THE SOCIAL COST OF ILLEGAL DRUG CONSUMPTION IN SPAIN: IDENTIFYING AND QUANTIFYING ITS ELEMENTS

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Abstract

Social and health problems arise when illegal drugs are used or abused, at great cost to individuals and society as a whole. The main objective of this work is to estimate the economic impact of illegal drug consumption in Spain from a social perspective. We conducted a cost-of-illness methodology for the year 2012. Direct costs are distinguished from indirect and intangible ones. The Human Capital approach is taken to carry out an economic assessment of productivity losses due to morbidity and premature death. The total social cost related to drug consumption was somewhere between 962 and 1,172 million euros. The minimum cost of this consumption represented 0.09% of Spain’s GDP for that year. The minimum value for health care costs related to illegal drugs, accounted for 1.1% of spending in the Spanish National Health System. A great economic burden is placed on society when illegal drugs are consumed. In this way, drug prevention and treatment programs can be assessed and health policies will be better informed.

Keywords: illegal drugs, cost-of-illness studies, human capital, addiction

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1. Introduction

The costs of illegal drug consumption represent a great burden for individuals as well as society as a whole. In addition to health care system resources involved, one must also take into account the cost of preventative, training and research programs, losses in work productivity related to morbidity and premature death. Among the many consequences, there also is the pain and suffering endured by the consumers of these substances and the people closest to them.

According to some authors the costs of illegal drug consumption are equivalent to the annual value of the resources spent on consumption and the investment that is no longer available to society [1]. These are the past and present effects of drug consumption. Another factor is the value of intangible costs related to drug use.

Most studies on the cost of illegal substance consumption carried out from a social perspective follow the recommendations found in international guides on cost assessment. They therefore embrace the cost-of-illness focus proposed by the literature [2]. The starting point of this kind of research is to calculate the costs of illness in contrast with the alternative hypothesis: that the condition generating these costs does not exist. It is important to point out that these kinds of studies are inherently limited to a certain degree.

In cost-of-illness studies, it is impossible to make a comparison between various alternatives. In this way, these studies differ from those whose focus is cost effectiveness and cost-benefit. Nevertheless, they do provide an approximate quantification of the health problem. Once the costs are quantified for different areas of public health intervention, these areas can be prioritised [3].

In the first works on cost-of-illness the foundations are laid for classifying the most habitual costs found in economic assessments [2] [4]. Direct costs are distinguished from indirect and intangible ones.
This study adopts a social perspective from a prevalence approach. It considers the total costs involved in all the cases for 2012, regardless of who met those costs. The human capital approach is taken to carry out an economic assessment of productivity losses due to morbidity and premature death.

The main objective of the article is to quantify the social costs of illegal drug consumption in Spain for 2012 and to assess the relative weighting for its different headings. In the attempt to do a sensitivity analysis, minimum and maximum values are presented for some of the cost headings considered in the estimate.

In the second section of the article, the subject is contextualised. There is a systematic overview of the results obtained in other studies that estimate the social cost of illegal drug consumption. The third to fifth sections provide the general framework for the analysis, methodology and obtained results in each of the cost categories examined.

Aggregate costs arising from the assessment, the conclusion and recommendations are found in the final sections.

2. Previous literature

One of the pioneer works in estimating the costs associated with illegal drug consumption was done for the United States [5]. The authors reckon there was a total cost of 43,000 million dollars in 1985. 65% of this amount is attributed to indirect costs, such as hospitalisation and premature deaths. Direct costs are mostly spread out among health care expenses (4.4% of the total) and those incurred by the police force, judiciary and prison system (30.6% of the total).

Other studies obtain the total associated cost of illegal drug consumption in Ontario for 1992, which was 490 million Canadian dollars. 60% of the amount corresponded with indirect costs. The weighting for direct costs is, in general terms, divided among the costs of drug-related crimes (134 million), health care (39.2 million), research and prevention (3.3 million), traffic accidents (4.2 million), and programs for workforce reintegration (1.32 million) [6].
In France were developed estimations of costs from drinking, smoking and taking illegal substances for 1997 [7]. Illegal drugs generate a social cost of 2,035 million euros (0.16% of the GDP). Losses in work productivity reached 930 million euros, about 45.7% of the total cost. Legal expenses make up 29.3% of the total. Closely behind are health care expenses, with a cost of 232 million euros.

