Costs of Schizophrenia in The Netherlands

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Abstract

This study tries to identify and estimate the health care costs of schizophrenia in The Netherlands and to determine in a broader sense the total costs of schizophrenia for society in terms of productivity loss caused by absence from work and early retirement. The study can be described as a "cost-of-illness" study based on prevalence data. It shows that in The Netherlands about 2 percent of the total health care budget is spent on the treatment of schizophrenia patients. This figure is rather high, since the prevalence rate of schizophrenia in The Netherlands is only 0.6 percent. The indirect costs—production lost because of absence from work, disability, and early death—were very low, but these costs are underestimated because schizophrenia patients are unlikely to become active participants in the labor force. It is also difficult to identify people who have died of schizophrenia in national data because schizophrenia in itself is not lethal, but individuals with schizophrenia may die because of suicide or violent death.

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It is well known that the burden of mental illness is great, not only for the individual patient and the patient's family, but also for society as a whole. According to Andreasen (1991), schizophrenia is probably the most costly illness that psychiatrists treat. It begins early in life, produces maximal morbidity, and has no comprehensive efficacious treatment. The personal cost to the families of schizophrenia patients is great, as in many cases the course of illness is nothing less than tragic.

The purpose of this study is to assess the burden that schizophrenia puts on Dutch society. The study can be characterized as a "cost-of-illness" study. In a cost-of-illness study, costs are not restricted to the health care sector itself. There are also psychological costs to patients and their relatives and consequences for society because of absence from work, disability, and premature death. In cost-of-illness studies, a distinction is made between direct and indirect costs.

Direct costs are the actual expenditures related to an illness or disorder, including money spent on hospital and nursing-home care, the services of physicians and other medical professionals, drugs and appliances, and rehabilitation (Luce and Elixhauser 1990). Direct costs may include a certain allowance for the capital cost of buildings and the costs of the service infrastructure.

Indirect costs are broadly defined as the value of lost output due to reduced productivity caused by illness, disability, or injury. This includes the value of lost workdays and housekeeping days, diminished productivity due to illness or disability, and losses incidental to premature death. In a cost-of-illness study, indirect costs are usually confined to the earnings that are foregone on account of illness and are derived from the time spent out of the work force or from the degree to which per-

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sons must accept lower paid work because of illness.

A cost-of-illness study can be based on either incidence or prevalence rates. Prevalence is the presence of disease during some chosen period, such as a year (Kleinbaum et al. 1982). The underlying rationale of the prevalence-based method is that costs should be assigned to the year in which they are borne (1989 in this study) or with which they are directly associated. In this approach, direct costs and productivity losses resulting from a disease are assigned to the year in which they occur. Expected future earnings lost as a result of premature mortality are assigned to the year of death (Hartunian et al. 1980).

Incidence is the development of disease during a certain period (Kleinbaum et al. 1982). The incidence approach is based on the principle that the flow of costs associated with a disease should be assigned to the year in which that flow begins. All costs, both direct costs and productivity losses owing to morbidity and mortality, are discounted to present value and assigned to the year in which the disease first appears.

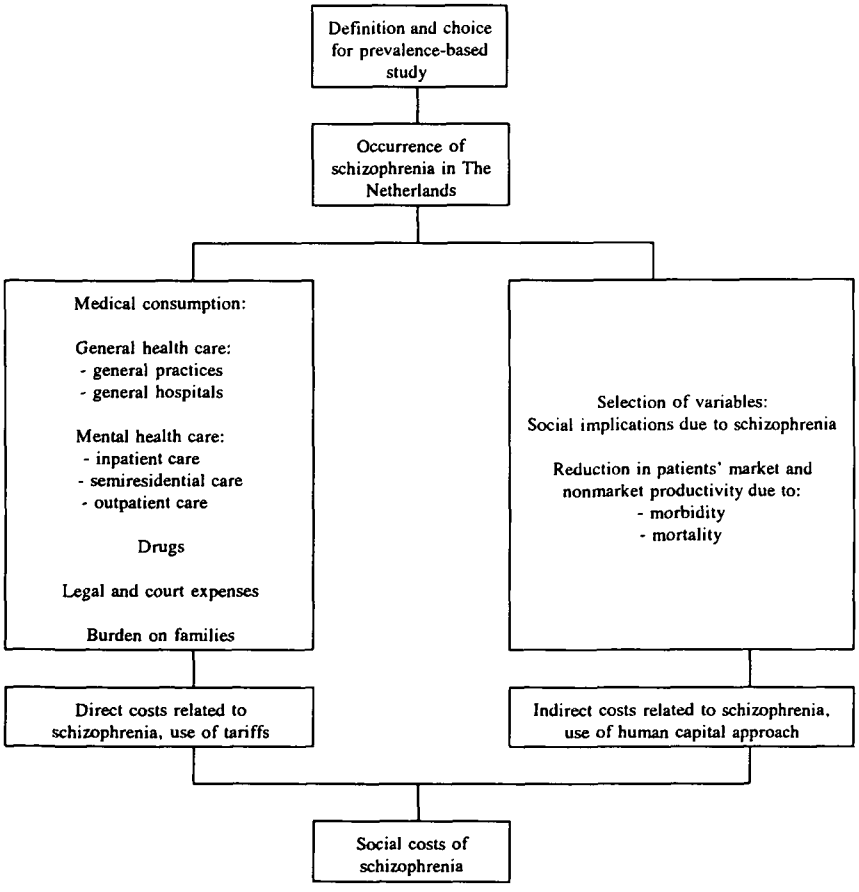
It is a matter of strategy whether one chooses to use the incidence or the prevalence method. If one wants information about the burden of a disease for society as a whole—for example, to make a comparison with the societal burden of another disease—a prevalence-based cost-of-illness study can be of great help. The prevalence method gives an impression of the magnitude of the problem, and such a study can be useful for priority setting on a macro level.

