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RESEARCH ARTICLE

An estimate of the economic burden of schizophrenia in Mexico: a retrospective study in the psychiatric hospital setting

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Background

The aim of the present study was to estimate the economic burden from the perspective of patients and their families and the associated variables.

Methods

Quantitative evaluative research with retrospective design of patients with schizophrenia diagnosis according to the International Classification of Diseases (ICD-10). Direct costs (medical and out-of-pocket costs), non-medical costs (transportation) and indirect costs were calculated.

Findings

A sample of 96 patients was obtained; 62% were males, the median of treatment was 7.5 years (Interquartile range, IQR 13), the mean schooling was 10 years (standard deviation, SD 2.7). The 71.8% of study sample had no work activity. Direct costs: medical costs USD 2,956 and out-of-pocket expense USD 498. Non-medical costs USD 10. Indirect costs: the productivity loss of the patient was USD 5,760 and for the family caregiver was USD 460. The annual illness cost of a case of schizophrenia was USD 7,164; considering the prevalence of schizophrenia, the annual economic burden was USD 206,625,079 in total. There is a negative association between the loss of productivity of the patient with age, occupation and years of treatment evolution, Coefficients -.318, $P < 0.05$; -.431, $P < 0.001$; -.428, $P < .000$; respectively.

Conclusions

The economic burden of schizophrenia in Mexico was determined by the loss of productivity and out-of-pocket expenses; the determinants were work activity and the years of evolution of the disorder. It is necessary to establish mechanisms for financial protection and timely care of the schizophrenia in order to achieve the patient's reintegration into the labor market.

Introduction

Globally, mental disorders are among the leading causes of years of life with disability (YLD) and collectively represent the greatest burden of disease in the productive ages.[1] Schizophrenia, one of the most disabling mental disorders, has been documented with a total lifetime prevalence of 1.11%.[2]

Estimating the cost of the illness is relevant in order to understand the economic impact of its care for both the health system and for families, and provides guidance on policy decisions regarding the necessary funding for

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allocations for prevention and treatment.[3] In the case of mental disorders, it has been documented that the costs associated with lost productivity are the main cause of economic attrition, representing up to 58.97%, while medical costs account for 37% of economic attrition.[4] Regarding the social cost of schizophrenia, it has been documented that the loss of productivity due to morbidity ranges from USD 28,600 (51.6%) in the USA to USD 4,260 (73.2%) in Thailand.[5]

Given the prevalence of this mental disorder, the effect on gross domestic product (GDP) is relevant for both high-income and low-income countries.[6,7] In the case of schizophrenia, it has been documented that factors such as unemployment, evolution of the disease, severity of symptoms, early onset of the disorder, and schooling, influence the integration of patients into the labor market (13.7%) and therefore the indirect costs of the disease.[8,9]

The social cost of the disease can be analyzed from various perspectives: the social perspective includes medical and non-medical costs, morbidity and mortality costs; the business perspective only includes coverage costs and mortality coverage costs; while the analysis from the perspective of relatives and patients includes out-of-pocket expenses for medical and non-medical care, lost wages due to morbidity and mortality and foregone transfers; the latter includes aspects that are essential to have a clear idea of the cost of the disease.[3,10,11]

Indirect costs or costs related to loss of productivity in the case of schizophrenia have not been documented in Mexico, although it has been reported that for depression, anxiety, and panic disorder the annual work loss is 20 days.[12] It has been documented that patients with schizophrenia have poorer access to employment, so we assume that poor access to formal employment conditions the cost of illness. Therefore, our objective is to estimate the cost of the schizophrenia disorder, from the perspective of patients and their families and the associated variables that influence the indirect cost of the illness.

Methods

A retrospectively designed quantitative evaluative investigation of the cost of schizophrenia was conducted, with two main components: direct costs (medical, non-medical and out-of-pocket), and indirect costs due to lost productivity of patients and their caregivers.