From the perspective of the studies promoted by state entities, one that stands out is the series of estimates developed in 1988 for the *National Drug Strategy* in Australia [1]. In the most recent estimate (2004-2005), the total cost of consumption of illegal drugs in Australia was 8,189 million dollars. These authors distinguish between tangible and intangible costs. The former could be estimated at 84.4% of the total. They include lost production- paid and unpaid- in the labour market, the use of health care resources, the effects of accidents and the costs related to felonies. Intangible costs include aspects like morbidity, mortality and the pain and suffering that come with consuming these substances.

Another series of highly relevant studies was produced by the *United States Department of Justice*. The results that correspond with the latest edition, from 2007, indicate the total cost for drug consumption is 193 billion dollars [8]. 62% of this amount has to do with work productivity losses in the paid job market and domestic sector. These losses are estimated over a total of premature deaths, illnesses directly related to drug use, hospital admission and a long-term stay, crime victims and time in prison, including repeated prison sentences that take place across the user’s life. Next in line after this heading is the one that covers legal costs and the expenses incurred by victims of drug-motivated crimes (31.6%). Health costs come next at 5.7% of the total.

At the request of the Ministry of Health in New Zealand, some authors assessed the social cost of consuming alcohol and other drugs between 2005 and 2006 [9]. This cost was estimated to be 1,585 million dollars. Tangible costs represented 75.5% of this feature. Among these were losses in work productivity, the costs related to traffic accidents, health expenses as well as the money spent to consume and produce drugs. Morbidity and death-related costs came to around 393.6 million dollars.
As for Spain, we can find two works that can serve as a reference [10] [11]. The first of them take on a social perspective to estimate the cost of illegal drug consumption in Spain during 1997. The most conservative estimate has a cost of about 88,800 million pesetas (0.07% of the GDP). Direct costs are around 75% of the total (65.5% health care related). Under the heading of health care costs, the amount spent on medication makes up 46% of the health care cost total. For indirect costs, the authors included losses in work productivity associated with premature death and hospitalisation.

The second study estimate the social cost of drug use for the region of Galicia, Northwestern Spain, in 2008. The authors find that, during 2008, the consumption of illegal drugs generates a cost between 73.6 and 98.6 million euros, or 0.12 of the GDP of Galicia. The heading with the greatest weighting has to do with outpatient care costs for HIV/HIV patients and losses in production, 70% of the total amount estimated. Here, indirect costs exceeded 40.5% of the total.

3. A general framework: the cost-of-illness analysis

Cost studies provide both society and policy makers with valuable information about an illness or the relative and absolute importance of an event. Thus, the studies help with the task of weighting priorities and allocating resources. These estimates are used to define the magnitude of the illness or injury in monetary units. They also help justify intervention programs; assist in the allocation of research budgets for specific illnesses; provide a basis for policy and planning initiatives; and provide an economic framework for program evaluation in terms of cost effectiveness and cost-benefit analyses [12].

In the strict sense of the term, a cost-of-illness analysis is not an economic assessment. Instead, it relates to the initial assessment stage. It is based on the principle that the cost for a specific health problem takes into account the economic benefits of providing health care intervention to reduce the consequences of that problem. This type of analysis does not compare costs with results; its main aim is to estimate the value of the net resources that are no longer available for other uses as the result of a specific health problem.
Pioneering studies of cost-of-illness were carried out in the second half of the 1970’s. Ground breaking work specified the first methodological steps to take when estimating illness-related costs [2]. Another point of reference for cost-of-illness studies laid down the foundations for classifying costs in general terms. A distinction is made between health-related and non-health-related direct costs, indirect costs and those that are intangible [4].

Direct costs measure the opportunity cost of resources used for treating a particular illness, whereas indirect costs measure the value of resources lost due to a particular illness. Intangible costs appraise pain and suffering. Although they are very relevant to cases involving drug use, these costs are difficult to estimate. However, there is a range of methodologies that help approximate them. “Willingness to pay” is one of the most widely used ways to approximate the monetary value of a life. If this cannot be estimated, it should at least be explicitly mentioned and taken into account by policymakers.