However, in a prevalence study there is no link to the benefit from a possible intervention to reduce the burden of a disease. If one has to decide between alternative methods of intervention, information from incidence-based cost-of-illness studies is more helpful, because an intervention will affect all future treatment costs and productivity losses. The incidence figures can be used for estimating the benefits of the intervention. But the incidence approach can be used only if followup data are available. In The Netherlands, few data bases, or so-called health case registers, on schizophrenia patients are available to be used for such an incidence-based study. None could be used in this research, so this study is based on prevalence data. All data are gathered for a specific base year, 1989.

Method

By using data bases and relevant studies, we estimated the social consequences of schizophrenia in 1989. The epidemiologic figures had to be translated into direct and indirect costs (see figure 1). The costs of medical consumption

Figure 1. Method



(e.g., consultations and treatment days) are based on figures provided by the *Financieel Overzicht Zorg* (FOZ), a government publication that is presented to the Dutch Lower Chamber together with the budget (Tweede Kamer 1991–92). It gives an integrated overview of the financial developments in The Netherlands during recent years. The costs of drugs are calculated by means of Information Medical Statistics (IMS; 1989) on-line sales data at public price levels.

To quantify the indirect costs, the human capital approach is used. The human capital approach tries to estimate the value of lost production resulting from temporary absence from work, disability, or premature death. Production losses are valued using the average earnings. In this study, only the indirect costs of lost production are valued in monetary terms.

Occurrence of Schizophrenia

In developing a procedure for assessing the costs of schizophrenia, one of the first problems encountered is that of defining the disease. Wherever possible, schizophrenia in this study is defined by the criteria of *DSM–III–R* (American Psychiatric Association 1987) or the International Classification of Diseases (ICD–9; World Health Organization 1978). The *DSM–III–R* definition of schizophrenia is narrower.

Owing to the protracted course of schizophrenia, the ratio between incidence and prevalence is quite large (Scenariocommissie Geestelijke Volksgezondheid 1990). Little is known about the incidence and prevalence in The Netherlands. In a study of the epidemiology of psychoses, Giel et al. (1980) found an annual incidence rate of 0.112 new cases of functional psychosis (295, 297, and 298 ICD–9) per 1,000 of the total population (age 15–44 years). Giel's measure was the number of new patients contacting mental health services in Groningen and Drenthe. Because the Dutch are very cautious in making a diagnosis of schizophrenia, only a small portion of these cases (0.029 per 1,000) were diagnosed as having schizophrenia. But Giel et al. state that their annual incidence is very low compared with that in other studies. The Dutch Society for Schizophrenia estimates the annual incidence at 0.23 per 1,000 (Scenariocommissie Geestelijke Volksgezondheid 1990). Hodiamont (1986) describes the Health Area Project Nijmegen, which involves a population survey in Nijmegen and its environments. In the project, a survey of functional psychiatric disorders was carried out on a representative sample from the regional population in two phases. At the outset, 3,232 respondents completed the 30-item General Health Questionnaire (GHQ; Tarnopolsky et al. 1979). To get an idea of the actual psychiatric prevalence, during the 2 weeks after phase 1, Present State Examination (Wing et al. 1974) interviews were sought not only with the 252 respondents who had been selected on the basis of having GHQ scores of 10 or more (indicating a higher risk), but also with 234 randomly selected persons. The prevalence of schizophrenia in this group was 6 per 1,000. Using this figure and other data, the Scenariocommissie Geestelijke Volksgezondheid (1990) estimated that the prevalence of schizophrenia in The Netherlands varies from 6 to 6.7 per 1,000 (age 18–65 years).

Direct Consequences of Schizophrenia

Medical Consumption. The Dutch mental health care system can be divided into general health care and more specific mental health care. People with schizophrenia use both health care subsystems. People with mental problems usually apply for help first to a general practitioner, who sometimes recognizes the psychological origin of the problem. According to Goldberg and Huxley (1980), of their group of 250 persons who experienced distressing psychological symptoms, 230 consulted a primary care physician. In 140 of these 230 cases, the primary care physician detected the disorder, and 17 of these persons were again referred to psychiatrists. The general practitioner is often seen as a gatekeeper for the more specialized mental health care.

General Practices. Table 1 lists several sources that register the morbidity of schizophrenia as found in the general practices. Unlike the normal meaning of period prevalence—the total number of persons known to have had the disease or attribute at any time during a specific period (Kleinbaum et al. 1982)—prevalence in table 1 means the number of consultations in a general practice due to schizophrenia during 1 year.

The Continuous Morbidity Registration (CMR) of the Nijmegen University Department of General Practice involves a daily registration of morbidity in four general practices affiliated with the department (van den Hoogen 1985). The population in this study is the patient population of four general practices—about 12,000 individuals. The data, based on figures col-

Table 1. Prevalence of schizophrenia in general practices

Study	Period	Annual prevalence per 1,000 (M/F)
van den Hoogen (1985)	1978–82	3.0
Information Medical Statistics (1989)	1989	0.6
van de Lisdonk (1990)	1971–88	0.6–1.3
Lamberts (1991)	1985–89	0.9
van der Velden et al. (1991)	1987–88	1.0

Note.—M = male; F = female.

lected over the period 1978–82, is reduced to figures for a standard practice—that is, a fictional general practice with a population of 2,800 persons whose age and sex distribution is identical to that of the total Dutch population as indicated by the Centraal Bureau voor de Statistiek in 1980. The CMR has used the so-called E-list, which derives from the ICD-7 (World Health Organization 1978). The incidence rate based on the CMR is 0.2 per 1,000, while the prevalence rate is 1.1 per 1,000. Reduced to a standard practice (the age composition of an average practice), these rates would be 0.4 per 1,000 (incidence) and 3.0 per 1,000 (prevalence).

Van de Lisdonk (1990) reported the morbidity in the general practices taking part in the CMR for a longer period, 1971–88. In this longer overview it became clear that the number of individuals with schizophrenia who are diagnosed for the first time is relatively small. In the 18 years studied in the CMR practices, 4 men and 15 women were diagnosed with schizophrenia. In addition to this, every practice has a number of known schizophrenia patients. The prevalence rate for men was about 0.6 per 1,000 and for women about 1.3 per 1,000.