Participants

Participants were users of a public psychiatric hospital in Mexico City, who required outpatient services for the management of schizophrenia. Purposive sampling was performed to reach a finite sample of 96 patients with

schizophrenia diagnosis, according to the International Classification of Diseases (ICD-10), in addition, years of evolution of the mental disorder and years of treatment were recorded.

Sample study

A probabilistic sample calculation was performed, using a simple random sampling to estimate a proportion from a finite population[13] of 2161 patients with schizophrenia treated at the selected hospital,[14] sample with a 95% confidence level and 5% margin of error. We use 20% as a proportion or approximate value of the parameter we wanted to measure. The sample size calculated was n = 81, value to which we add 15% of no-response rate. The final sample size calculation was 95.

Data collection

An *Income and Expenditure Questionnaire* based and validated on questions contained within the National Survey of Household Income and Expenses 2018 in Mexico[15] was applied, which included socio-demographic data: sex, age, schooling, marital status, work or occupation of the patient, days off work per patient, days off work by the family member due to patient care, travel expenses to receive medical care, out-of-pocket expenses, expenses for water, electricity, rent, telephony, school. This questionnaire was applied in a previous study.[16] Further, a pilot test of the instrument was carried out to correct errors and problems during application, after the first revision the wording of the questions was corrected, and the final version was applied by the main researcher and a social worker. The expenditure questionnaire was administered to the responsible family member (mother, father, sibling or partner) and/or patient. To avoid recall bias, information was collected on household and out-of-pocket expenditures for the last month, as short recall periods have been shown to increase the estimate for the average annual health expenditure.[17]

Cost estimation

DIRECT COSTS

Medical costs: Hospital medical care costs were reported in the previous study and included the costs of inpatient medical care (emergency, intensive care and continuous hospitalization), personnel (doctor, nursing, social work, psychology), food, laundry, laboratory, water, electricity, municipal waste, cleaning, security. The total estimated cost updated to June 2018 for a hospitalization with an average stay of 24 days and medicines was USD 2930.39 with typical antipsychotic, and atypical antipsychotic it was USD 3009.25.[18]

Non-medical costs: those incurred for payment of transport to receive medical care in outpatient or inpatient care, and were measured by occasion.

Out-of-pocket costs: these were defined as direct payments made by individuals when using health services, including payments for hospitalization, outpatient care, laboratory tests, imaging studies, psychological tests and medication for the treatment of schizophrenia.

INDIRECT COSTS

To calculate indirect costs, the human capital method was used, which is based on the idea that human capital is one of the factors of production through which future value of goods and services is generated; this value enriched through investment in formal or informal education or training in skills and abilities; this method considers the loss of productivity as that which the person stopped doing.[19] Given that there is no reference for the average wage of patients with schizophrenia in Mexico to assess productivity loss, we decided to use the INEGI manufacturing industry wage for June 2018, which was USD 2.4 hour at the time.[20] The average schooling of patients with schizophrenia was considered to be high school. In addition, the monetary income of working patients was taken as a counterfactual proxy for a patient with this mental disorder.[21]

The loss of productivity was calculated based on the loss of access to the labor market due to the mental disorder, i.e., information was collected on the days lost from work by the patient and his or her main caregiver in the last month due to schizophrenia. Weekends and holidays were excluded.

To calculate the prevalence of schizophrenia, we took as a basis the average lifetime prevalence reported as 0.48 %,[2] and to estimate the number of cases, we used data from the National Population Census 2020, which reports a working age population (between 18 - 64 years old) of 84.663.440 inhabitants.[22]

Data analysis

For all analyses, STATA version 14 software was used. Descriptive statistics were performed for continuous variables, median, arithmetic mean, standard deviation and absolute and relative frequencies for categorical variables. For expenses, the median and confidence interval and Shapiro-Wilk test were estimated to verify normality in the sample distribution. A correlation analysis was performed to determine which factors influence the indirect costs of schizophrenia.