As it is the most widespread way of classifying costs in the literature, it is proposed as a reference point for grouping the social costs of illegal drug consumption.

\[
\text{Cost-of-illness} = \text{Direct Costs} \ (\text{medical costs + non-medical costs}) + \text{Indirect Costs} \ (\text{mortality costs + morbidity costs}) + \text{Intangible Costs}
\]

The social perspective approach is the one that encompasses most within cost studies concerning drug consumption. From the perspective of a society, all of the costs should be identified, measured and allocated a value, whoever incurs those costs. That is, adopting a social perspective involves taking into account the full investment of resources supposed by an opportunity cost for any member of that society.

In terms of time-frame, there are two basic alternative methods for estimating the cost-of-illness: prevalence-based and incidence-based methods. We use prevalence-based costs, which measure all problem-related expenses for one year, regardless of when the problem occurred. On the whole, traditional cost-of-illness studies to date have related costs for a given year, but not for future years. Also estimated is the present value of
lost productivity associated with mortality and permanent incapacity for all patients who
die or become permanently disabled in the year under study for that year and each year
until the expected age of death [13].

Individuals are not indifferent about the moment in time that costs or benefits take
place. When estimating the costs of an illness and certain costs, like those caused by
premature death, are spread out over time, adjustments based on time preferences must
be made. Future costs have to be discounted before they are added to the remaining
ones. The procedure for working out this discount entails expressing future values in
their equivalent value for the current moment.

To obtain the present value ($PV$) from the flow of costs elements associated with an
illness, the following expression is employed:

$$ PV(C) = \sum_{t=0}^{n} \frac{C(t)}{(1+r)^t} $$

$n$ being the number of periods that have passed from the current moment to the point in
time the cost, $r$, discount rate and $C(t)$ the costs of the illness in period $t$ are incurred.

When it comes to estimating the social cost of an illness, there is no consensus in the
literature over what the social discount rate should be. As a recommendation, the most
practical course of action is to use a discount rate that is coherent with the literature and
that makes it possible to compare countries. In this way, a 3 % discount rate
corresponds with the one recommended by the World Health Organization guide to cost
effectiveness analysis [14]. An exhaustive review of economic assessment studies,
found that the most widely used discount rates were 3% and 5%. Another suggestion is
to use a sensitivity analysis and compare the 3% base rate with the 5% discount rate, as
well as the non-discount rate, 0% [15].

In conclusion, when it comes to making informed decisions, it is necessary to
incorporate uncertainty with certain variables in a cost study. In this sense, the study
will have to identify sources of uncertainty. It must also include cost estimates
calculated with various discount and productivity rates, as well as any variable that can present different values. Therefore, a range of variation will be presented for the results obtained and a base value. A traditional sensitivity analysis is recommended because one can identify the most influential parameters in the final results. The robustness of the analysis can thus be assessed.

4. Results

Direct health care costs

The adverse effects of drugs increase health care costs due to the health problems that are a direct result of consuming these kinds of substances. These problems include illnesses that can be attributed to drug consumption, such as hepatitis, tuberculosis, HIV/AIDS or infective endocarditis. Complications may arise when conditions that are not directly related to drug abuse are being treated. The result is the same, however: patients prolong their hospital stay and use up resources.

In assessing the direct costs of health care, the main diagnoses are considered. To do so, it is necessary to refer to the ninth edition of the International Classification of Diseases (ICD-9). Moreover, secondary diagnoses have been screened. In these episodes, diseases coexist with a main diagnosis that is unrelated to drug use.

Data have been culled from the Spanish National Health System’s discharge registry [16]. To place a monetary value on the diagnoses, the cost for the procedures is averaged with hospital procedures, measured according to the terms used in Diagnosis-Related Groups (DRG).