According to Information Medical Statistics (1989) about 26,000 general practitioners' consultations each year are due to schizophrenia. On average, the general practitioner was consulted 4.1 times per year per patient for this diagnosis. This would mean that during 1989 about 6,300 patients (0.6 per 1,000) consulted a general practitioner because of schizophrenia.

In the period 1985–88, 38 general practitioners in 22 practices at 14 locations recorded their patients during 1 year. In this "Transition Project," 118,036 contacts and 179,644 reasons for contact were registered (Lamberts 1991). Along with the numbers of contacts, the episodes of care were also registered. An episode of care is an illness or a health problem that lasts from the first contact with the general practitioner until the last contact at the end of the medical intervention. More than one contact between general practitioner and patient may occur within one episode of care. In the Transition Project, data are gathered by using the International Classification of Primary Care. In this project, the annual incidence of a conclusive diagnosis of schizophrenia was found to be 0.1 per 1,000 patients; the annual prevalence with a conclusive diagnosis of schizophrenia was 0.9 per 1,000.

In a national study (van der Velden 1991) focusing on the prevalence of diseases, complaints and problems in the practice of the general practitioner, and the actions undertaken by the general practitioner, the morbidity of schizophrenia was also examined. The morbidity is recorded in the practice, by the general practitioner and his or her assistant, by means of contact registration over a period of 3 months. The study was carried out with a randomly selected nonproportional stratified sample of 161 Dutch practicing general practitioners from 103 general practices with a total population of 335,000 patients, or about 2.5 percent of the total general practitioners' clientele in The Netherlands. In the period from April 1, 1987, to March 31, 1988, divided into four periods of 3 months, a total of 8,650 cases of schizophrenia were registered by the general practitioners, of which 1,487 were new cases. Incidence and prevalence rates are calculated for the four periods. From these figures, it is estimated that the annual prevalence for schizophrenia is 1 per 1,000 persons visiting a general practitioner (age 0–75+ years): Spring prevalence – spring incidence + spring incidence + summer incidence + autumn incidence + winter incidence = 0.6 – 0.1 + 0.1 + 0.1 + 0.2 + 0.1 = 1 per 1,000.

In all these studies one would expect that the incidence and prevalence rates would underestimate the true rate, because general practitioners are very reluctant and sometimes unable to diagnose a patient as having schizophrenia: Most leave diagnosis to specialists in mental health.

One can also see that the prevalence rate found in the various studies varies between 0.6 (Information Medical Statistics 1989) and 3.0 per 1,000. It is hard to give an explanation for this phenomenon because the studies vary in methodology and population. In the remainder of this research, the figures from the national study (van der Velden 1991) are taken as a basic assumption. The prevalence rate in this study was 1 per 1,000 persons visiting a general practitioner (age 0–75+ years).

Little is known about the total cost of the services given by general practitioners, mainly because of the different ways general practitioners are paid for their services, either by patients or by medical insurers. For National Health Service patients the general practitioners receive a fixed amount annually, which is independent of their diagnosis and frequency of contact. Privately insured patients are sometimes fully insured, but many have to pay part of the cost of their medical consumption under various arrangements. The total cost of general practitioners' services in 1989 was 1,814 million guilders (1.8 Dutch guilders = 1 US dollar) (Tweede Kamer 1991–92). It was estimated that about 1 in every 1,000 visits to a general practitioner is due to schizophrenia (van der Velden 1991). Then the total costs due to these general practitioner consultations in 1989 would be about 1.8 million guilders.

General Hospitals. Persons with schizophrenia are admitted to general hospitals for various reasons. The Landelijke Medische Registratie (1990*a*, 1990*b*) registers patients who are admitted to general hospitals, academic hospitals (i.e., teaching hospitals), or specialized hospitals (e.g., children's hospitals) by ICD–9 classification. Of the 1.5 million people admitted to general hospitals in 1989, the Landelijke Medische Registratie registered 99 percent (Bouter and van Dongen 1991). The present study focuses on people who were admitted to general hospitals because of schizophrenia. In 1989, 1,004 patients with schizophrenia (diagnosis at discharge) were discharged from general hospitals, after a mean stay of 45.8 days. Some general hospitals have a special department for treating people with psychiatric diseases. In 1989, 694 patients with schizophrenia were discharged from psychiatric departments. The total number of days of hospitalization for schizophrenia patients in the psychiatric departments was 27,961, for an average stay of 40.3 days.

The National Hospital Institute (Nationaal Ziekenhuisinstituut 1991) has counted the number of patient-days for general, academic, and specialized hospitals and came up with 17,828,000. If one divides this into the overall costs (12,255 million guilders), then the cost per patient-day is 687.40 guilders. These costs are generated by three kinds of hospital: general, academic, and specialized. It should be noted that the cost of a patient-day varies with the kind of hospital: Patient-days in general and special hospitals are much cheaper (about 600 guilders) than those in academic hospitals (about 1,000 guilders). These are average costs per patient-day. The costs per disease category vary with the staff employed and other factors. We have assumed that admissions due to schizophrenia are equally distributed among the types of hospitals in the same pattern as all admissions, so we use the average overall cost per patient-day in our calculations, except for specific calculations for the psychiatric departments of general hospitals.

Approximately 60 percent of the patient-days in the hospital due to schizophrenia are spent in psychiatric departments of general hospitals. Overall, the costs at these departments are relatively low, partly because of the absence of surgery, as compared with the costs of other departments in the same hospitals. Jacobs and Bijl (1991) state that it is very hard, if not impossible, to estimate the percentage of the total costs of general hospitals that can be assigned to their psychiatric departments. Since January 1, 1989, the costs of these departments have been covered by the General Law on Special Health Care Costs (Algemene Wet Bijzondere Zicktekosten [AWBZ]). The psychiatric departments accounted for 301 million of the 13,488 million guilders total spent under the terms of this law. The total number of patient-days was 710,000. The cost per day was thus 423.94 guilders. If we assume that the coverage rate under the AWBZ system of the total costs of the psychiatric departments of general hospitals is similar to the coverage for general psychiatric hospitals (i.e., 0.964), then a correction must be made, resulting in a cost per day of 439.77 guilders.