To calculate out-of-pocket expenditures, medication expenditures were annualised as they are assumed to be constant, while outpatient, inpatient, diagnostic aids and transport expenditures were accounted for on a per occasion basis.

Sensitivity analysis

The annual income per person in manufacturing industry 2018 was applied to the prevalence of employment in patients with schizophrenia under three scenarios of employment rate.

Table 1. The economic costs of schizophrenia in Mexico

		Frequency (n)	Percentage (%)	USD Mean	95% *CI
Out-of-pocket	Hospitalization	56	58.3	55	59 - 92
	Medicines	86	89.5	481	456 - 628
	outpatient consult	72	75.0	4	3 - 7
	Auxiliary diagnostic studies	54	56.2	17	17 - 25
Non-medical costs (transport)		92	95.8	12	13 - 20
Out-off-pocket expenses		96	100	581	470 - 647
Medical costs		96	100	3129	1377 - 2012
Indirect costs	Lost patient productivity	96	100	6138	4172 - 5096
	Lost productivity of the caregiver	96	100	491	854 - 1666
Cost of illness		96	100	7635	7352 - 8943

Shapiro-Wilk Test p=0.896

* CI = confidence intervals

Ethical issues

The research project was approved by the Ethics and Research Committee of the Psychiatric Hospital "Fray Bernardino Álvarez" in May 14, 2018. Registry 18C-19. All participants agreed to participate in the study and signed an informed consent form.

Results

Ninety-six patients were evaluated, 62% of whom were male and the median number of years of treatment for schizophrenia was 7.5 years ((Interquartile range, IQR 13). The mean age was 37 years (standard deviation [SD] 12.3). The mean schooling was 10 years (SD 2.7), corresponding to incomplete high school.

Table 1 shows the out-of-pocket expenses that were mostly composed of the purchase of medicines and hospitalizations, the annual median for the purchase of medicines was USD 481 (95% Confidence Interval, CI 456 - 628); the second reason was hospitalization expenses with an annual median of USD 55 (95% CI 59 - 92).

Regarding work activity, unemployment predominated (71.8%); of those with work activity, unskilled activities were the most frequent (22.9%), and only 5.1% had skilled activity. The median number of days not worked by the patient or family member in the last month was 25 days (IQR 15) and 2 days (IQR 4) respectively. The median annual income of working patients was USD 945 (95% CI 998 - 2.463).

The median annual income lost due to non-work activity for the patient was USD 6,138 (95% CI 4.172 – 5.096) and for the family caregiver USD 491 (95% CI 854 - 1.666). The annual disease cost per morbidity of a clinically stable

Table 2. Estimation of the economic burden of schizophrenia in Mexico

Population in Mexico (2018)	126,014,024 inhabitants
Working age´s population in Mexico (18-60 years old, 2018)	84,663,440 inhabitants
GDP* (millions USD 2018)[a]	1,222,000,000,000
GDP* per capita (millions USD 2018) [a]	8,480
Prevalence of schizophrenia (%)	0.48
Annual salary (USD, 2018)	6,137
Annual cost of illness (USD 2018)	3,065,866,865
Percentage of GDP*	0.25

[a] World Bank Group: GDP (current USD) Mexico

*GDP: Gross Domestic Product

Table 3. Sensitivity analysis of the cost of illness by employment

Cost of illness by schizophrenia	Formal employment rate (%)	Decrease in the cost of illness
USD 3,202,664,074	5.10*	USD 2,594,143,693
	12.50+	USD 2,594,143,693
	30.30+	USD 2,494,368,935

* Formal employment rate in the study group

+ Formal employment rate reported in the literature

case of schizophrenia was determined by indirect costs with 53.4% versus 46.6% direct costs. Indirect costs were reduced by assuming that 70% of patients had a work activity (counterfactual), with mean income similar to this sample, the cost of illness would be USD 5,438 (95 % CI 4,256 – 5,643) versus USD 7,634 (95 % CI 7,352 – 8,943) with statistically significant difference (P < .000).