In this list, there were a total of 5 027 discharges whose main diagnosis was related to the consumption of illegal drugs. These discharges corresponded with 51 475 days of hospitalisation. 71.75% of the cases were for male patients, whose average age was 39.4 years old. Table 1 provides the five first secondary diagnoses related to a hospital admission whose main diagnosis was related to illegal drug use.
Using the value for the quantity that was spent on intervention, the estimated annual cost for the time patients are hospitalised due to illegal drug consumption rose to 24 377 710 euros.

Various studies conclude that those patients whose secondary diagnoses are related to drug consumption use up even more resources during their time at hospital, which tends to be longer [17] [18] [5]. On the basis of different studies [18] [19], the estimate for the cost of comorbidity considers the difference that can be observed between the days in hospital of the patients whose secondary diagnosis was related to drug consumption and the average length of time in hospital calculated for procedures following Spanish Health System guidelines in 2012.

Table 2 includes the first five main diagnoses registered in the system for 2012.

To avoid overestimating the additional days of hospitalisation, discharges were considered only when the comorbidities took second place in the sequence of diagnoses. A total of 6 388 admission were generated with secondary diagnoses related to the consumption of drugs in 2012. These resulted in 71 269 days in hospital. For patients whose main diagnoses were not related to illegal drug use, the number of additional days of hospitalisation over the average length of stay were 18 020, leading to 8 103 635 euros in hospital costs.

Also included in the estimate is the cost of admissions in which the main diagnoses had to do with viral hepatitis, tuberculosis and HIV/AIDS. These infectious diseases reflect the high degree of risk involved in consuming drugs by injection. To assess the cost of these hospitalisations, the only admissions considered were those which codified secondary diagnoses directly related to injecting drugs, the most likely route of infection.
Table 3 presents the total length of time in hospital and how much this hospitalisation costs when it comes to infectious diseases related to drug use. Only the codes for secondary diagnoses related to the use and abuse of opioids were included. This would mean that the drugs that were usually administered intravenously were dealt with. In 2012, the total cost generated by infectious diseases presumably injected by the user was 399 235 €.

Quantifying the cost of primary care (PC) entails applying the rate per 1 000 people who come to a primary health care service because they are abusing drugs (indicator P19 – drug abuse in primary care) over the total number of appointments for primary care, provided by the Spanish National Health System. Paediatrics and nursing care consultations were excluded from the estimate for the number of appointments. This rate is obtained from the Clinical Data Base for Primary Care (MSSSI, 2014). Average appointment costs were estimated by means of Primary Care allocation figure and the total number of appointments allotted to that cost (24.24 €). They were used to assess how much was spent on primary care appointments. To incorporate a lower limit in the sensitivity analysis for the estimates, the average cost per PC appointment was applied. It was first estimated by Rivera et al. (2012) and then updated into euros in 2012 (18.36 €).

In 2012, it was estimated that there had been a total of 222 244 primary care appointments directly related to this health problem. The cost interval estimated for PC appointments related to drug problems was between 4 080 400 and 5 387 195 euros.

Among drug users who inject themselves, the risk of being infected with HIV is one of their gravest health concerns [20]. In addition to hospital costs, outpatient HIV/AIDS program expenses are part of a key heading to assess. This is especially true if one considers the disease’s chronicity and the elevated costs of highly active, anti-retroviral therapies.
A methodology for calculating the costs outside of hospitalisation for HIV carriers who were infected by injecting drugs was developed by some authors [11]. To this end, an epidemiological register with new and cumulative HIV cases was used, by applying the prevalences calculated in the epidemiological analyses for this disease.

Survival rates for those infected improved due in part to the new anti-retrovirals. As a result, the figures for living people with HIV in Spain ranged between 130,000 and 160,000 [21]. Calculating the number of known HIV cases caused through the injection of drugs entailed using two sources of information. These sources provided the limits for the earlier sensitivity analysis. On the one hand, over the total number of living people with HIV one applies the frequency with which they claimed to have been infected when injecting drugs (ID) (59.46%), with respect to the total number of official AIDS cases registered.

Also applied, on the other hand, are the prevalences for HIV infections obtained by the Instituto de Salud Carlos III (ISC III). This study establishes that between 50% and 60% of the people who live with HIV in Spain were likely to have been infected through sharing equipment while injecting drugs.