Table 2 gives the following key figures for the hospital consumption in 1989 due to schizophrenia: 46,024 days were spent in a hospital by schizophrenia patients, of which 27,961 days were spent in psychiatric departments of general hospitals and 18,063 in other departments. Based on these two rates, the total costs due to schizo-

Table 2. Schizophrenia patients (ICD–9 295) discharged from general hospitals in 1989

ICD–9 classification	No. of schizophrenia patients	No. of patient-days in hospitals	Cost per day (guilders)	Total cost (million guilders)
Psychiatric department	694	27,961	439.77	12.3
Other departments	310	18,063	687.40	12.4
Total	1,004	46,024	—	24.7

Note.—ICD–9 = International Classification of Diseases (World Health Organization 1978).

Source.—Landelijke Medische Registratie (1990*a*). The conversion rate for Dutch guilders is 1.8 guilders = 1 US dollar in 1994.

phrenia in general hospitals were about 25 million guilders.

Mental Health Care. In the course of the 20th century, The Netherlands has developed a complex and differentiated system of mental health care for psychiatric patients that can be divided into three parts: (1) inpatient care (e.g., in general hospitals and psychiatric hospitals); (2) semiresidential or part-time care (e.g., day treatment, day care, and sheltered residences); and (3) outpatient care (intermittent or periodic treatment; e.g., the Regional Institutes for Outpatient Mental Health Care and psychologists' and psychiatrists' practices). On January 1, 1990, The Netherlands had about 49,800 patients in inpatient mental health services, or about 3.3 per 1,000 of the total population (Jacobs and Bijl 1991). In semiresidential mental health care institutions, there were about 12,800 persons (0.86 per 1,000). In outpatient settings, there were about 203,500 under the care of the Regional Institutes for Outpatient Mental Health Care and another 29,600 under the care of the Outpatient Centres for Addicts. During 1989, 41,500 patients were referred to the outpatient centers of psychiatric hospitals and 35,100 to outpatient psychiatric centers in general hospitals.

Inpatient mental health care. Less information is available about the use of mental health care facilities by people with schizophrenia in The Netherlands (Scenariocommissie Geestelijke Volksgezondheid 1990). It is only from the psychiatric hospitals—such as general psychiatric hospitals, forensic psychiatric institutions, residential institutions for addicts, and academic psychiatric hospitals—that data are gathered on a national level by the Patiëntenregister Intramurale Geestelijke Gezondheidszorg (PIGG), using the ICD–9 classification. The PIGG registered prevalences on December 31, 1989. It is possible that the use of these prevalence rates leads to selection bias. For instance, one might assume that schizophrenia patients with milder disorders might be discharged before the Christmas holidays and the turn of the year so that by the end of the year the more severely disordered schizophrenia patients are overrepresented.

On December 31, 1989, 6,643 schizophrenia patients (table 3) were staying in psychiatric hospitals. Of this group, 6,563 (30.4% of the population present) were staying in general psychiatric hospitals, 38 (10.0%) in forensic psychiatric hospitals, and 42 (16.3%) in academic psychiatric hospitals. According to the FOZ (Tweede Kamer 1991–92), the total cost of psychiatric hospitals in 1989 was 2,255 million guilders, of which the general psychiatric hospitals accounted for 2,020 million. If 30.4 percent of the patients in these hospitals have schizophrenia, their share of the cost is 614.1 million guilders.

In 1989, 93 million guilders was spent in forensic psychiatric hospitals (Tweede Kamer 1991–92). On

Table 3. Schizophrenia patients (ICD–9 295) resident in psychiatric hospitals in 1989

Type of hospital	No. of schizophrenia patients	Hospital population with schizophrenia (%)
General psychiatric hospital	6,563	30.4
Forensic psychiatric hospital	38	10.0
Residential institution for addicts	0	0.0
Academic psychiatric hospital	42	16.3
Total	6,643	—

Note.—ICD–9 = International Classification of Diseases (World Health Organization 1978).

Source.—Nationale Ziekenhuisraad (1990*a*, 1990*b*, 1990*c*, 1990*d*).

December 31, 1989, 10 percent of those present in these institutions were schizophrenia patients, so the costs that can be attributed to schizophrenia would be about 9.3 million guilders. The FOZ figures do not allow us to trace the costs in academic psychiatric hospitals.

Semiresidential and outpatient mental health care. In The Netherlands the semiresidential and outpatient institutions do not keep a central register of the diseases their care groups exhibit. We made further inquiries for this information from several umbrella organizations, but this approach did not seem promising. Therefore, we made a rough estimate of the medical consumption in this sector due to schizophrenia.

The sheltered residences are one important group of institutions in the mental health care sector. In our study, two Regional Institutes for Sheltered Residences (in Drenthe and Zeeland) were asked to give us the schizophrenia prevalence rates in a certain year. In 1989, in the Regional Institute for Sheltered Residences in the region of Drenthe, 54 percent (60 of 112) of patients resident on December 31, 1991, were classified as having schizophrenia using the *DSM–III–R* or the ICD–9. In the sheltered residences in Zeeland, 21 percent (19 out of 92) of those present had schizophrenia.

Tholen et al. (1988) compared three random samples: (1) residents of the nursing department of a general psychiatric hospital, (2) residents of a more independent housing unit of a general psychiatric hospital, and (3) residents of sheltered residences in the same health region. According to *DSM–III* (American Psychiatric Association 1980) diagnoses, 58 percent of the combined sample had schizophrenic disorders, including one atypical paranoid disorder and one atypical psychosis. This 58 percent includes the 13 percent of the sample who had the residual type of schizophrenia or were in remission. In the departments of general psychiatric hospitals that were studied, the number of persons with schizophrenia was much higher (68% in two and 66% in one) than in sheltered residences (39%).

On December 31, 1989, there were 3,250 people in sheltered homes throughout The Netherlands. Assuming that the overall percentage of people with schizophrenia in sheltered homes is equal to the mean of the figures for Drenthe (54%), for Zeeland (21%), and from the research by Tholen (39%), 1,235 of these people (38%) were in care because of schizophrenia. The total cost for sheltered homes in 1989 was 125 million guilders (Tweede Kamer 1991–92), so about 47.5 million guilders can be attributed to schizophrenia.

