fair allocation of resources is achieved when total utility is maximised. There is no preference between individuals, so that the social welfare function is linear (U1-U2 curve in the figure). Because of its indifference to distributive issues, this theory is sometimes considered as focusing on efficiency. Provided that health has a marginal decreasing utility, then such a theory will also promote a redistribution towards individuals with poorer health status. But, apart from utility, such a perspective does not allow for any inequality aversion, nor does it allow for the concept of needs.

Drawing on a strong **egalitarian tradition**, some theories assume that there is a diminishing marginal welfare function from increasing the health of an individual, so that the social welfare function is curved, the stronger the inequality aversion (E1-E2 curve). It is sometimes stated that infinite inequality aversion corresponds to the Rawlsian maximin principle in which social welfare function is kinked (M curve),

allowing for no equity/efficiency trade-off-off. Theories of needs suggest that health care should be distributed in relation to needs and not by market forces. Such a point of view is very strongly settled in public health, epidemiological research, and medical ethics (104). One of the difficulties of such a standpoint is the question of how needs should be defined. Following the work of Culyer (71), needs can be defined as ill-health status, as the capacity to benefit from health care, or as the expenditures required to equalize health. The first definition of needs leads to attributing more weight to ill individuals and to choosing a social welfare function with a very strong curvature. If needs are defined according to capacity to benefit, then this, for the most part, yields a utilitarian perspective on health, where the objective is to maximise the result.

In the **desert theory**, social justice recognises that social welfare functions should not give the same weight to all individuals. The contour line is no longer symmetric around the diagonal line (curve S1-S2). This is the case when some individuals or some groups are seen as being more deserving. This could apply, for example, when the allocation of health care is intended to compensate individuals for any health disadvantage they suffer through no fault of their own, but not for disadvantages they suffer as a result of their own free choices (194).

The theory of minimum standards suggests that a fair distribution should first grant each individual a minimum level of health or health care. This is in fact how Rawls has considered health in his theory of justice. Although Rawls' maximin principle has been said to express an extreme aversion to health inequalities (hence fostering an egalitarian stance), Rawls explicitly rejected the idea that health should be considered within the difference principle, because health is not seen as a primary good and is a not just a means but also an end in itself. Rawls' theory of justice suggests that all individuals should be brought up to the minimum level of health required for them to be normally functioning members of society. The minimum standard approach is also rooted in the libertarian stance of protecting natural rights by ensuring that minimum standards of health are achieved.

Equality of access to health care is another popular stance in the equity debate, with Gavin Mooney as the main proponent of the idea that an equitable health care system should equalize access between individuals (231). There are four main definitions of access (71), access as utilization, access as the monetary and non-monetary cost of using care, access as the maximum quantity that an individual could afford to buy, and access as lost opportunity. The first difficulty of access (particularly for the first and second definitions) is that it disregards income differences, seeing individuals facing the same costs as having the same access, although their incomes could be very different. The second drawbacks of access are that it only worries about supply-side conditions, that it gives no guarantee that individuals with equal needs and equal access will use the same quantity of care, because patient behaviour preferences and physician incentives could lead to a very different quantity and quality of effective care.