If the previous hypotheses are taken as a starting point, the estimated total number of HIV cases in Spain infected through injection would be between 45 500 and 66 593 people (Table 4).

(Table 4 over here)

Estimates of the annual costs associated with different treatment regimens used with HIV-infected patients were made in Spain [22]. To assess the costs of outpatient HIV treatment one needs to consider the costs related to anti-retroviral programs: the pharmaceuticals themselves and outpatient appointments, as well the costs incurred when treatment is unsuccessful.

Although other treatment regimes have been included in the estimate, TDF+3TC+EVF has been taken as a point of reference. This is in accordance with the anti-retroviral treatment guides, the one most commonly used in health care centres. Moreover, the
cost of this treatment regime approximates the average cost for the set of guidelines included in the study (9,898 euros a year). The health care costs of individuals infected with HIV through injection ranges between 450 and 659 million euros.

The last categories to be considered in direct health care costs are those related to the costs incurred in running support programs for drug addicts and follow-up treatments for people who have an opioid dependence. The data provided by the National Action Plan on Drugs states the budget allocated to support programs is 198,974,652 euros, including programs run in collaboration with charities and town halls. As for the spending on active ingredients to treat those addicted to opioids, a total of 173,585 packages of methadone, buprenorphine-naloxone and naltrexone were prescribed in 2012. The bill for these pharmaceuticals reached 2,698,876 euros [20].

**Direct costs beyond health care**

In this cost heading one finds the budget spent on public policies whose objective is to mitigate the impact of drug consumption on the wellbeing of individuals and the collective³. These costs are included in the estimate for social costs because they deal with investments made to prevent future costs directly related to drug use. These would be inexistent in the hypothetical scenario that has none of the problems it causes.

Within the concept of direct costs unrelated to health care, there are the costs incurred in prevention programs: intervention aimed at delaying, reducing or eliminating drug-consuming habits. To this end, protective measures are reinforced and risk factors that affect individuals are reduced (29,933,215 euros).

This category also has to do with training the professionals and volunteers who form part of the varied support services for drug users. Another area covered in this category is research and assessment. The cost here rises to 1,245,226 euros.

The last heading has to do with the costs of coordinating entities so that strategies can be developed for widespread intervention. Here the aim is for various branches of the state can cooperate fully (3,866,775 euros).
Another heading, “other concepts”, deals with expenditure on documentation and publications, investment, public awareness campaigns and further activities. These costs reach 1 059 883 euros.

**Indirect costs**

Illegal drug use leads to health problems that cause a reduction in the availability, quality and effectiveness of the paid and unpaid workforce.

We consider the reduced value in expected production caused by premature deaths and hospitalisations in this estimate. There is an absence of data on this topic in Spain; nor are empirical studies available. Consequently, it has been impossible to place a value on production lost through absenteeism at work, the decrease in productivity in a specific post due to drug consumption as well as losses in production in the domestic economy or those due to illness-related absences.

The theory of human capital is the most widely used focus in literature that places a value on the costs of productivity [23] [24] [25]. With this focus as a starting point, it is possible to estimate present and future production costs owing to premature death from substance abuse. These costs are valued from the gross salary that an individual would no longer receive in the future as soon as he or she leaves the labour market. As this mean dealing with costs that are produced in different time periods, discounts need to be made. This focus makes it possible to establish a relationship between productivity and variables like level of education and work experience. In this way, it can be supposed that productivity, as well as salary, increases with age. Moreover, a growth rate can be applied to collect the variables that, over time, alter the human capital stock of those involved [26].

When applied to studies on the cost-of-illness, the human capital approach is often criticised because it overestimates periods of productivity. It does not take into account hiring a new worker and the training this entails [27]. According to the *Friction Cost Method*, the only relevant cost that is to be estimated is that of covering a loss in productivity resulting from the temporary or permanent absence of the person who is ill.
Nevertheless, human capital is the most commonly used focus in the literature on cost-of-illnesses. The main problem with the friction cost method focus is the limited theoretical support it provides when contradicting some of the axioms in economic theory [28] [29].