The approximate number of patients with schizophrenia in Mexico was 406,384 which means that the economic burden of schizophrenia for Mexico was USD 3,065,866,865; equivalent to 0.25% of the GDP;[23] if we take as a counterfactual the average income of patients who are employed, the cost of the disease is USD 2,210,158,327, i.e., the cost of the disease would be reduced annually by 31% (Table 2).

A reduction in productivity loss is observed, although this effect is more noticeable until employment rates above 30% are reached (Table 3).

Pearson's analysis showed negative correlations between productivity loss and age, occupation and years of treatment evolution (Coefficients -.318, P < .001; -.431, P< .000; -.428, P < .000; -.428, P < .000) while there are negative correlations without statistical significance between productivity loss of the relative and age and occupation (Coefficients -.034, P > .05; -.160, P > .05) and significant correlations with the patient's years of evolution (coefficient -.232, P < .05). Schooling and years of treatment were predictors of productivity loss (R=.456, R2=.208; P < .000).

Discussion

The results of our research show that the annual cost of illness due to schizophrenia in Mexico is determined by indirect costs, i.e., the main burden of the disease is due to the loss of patient productivity. Likewise, despite the fact that one third of the patients are in paid employment, their income is lower than the average wage income reported in the country.

The findings are consistent with another report in which direct costs for medication and hospitalisation expenses are documented as the main reason for economic attrition. The direct costs are also congruent with those derived from loss of patient productivity, followed by loss of caregiver productivity.[24]

Regarding the economic burden of direct and indirect costs, the estimates are similar to those reported in another middle-income country.[25] Of the total costs for schizophrenia, the direct costs we report of 46% are similar to those reported in China (40%). Notably, in our country and in China, these costs exceed up to 50% of household disposable income.[26]

According to the results of this work, the economic drain caused by schizophrenia is similar to that reported for other mental disorders with much higher prevalence, for example, major depressive disorder in the United States of America is attributed 45% to direct costs, 5% to suicide-related costs and 50% to labour costs either through presenteeism or absenteeism.[27]

Determinants such as low schooling, continuity of treatment (access) or intensity of symptoms and evolution of the condition have an impact on the loss of productivity, are factors that condition unemployment, particularly high among the patients with schizophrenia we studied and similar to that of high-income countries.[8,9,28,29] It is therefore possible that the psychopathology of the disorder is central to the integration of patients into some kind of work activity, and it is therefore necessary to establish timely and continuous treatment strategies for these patients.

Data on economic burden of schizophrenia are critical for policy-makers to set public health priorities and allocate scarce resources,[26] and has a remarkable effect, in Mexico, according to our data, so our results show the need for mental health policies to be strengthened in terms of early treatment of the disorder, as this reduces the possibility of social deterioration of the patient and increases the chances of integration into the labor market. It should be noted that, to our knowledge, this is the first study in Mexico to report the economic burden of schizophrenia, so it is necessary to increase research in the field of the social cost of mental illness in Mexico.

That is relevant because, the cost of the disease is significantly reduced if patients are integrated into formal employment; to achieve this it is necessary to ensure timely and consistent treatment, aspects that can be achieved with the current policies of free health services and medicines.

The limitations of this study are that it does not include other non-psychiatric illnesses among the variables, so future studies should measure them due to the high prevalence of metabolic and cardiovascular comorbidities in this type of patient. Nor did we include patients with public or private insurance payments, which are not exempt from substantial economic attrition.[30] Therefore, the analysis focuses only on service users with schizophrenia without social security and demanding care in a national public referral hospital in Mexico. However, despite the limitations, the results of the present research mark a milestone in the way the economic burden of one of the most disabling mental disorders in the world is assessed in the country.

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