General and academic psychiatric hospitals record the number of schizophrenia patients admitted to part-time care. In 1989, of the day care in general psychiatric hospitals and academic psychiatric hospitals, 11.1 percent can be attributed to schizophrenia patients. According to the National Ziekenhuisinstituut (1991) the total expenditure on day care in 1989 was 83 million guilders, of which 9.2 million can be attributed to schizophrenia.

The scenario study for mental health care (Scenariocommissie Geestelijke Volksgezondheid 1990) estimated the number of persons with schizophrenia in inpatient and outpatient institutions. This tentative estimate is based on several empirical studies and gives the following figures: Of every 100 chronic psychiatric patients, there are 6 in inpatient care, 30 in outpatient care, 26 unknown but no longer in care, 13 drifting, and 25 never diagnosed and receiving no assistance. In their research on chronic patients in mental health care, Wiersma et al. (1988) found that for every long-stay patient in a general psychiatric hospital there are five chronic patients in outpatient mental health care.

In 1989, 6,643 clients with schizophrenia were present in inpatient psychiatric hospitals (table 3). A tentative conclusion from the breakdown above would be that 33,215 schizophrenia patients[1] were receiving treatment from outpatient mental health care institutions. This would be 9.4 percent of all outpatients in mental health care (Jacobs and Bijl 1991).

Outpatient settings in The Netherlands consist for the most part of Regional Institutes for Outpatient Mental Health Care and the Outpatient Centres for Addicts. In 1989, the total costs for this type of care were 670 million guilders (Tweede Kamer 1991–92). If 9.4 percent of the patients in the outpatient sector had schizophrenia, then the cost that can be attributed to schizophrenia in outpatient care is about 62.9 million guilders.

Use of Drugs. The most important treatment for schizophrenia is the administration of medicine. Extensive information about drug administration is registered by IMS. IMS gathers information about patients (except inpatients) seen by general practitioners and nine cate-

[1] $30/6 \times 6{,}643 = 33{,}215$

gories of specialists. The sample covers 325 general practitioners and specialists and is fully rotated during the year. It includes 141 nondispensing general practitioners, 23 dispensing general practitioners, and 26 psychiatrists. The doctors, who are recruited by letter and telephone, are asked to record data for 7 consecutive days on all patients seen or contacted in any way, including those who did not receive prescriptions. Diagnoses are coded according to ICD–9.

A number of drugs are given for the treatment of schizophrenia (see table 4). According to IMS, these drugs are prescribed either by psychiatrists (72.6% of the drugs prescribed for schizophrenia) or by general practitioners (27.4%). In 1989 (IMS, on-line data), 26,000 consultations with general practitioners and 72,600 consultations with psychiatrists were due to schizophrenia. This is 1.5 per 1,000 of total consultations for both kinds of doctors in that year. Table 4 gives an overview of the costs of drug treatment for schizophrenia. From the IMS figures for on-line sales per sector at public price level, we estimate that the outpatient drug costs for schizophrenia were about 8.6 million guilders.

Burden on the Family. The term "family burden" refers to the emotional and economic strain that family members, neighbors, and friends of a mentally ill person experience. According to Schene (1988), this burden can have various effects on others. First, it can influence the roles they play in relation to the patient. The patterns and roles within a family can change because of the patient's problems. Second, it can reduce their leisure activities and social contacts. Finally, it can threaten their own mental and physical health, sometimes forcing them to cut down on their normal daily duties. Clearly this reduction in activity can have financial consequences both for those close to a person with schizophrenia and for society as a whole.

Indirect Consequences

Absenteeism. Along with the direct consequences due to medical consumption, use of drugs, and legal and court expenses, schizophrenia also leads to absence from work because of illness. Most of the data on absenteeism are registered by occupational associations, covering persons who are voluntarily or compulsorily insured under the Sickness Insurance Act and whose employers are members of an occupational association. The classifications used by these associations are based on ICD–9.

Approximately 70 percent of the work force is insured under the Sickness Insurance Act, and 80 percent of these are also insured with an occupational association. It follows that the statistics on absences from work refer to 56 percent of the working population.

Table 5 gives an overview of the periods of absence due to mental disorders and schizophrenia that ended in 1989. In 1989, there were 134 cases of absence due to schizophrenia, with a total duration of 29,317 days. This average duration (219 days) is much higher than the average duration for all absences (24 days).

To estimate the total work time lost due to schizophrenia, we assume that the distribution presented above, based on 56 percent of the working population, is valid for the whole Dutch work force. Therefore, we have to multiply all figures by 100/56. This would mean that in 1989 there were about 240 cases of absence from work due to schizophrenia, with a total duration of 52,352 days. However, this is an estimate, and the true rate may be somewhat different because it is known that the rate of absence due to sickness of certain groups deviates from the norm. Only 24 percent of self-employed persons, for example, have any period of absence from work within 1 year, whereas the rate for employees is 56 percent (Centraal Bureau voor de Statistiek 1986).

Work Disability. By fulfilling certain conditions, a worker can get a benefit due to "work dis-

Table 4. Costs of drug treatment for schizophrenia

Main drug category	Outpatient consumption of drugs, %	1989 Sales at public price level (million guilders)
Antiparkinsonians	10.7	3.42
Neuroleptics	13.9	3.94
Hypnotics/sedatives	1.1	0.61
Tranquilizers	0.5	0.22
Antidepressants	0.9	0.45
Total	—	8.64

Source.—Information Medical Statistics, on-line information.

Table 5. Cases of absence due to schizophrenia and mental disorders in 1989

Diagnosis	Cases of absence (*n*)	Average sickness duration (days)	Total duration (patient-days)
Not seen by an insurance physician	2,995,431	10	29,134,267
Mental disorders (including schizophrenia)	175,070	96	16,744,077
Schizophrenia	134	219	29,317
All cases	4,146,694[1]	24	99,545,039[1]

Note.—Benefits of employees insured under the Sickness Insurance Act with the occupational associations.

Source.—Centraal Bureau voor de Statistiek (1991).