The data used for calculating deaths and the years of potential life lost (YPLL) are obtained from the microdata in the Death Statistic According to Cause of Death provided by the National Statistics Institute (Instituto Nacional de Estadística - INE) [30]. Deaths by substance abuse are registered in accordance with the 10th Edition of the International Classification of Diseases (ICD). With this indicator, data are collected on deaths subject to judicial investigation in which the main and direct cause was a severe adverse reaction from the non-medical or intentional consumption psychoactive substance, with the exception of alcohol and cigarettes.

Data from 2012 were culled by following the indicator Mortality due to an Acute Reaction to Psychoactive Substances (codes F19, X42 and X44). The data provide background information on the deaths that occur within the national territory: the underlying cause of death, as well as the victim’s sex, age and place of residence. In 2012 a total of 370 deaths by substance abuse were registered in Spain for people over 16 years old. Of these, 316 were males.

Adjusted according to sex and age, the employment rate is needed to estimate the loss of labour productivity. This rate is obtained by gathering data from the Economically Active Population Survey [31]. It is defined as the percentage of the population in employment in relation to that of working age. Here, the Annual Wage Structure Survey (Encuesta de Estructura Salarial - EES) was used to obtain the average annual gross salary according to sex and age [32].

The estimated cost of premature deaths attributed to substance abuse includes the value for lost production in the year the death takes place, as well as the value discounted from the production that would have been obtained throughout the rest of a person’s working life. With each group of a certain age and sex, the calculation entails
multiplying the number of deaths by the present value from future gains in salary, achieved with the following expression [7]:

\[ FDR_i = n_i \left( \frac{t_i \cdot W}{(1 + r)^i} \right), \]

in which \( FDR_i \) is the flow discounted from the income based on salary of the victim, who died prematurely from the cause \( i \); \( n_i \) the number of deaths before the age of 65; \( t_i \) are the potentials for the working life lost due to cause \( i \); \( W \) is the average income from salary, in which 1% productivity increments are considered and \( r \) is the discount rate, which assumes values of 0%, 3% and 5% [33].

With this information it was possible to carry out the present and future flow simulation for the lost work-related income due to premature deaths caused by suicides. To this end, for the deaths produced in a group of a specific age and sex, one applies the employment rate and salary earnings expected for each period preceding a predetermined limit. Here it was 65 years, the legal age for retirement in Spain.

To build uncertainty into the quantification of losses in labour productivity, alternative discount rates were used. Therefore, a value base and range of possible variation would be presented for the results obtained. In this way, a 3% annual discount rate could be applied to future values, along with a 1% annual growth rate in labour productivity (Scenario 1). This was deemed the base case, on which a sensitivity analysis was carried out considering two alternative discount rates, 0% and 5% (Scenarios 2 and 3).

The Years of Potential Life Lost (YPLL) express the years that a person is unable to live if he or she dies at an age that is not habitual, in relation to the life expectancy adjusted to each age bracket. Once the YPLL had been calculated, the next step was to estimate the Potentially Productive Years of Life Lost (PPYLL). For this, the calculation was made of the number of deaths within working age or at an age preceding the point of entry into the job market (those under 65 years of age). This means that the PPYLL are 49 for each death produced at the age of 16. When the death takes place at an age at or above 65, the PPYLL are equal to zero.
According to the results obtained here, the PPYLL for the individuals whose death was caused by drug consumption reached a total of 6 924 (5 967 for men and 957 for women).

Table 5 shows the estimated cost of deaths from substance abuse based on the PPYLL data obtained earlier. The unemployment rate and average annual salary take into account the victims’ gender and age.

If one considers the base case (1% annual growth rate for productivity and a 3% annual discount rate), the 6 924 potential years of working life that are on average lost to substance abuse, there is an estimated cost of 97.6 million euros (264 thousand euros per death). The lower limit is established at 60.7 million euros. This is calculated by considering a 1% increment in productivity and adopting a 5% discount rate. The upper limit is established at 211 million euros, calculated with a 0% discount rate.

(Table 5 over here)

It is not a straightforward task to approximate the number of cases indirectly related to drug use. In these cases, death is often the result of a complex interplay between factors as a backdrop to drug use. Identifying the problem or pathology responsible for this behaviour is complicated [35]. The deaths indirectly caused by drugs were calculated using the prevalence rates for the consumers who died from diseases in which infection was transmitted through illegal drug injection (Table 6).

Starting with the percentage of AIDS cases among users who inject the drug, it can be assumed that 59.46% of the codified deaths that correspond with infection through injection (494). The fractions used for the case of tuberculosis (8.2%) and viral hepatitis (9.42%) are obtained from a previous study [10]. Previous literature assumes that around 33% of deaths from infective endocarditis are the result of the infection from injecting drugs [36].
Although one cannot establish a causal relationship between the presence of drugs in bodily fluids and traffic accidents, various empirical studies detect that the risk of having a traffic accident when consuming drugs significantly increases [37] [38]. The mortality that links traffic accidents and single-level consumption of illegal drugs is obtained with the percentage of 2.5% calculated for Spain [39]. In 2012 there were an estimated 33 deaths in traffic accidents caused by the use of illegal substances.

(Table 6 over here)

Losses in work productivity owing to hospitalization are quantified for the patients who are working. These figures are based on the employment rates adjusted by age and gender \textit{Economically Active Population Survey}. Also considered are the discharges directly related to drug use over the average amount of time spent in hospital for the main diagnosis and those discharges caused by the infectious diseases that have as a risk factor the consumption of drugs through injection.

The estimated value for the lost production owing to hospitalization is 23 837 569 € for those patients who had been in the labor market before going to hospital for diagnoses directly related to consuming drugs. This amount is valued on the basis of 1 455 months of hospital stay. It is estimated that a total of 1 866 hospitalized individuals with a secondary diagnoses related to drug use were in the job market in the moment they were sent to hospital.

The hospitalization period of these individuals exceeded 576 months. Therefore the loss of production can be valued at 8 830 707 euros. Hospitalization for infectious diseases caused by injecting drugs reached a total of 22 months, and a loss in production of 426 737 euros.

5. Cost aggregation

The total aggregated cost represents an economic value for those resources that could have been directed towards other uses if there had not been a drug problem. Moreover,
there would not have been the lost production due to morbidity or premature mortality. (Table 7).

(Table 7 over here)

It can be affirmed that the results collected in Table 7 undervalue the total cost attributed to the consumption of illegal drugs. The main reason for this is the fact that certain costs are omitted. For instance verifiable information is not available for emergency services and lost productivity in unpaid work. A second consideration is how complex it is to place a monetary value on specific concepts, like intangible costs.

If the most conservative focus is taken, the total estimated cost is quantified at nearly 962 million euros, of which 24.6% are indirect costs. The weighting of this category is distributed among loss of productivity through, on the one hand, premature death, making up 86% of indirect costs, and, on the other, hospitalization (14%). 95% of the direct costs have to do with health care resources and support programs. The most noteworthy of these expenses are for outpatient treatment for HIV/AIDS. These comprise 65.4% of total health care costs (450 million euros). What is spent on support programs rose to 199 million euros in 2012. This was 28.9% of total health care costs. (Graph 1).

(Graph 1 over here)

6. Discussion

The total cost of illegal substance consumption in Spain for 2012 produced these figures, among others. There were around 51,475 hospitalizations in which drug consumption was related to the main diagnosis. In 71,269, drug use was the secondary diagnosis. 222,244 appointments had been made in primary care. While drug abuse was directly responsible for 370 premature deaths, it was an indirect factor in another 571. Around 45,500 people with HIV/AIDS count on health care resources in outpatient treatment programs.
In the cost structure, the greatest weighting falls in two areas. One is the cost of outpatient treatment for HIV/AIDS. The other is for support programs. These items make up 67.5% of the total estimated costs. The minimum value for the total cost of illegal drug abuse represented 0.09% of Spain’s GDP in 2012.

Looked at from another perspective, the minimum value for health care costs related to drugs, accounted for 1.1% of spending in the Spanish National Health System. García-Altés et al. (2002) estimate the total cost of illegal drug use in Spain at 792 million euros (euros de 2012). Direct costs represent 77% of the total costs; the remaining 23% have to do with losses in work productivity. This figure is equivalent 0.07% of the Spanish GDP in 1997.