[1]Total does not add because not all groups are present.

ability" after the 1-year period of absence described above. The National Insurance Council (personal communication, J.W. Nool; Social Insurance Council 1992) divides those unable to work into several groups:

1. Wet op de Arbeidsongeschiktheidsvorzekering (WAO; Employee Disablement Insurance Act)—persons who are working and thus have a work history.
2. Algemeen Burgelijk Pensioenfonds (ABP; other insurance groups for special servants), etc.—civil servants, railway employees, soldiers, and self-employed persons who are working and have a work history.
3. Privately insured—self-employed persons and family members who work in the family business.
4. Early disability—persons without a work history who have become unfit for work before age 17 and those who became unfit for work before age 27 and were still studying.
5. Others—all persons who are not defined above.

All people receive a disability benefit under either the Disability Insurance Act (WAO) or the general Disablement Benefits Act (Algemeen Arbeidsongeschiktheidswer; AAW).

In 1989, 921,990 persons were receiving a benefit as being unfit for work (table 6), of whom 27 percent receive the benefit because of psychological disturbances. Of these only a few have schizophrenia (1,212 persons, or 1.3 per 1,000 persons receiving a disability benefit). Because schizophrenia makes people unable to carry on with their work, it leads to lost productivity for society. The human capital approach, as mentioned earlier, calculates the productivity loss by means of earnings. Average earnings, including nonwage labor costs, are generally used to measure this loss. Before calculating this loss, it is important to recall the underlying assumptions of this approach.

First, the production value of the marginal worker is assumed to be roughly the same as his or her earnings. Second, the production value of each new labor hour is assumed constant, although the law of diminishing returns proves this to be untrue. Third, full employment is assumed, even though

Table 6. Number of persons receiving a disability benefit because of psychological disturbances in 1989

Population group	Psychological disturbances (in absolute numbers)	Schizophrenia (1990)	Total number of persons receiving disability benefits
WAO	171,192	743	666,005
ABP, SPF, AMP	43,048	11	102,360
Privately insured	6,824	51	61,008
Early disability	25,381	335	84,278
Others	2,505	72	8,339
Total	248,950	1,212	921,990

Note.—WAO = Wet op de Arbeidsongeschiktheidsvorzekering (Employee Disablement Insurance Act); ABP = Algemeen Burgelijk Pensioenfonds (Pension Fund for Civil Servants); SPF = Spoorweg Pensioen Fonds (Pension Fund for Railway Employees); AMP = Alegmeen Militair Pensioenfonds (Pension Fund for Soldiers).

Sources.—Algemeen Arbeidsongeschiktheidsfonds/Arbeidsongeschiktheidfonds (1990), Sociale Verzekeringsraad (unpublished data on schizophrenia).

in reality there is a labor reserve and unemployment has a structural as well as a fictional character.

In 1989, the average gross annual income (including special payments and transfers) for people between 16 and 64 years old was about 48,400 guilders. To obtain the average earnings per day, this figure should be divided by 365, because the figures used are based on all days, including holidays and weekends. Thus, the average daily income is 132.60 guilders. The total absence from work due to schizophrenia in 1989 was earlier estimated as 52,352 days. Multiplying by the average earnings per day yields about 6.9 million guilders. In addition to absence from work, a number of persons (1,212 in 1990) are more or less permanently disabled because of schizophrenia. The production loss due to permanent disability can be calculated in the same way. Multiplying the number of disabled persons with schizophrenia by the average gross yearly income gives a cost of nearly 58.7 million guilders. The total production loss due to schizophrenia is therefore 65.6 million guilders.

Mortality. According to the databases normally used to study cause of death, almost nobody dies of schizophrenia. Of the nine persons who died of schizophrenia in The Netherlands in 1989, five had schizophrenia as a primary cause of death and four as a secondary cause. Of course, it is true that schizophrenia in itself is not life threatening, but several studies reveal that individuals with schizophrenia have a shorter life expectancy and have a high risk for mortality because of suicide and violent death. Allebeck (1989) reviewed several studies that show that the overall mortality among patients with schizophrenia is about twice that in the general population. The average of the standard mortality rates for schizophrenia found in the studies is 2:1 for men and 2:4 for women. The greatest excess mortality for persons with schizophrenia is due to suicide and violent death, but there seems also to be increased mortality due to cardiovascular disorders.

As suicide is the leading cause of death among individuals with schizophrenia, Caldwell and Gottesman (1990) reviewed recent studies reporting suicide rates and risk factors for this population. According to this study, 2 to 13 percent of mortality in schizophrenia patients is due to suicide. Within this group, young white males with psychological features of depression and a history of suicide attempts are twice as likely to commit suicide as patients in the schizophrenia population as a whole. Both Black and Winokur (1988) and Tsuang et al. (1979) described higher mortality rates in the younger age groups.

Conclusion

Individuals with schizophrenia in The Netherlands use various kinds of services in both general and mental health care. Table 7 gives an overview of the key figures on medical consumption that are used in the cost calculations. Legal and court costs, mortality, and burden on families could not be quantified, so no estimates were made.

The national data on absence from work, disability, early retirement, and mortality reveal little of the indirect consequences of schizophrenia. Few workers (defined as active members of the work force) actually suffer from schizophrenia because schizophrenia patients (or those who will be so labeled) are unlikely to find work, especially in societies with high unemployment. Therefore, estimates of productivity loss based on these figures underestimate the burden of schizophrenia for society. Furthermore, people with schizophrenia often lose their jobs in the prodromal phase, before they are actually diagnosed as having schizophrenia.

According to the national data on mortality, almost nobody dies of schizophrenia. Other studies reveal that the mortality of schizophrenia patients is twice that of the general population, because of suicide, violent death, and natural causes. Owing to the limited information available, the social implications of schizophrenia are underestimated.

If one looks at the 0.6 percent prevalence rate of schizophrenia in The Netherlands, the direct costs of schizophrenia, at 778 million guilders, appear rather high. This is about 2 percent of the Dutch health care budget and about 10 percent of the amount spent on all mental illness. Furthermore, one can compare these costs with the costs of other diseases. For instance, calculated by the same methods, the direct costs of coronary heart diseases, with a 1988 prevalence rate of 27 per 1,000 (Vrieze et al. 1994), and dyspepsia, with a 1988 prevalence rate of 150 per 1,000 (Warndorff et al. 1992), were 1,200 million guilders (Gorissen et al. 1993) and 506 million guilders (Warndorff et al. 1992), respectively, in 1988.

Of the total health care costs devoted to schizophrenia patients, the largest part is the inpatient

Table 7. Costs of schizophrenia in The Netherlands

	Effects due to schizophrenia (rate used)	Cost (million guilders)
General practitioners	0.1%	1.8
Hospitals (excluding psychiatry)	46,024[1]	24.7
General psychiatric hospitals	30.4%	614.1
Forensic psychiatric institutions	10.0%	9.3
Sheltered residences	37.8%	47.5
Psychiatric day care	11.1%	9.2
Outpatient care	9.4%	62.9
Total health care	—	769.5
Drugs (outpatient)	—	8.6
Total direct costs	—	778.1
Absenteeism	29,317 days	6.9
Disability	1,212 cases	58.7
Total indirect costs	—	65.6
Legal and court costs	More often admitted by means of a committal to custody or by judicial authorization than the total population. Comparatively speaking, there are more schizophrenia patients who have been detained by means of special legal sentences	
Mortality	Twice that in general population due to suicide, violent death, and natural causes	
Burden on families	Emotional and economic strain that family members, neighbors, and friends experience when a relative is mentally ill	
Total all monetary costs	—	843.7

Note.—Percentages indicate part of the population, some are expressed as figures and others as percentages.

[1]Hospital days.

cost of psychiatric hospitals. Only about 8 percent is related to outpatient care. Furthermore, it can be seen that the total drug costs in the treatment of schizophrenia are relatively low, especially since 9 percent of the total money spent on all diseases is spent on drugs.

References

Algemeen Arbeidsongeschiktheidsfonds/Arbeidsongeschiktheidfonds. *Jaarverslag 1989.* Zoetermeer, The Netherlands: Algemeen Arbeidsongeschiktheidsfonds/Arbeidsongeschiktheidfonds, 1990.

Allebeck, P. Schizophrenia: A life shortening disease. *Schizophrenia Bulletin,* 15(1):81–89, 1989.

American Psychiatric Association. *DSM-III: Diagnostic and Statistical Manual of Mental Disorders.* 3rd ed. Washington, DC: The Association, 1980.

American Psychiatric Association. *DSM-III-R: Diagnostic and Statistical Manual of Mental Disorders.* 3rd ed., revised. Washington, DC: The Association, 1987.

Andreasen, N.C. Assessment issues and the cost of schizophrenia. *Schizophrenia Bulletin,* 17(3):475–481, 1991.

Black, W.B., and Winokur, G. Age, mortality, and chronic schizophrenia. *Schizophrenia Research,* 1:267–272, 1988.

Bouter, L.M., and van Dongen M.C.J.M. *Epidemiologisch Onderzoek, Opzet en Interpretatie.* 2nd ed., revised. Houten/Antwerp, Belgium: Bohn Stafleu Van Loghum, 1991.

Caldwell, C.B., and Gottesman, I.I. Schizophrenics kill themselves too: A review of risk factors for suicide. *Schizophrenia Bulletin,* 16(4):571–589, 1990.

Centraal Bureau voor de Statistiek. Ziekteverzuim van de beroepsbevolking 1981–1984. *Maandbericht Gezondheidsstatistiek,* 4:5–22, 1986.

Centraal Bureau voor de Statistiek. Beëindigde verzuimgevallen en hun gemiddelde duur naar diagnosehoofdgroep, leeftijd en geslacht. *Statistisch Bulletin,* 47(3):3, 1991.

Giel, R.; Sauër, H.C.; Slooff, C.J.; and Wiersma, D. Over epidemiologie van functionele psychosen en invaliditeit. *Tijdschrift voor Psychiatrie,* 22(11–12):709–722, 1980.

Goldberg, D., and Huxley, P. *Mental Illness in the Community: The*

Pathway to Psychiatric Care. London, England: Tavistock Publications, 1980.

Gorissen, A.A.; Ament, A.J.H.A.; and Boas, G.M. *Kosten van Harten Vaatziekten naar Risicofactoren: Een Haalbaarheidsonderzoek.* Maastricht, The Netherlands: Rijksuniversiteit Limburg, Vakgroep Economie van de Gezondheidszorg, 1993.

Hartunian, N.S.; Smart, C.N.; and Thompson, M.S. *The Incidence and Economic Costs of Major Health Impairments: A Comparative Analysis of Cancer, Motor Vehicle Injuries, Coronary Heart Disease, and Stroke.* Toronto, Canada: Lexington Books, 1980.

Hodiamont, P.P.G. *Het Zoeken van Zieke Zielen.* Instituut voor Sociale Geneeskunde Publication No. 16. Nijmegen, The Netherlands: Katholieke Universiteit Nijmegen, 1986.

Information Medical Statistics Nederland. *Medisch Index.* Switzerland: Interstatistics Limited Zug, 1989.

Jacobs, C., and Bijl, R. *GGZ in Getallen, 1991, Kwantitatief Overzicht van de Geestelijke Gezondheidszorg: Instellingen, Zorgcircuits, Trends 1980-2000.* Utrecht, The Netherlands: Nederlands Centrum voor de Geestelijke Volksgezondheid, 1991.

Kleinbaum, D.G.; Kupper, L.L.; and Morgenstern, H. *Epidemiologic Research: Principles and Quantitative Methods.* New York, NY: Van Nostrand Reinhold, 1982.

Lamberts, H. *In het huis van de Huisarts: Verslag van het Transitieproject.* Lelystad, The Netherlands: Meditekst, 1991.

Landelijke Medische Registratie. *Bedrijfs- en Medische Informatie. Landelijke Gegevens, 1990.* Part 1. Utrecht, The Netherlands: Stichting Informatiecentrum voor de Gezondheidszorg, 1990*a*.

Landelijke Medische Registratie. *Bedrijfs- en Medische Informatie. Psychiatrische Afdelingen van Algemene Ziekenhuizen (PAAZ) Diagnoses.* Utrecht, The Netherlands: Stichting Informatiecentrum voor de Gezondheidszorg, 1990*b*.

Luce, B.R., and Elixhauser, A. Estimating costs in the economic evaluation of medical technologies. *International Journal of Technology Assessment in Health Care,* 6(1):57–75, 1990.

Nationaal Ziekenhuisinstituut. *De Intramurale Gezondheidszorg in Cijfers Per 1 januari 1990.* Utrecht, The Netherlands: Nationaal Ziekenhuisinstituut, 1991.

Nationale Ziekenhuisraad (NZR). Sectie Geestelijke Gezondheidszorg, and Stichting Informatiecentrum voor de Gezondheidszorg (SIG). *Patiëntenregister Intramurale Geestelijke Gezondheidszorg (PIGG), Algemene Psychiatrische Ziekenhuizen.* Utrecht, The Netherlands: Nationale Ziekenhuisrad/Stichting Informatiecentrum voor de Gezondheidszorg, 1990*a*.

Nationale Ziekenhuisraad (NZR). Sectie Geestelijke Gezondheidszorg, and Stichting Informatiecentrum voor de Gezondheidszorg (SIG). *Patiëntenregister Intramurale Geestelijke Gezondheidszorg (PIGG), Psychiatrische Universiteitsklinieken.* Utrecht, The Netherlands: Nationale Ziekenhuisrad/Stichting Informatiecentrum voor de Gezondheidszorg, 1990*b*.

Nationale Ziekenhuisraad (NZR), Sectie Geestelijke Gezondheidszorg, and Stichting Informatiecentrum voor de Gezondheidszorg (SIG). *Patiëntenregister Intramurale Geestelijke Gezondheidszorg (PIGG), justitiële TBS-inrichtingen.* Utrecht, The Netherlands: Nationale Ziekenhuisrad/Stichting Informatiecentrum voor de Gezondheidszorg, 1990*c*.

Nationale Ziekenhuisraad (NZR), Sectie Geestelijke Gezondheidszorg, and Stichting Infomatiecentrum voor de Gezondheidszorg (SIG). *Patiëntenregister Intramurale Geestelijke Gezondheidszorg, Klinieken voor Verslavingsziekten.* Utrecht, The Netherlands: Nationale Ziekenhuisrad/Stichting Informatiecentrum voor de Gezondheidszorg, 1990*d*.

Scenariocommissie Geestelijke Volksgezondheid. *Zorgen voor de Geestelijke Gezondheid in de Toekomst: Toekomstscenario's Geestelijke Volksgezondheid en Geestelijke Gezondheidszorg 1990–2010.* Utrecht, The Netherlands: Bohn, Scheltema & Holkema, 1990.

Schene, A.H. *Thuis bezorgd: Verslag van een Studiedag Over de Zorg voor Psychiatrische Patiënten in het Thuismilieu.* Utrecht, The Netherlands: Nederlands Centrum voor Geestelijke Volksgezondheid, 1988.

Tarnopolsky, A.; Hand, D.J.; McLean, E.K.; Roberts, H.; and Wiggins, R.D. Validity and uses of a screening questionnaire (GHQ) in the community. *British Journal of Psychiatry,* 134:508–515, 1979.

Tholen, A.J.; Giel, R.; Hoek, H.W.; de Jong, A.; and Wiersma, D. De psychopathologie in voorzieningen voor langdurig verblijf. *Tijdschrift voor Psychiatrie,* 30(1):54–72, 1988.

Tsuang, M.T.; Woolson, R.F.; and Flemming, J.A. Long-term outcome of major psychoses: I. Schizophrenia and affective disorders compared with psychiatrically symptom-free surgical conditions.

Archives of General Psychiatry, 36:1295–1301, 1979.

Tweede Kamer. *Financieel Overzicht Zorg 1992.* September 1991–92, 22311, Nos. 1-2. The Hague, The Netherlands: Staats Drukkerij en Uitgeverij, 1991–92.

van de Lisdonk, E.H. *Ziekten in de Huisartsenpraktijk.* Utrecht, The Netherlands: Wetenschappelijke Uitgeverij Bunge, 1990.

van den Hoogen, H.J.M. *Morbidity Figures From General Practice, Data From Four General Practices, 1978–1982.* Nijmegen, The Netherlands: Nijmeegs Universitair Huisartsen Instituut, 1985.

van der Velden, J. *Een Nationale Studie naar Ziekten en Verrichtingen in de Huisartspraktijk.* Utrecht, The Netherlands: Nederlands Instituut voor Onderzoek van de Eerstelijnsgezondheidszorg, 1991.

Vrieze, O.J.; Boas, G.M.; and Janssen, J.H.A. *Een Simulatie Model voor Toekomst Analyse van Coronaire Hartziekten, Rapport in Opdracht van de Stuurgroep Toekomstscenario's Gezondheidszorg.* Utrecht, The Netherlands: Van Arkel, 1994.

Warndorff, D.K.; van den Boom, G.; Ament, A.J.H.A.; and Evers, S.M.A.A. *The Cost of Disorders Associated With Dyspepsia.* Maastricht, The Netherlands: Rijksuniversiteit Limburg, Vakgroep Economie van de Gezondheidszorg, 1992.

Wiersma, D.; Giel, P.; Hoek, H.W.; de Jong, A.; Nienhuis, F.; Ruphan, M.; and Tholen, A.J. Chronische patiënten in de geestelijke gezondheidszorg, een epidemiologische verkenning van hun behoefte aan zorg. *Tijdschrift voor Psychiatrie,* 6:388–400, 1988.

Wing, J.; Cooper, J.; and Sartorius, N. *The Description and Classification of Psychiatric Symptoms: An Instruction Manual for PSE and CATEGO System.* London: Cambridge University Press, 1974.

World Health Organization. *Mental Disorders: Glossary and Guide to Their Classification in Accordance with the Ninth Revision of the International Classification of Diseases.* 9th ed. Geneva, Switzerland: The Organization, 1978.

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