Nevertheless, it is necessary to point out that these costs have been underestimated. From the start, it has been impossible to obtain reliable data about current and former users. They are not reflected in registers and statistics, yet they still pose a tremendous economic burden to society. Along with not having sufficient information to place an economic value on certain items, there is the added difficulty of carrying such a complex tax. For instance, estimating intangible costs is not at all straightforward.

A number of items are missing. Among these are the costs of emergency care or those faced by the judicial system, police force and prisons. Property that is damaged during drug-induced crime also has a cost, as does the loss of work productivity among the victims of these crimes or the users who are sent to prison as a result.

As for the cost of hospitalization, cases of a private nature have not been considered. Another indirect cost element not included in the analysis is the loss of productivity for unpaid work in a domestic setting. There is also the question of lost productivity through absenteeism or reduced productivity in a particular job.
Conclusions

A great economic burden is placed on society when illegal drugs are consumed. The cost-of-illness focus lends itself well to international guidelines for economic assessment. Nonetheless, there are discrepancies in its methodologies. These differences and the nature of the subject at the core of this work mean that it is difficult to compare it to other studies. The others deal with populations whose profiles and patterns of consumption are different. The way in which they use and gain access to support services may also vary.

If steps were taken to approximate the economic impact felt by the whole community as a result of this health problem, it would be sensible to include intangible costs. One case in point would be to place a monetary value on quality adjusted life years. It is essential to estimate this item and deal with one of the consequences of drug abuse. This consequence informs and justifies the majority of health and social programs aimed at reducing or eliminating the effects of drug addiction.

If public policies are to be considered, indirect methods such as “avoided costs” in cost-benefit analyses come into play. The cost estimates made in this article shed sufficient light on the economic magnitude of this problem. They also provide a sound foundation for making decisions and planning prevention, treatment and reinsertion programs. Cost-benefit analyses that inform economic assessments are becoming increasingly widespread. They help evaluate strategies for intervention based on preventing and reducing drug consumption. These methods provide a broad analytical framework and an explicit overview of the costs and benefits of this intervention for society as a whole. Policies are assessed in monetary terms and different forms of intervention can be compared for their effectiveness.

When it comes to allocating resources, the obtained results quantify the potential economic returns that could be achieved by effective policies for reducing drug use. Resources are limited; in this way, they could be redirected. By breaking down the
costs into different headings, more information is provided on the impact of drug use on each sector of society. This will make it easier to detect, through economic assessments, potential areas of inefficiency in how funds are distributed. Indeed, savings may even be made.

Acknowledgements

The authors would like to express their gratitude for the funding received from the Ministerio de Sanidad, Servicios Sociales e Igualdad through the Project “Estimación del Coste Social de las Drogodependencias en España y evaluación de la Rentabilidad Social de un Programa Multifásico de Tratamiento” whose reference number is 2013I027.

Notes

1 The coding sequence for the secondary diagnostics is established in order of severity.
2 Tenofovir (TDF)-based triple combinations plus efavirenz (EFV) plus lamivudine (3TC).
3 Data provided by the National Action Plan for Drogas (Ministry of Health, Social Services and Equality).

References


Table 1. Main diagnoses related to drug consumption. Cumulative discharge rate.

<table>
<thead>
<tr>
<th>Code</th>
<th>Code Description</th>
<th>Number of discharges</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>292.9</td>
<td>Unspecified drug-induced mental disorder</td>
<td>532</td>
<td>10.58 %</td>
</tr>
<tr>
<td>304.01</td>
<td>Opioid type dependence continuous use</td>
<td>511</td>
<td>10.17 %</td>
</tr>
<tr>
<td>304.21</td>
<td>Cocaine dependence continuous use</td>
<td>419</td>
<td>8.33 %</td>
</tr>
<tr>
<td>292.81</td>
<td>Drug-induced delirium</td>
<td>402</td>
<td>8.00 %</td>
</tr>
<tr>
<td>292.11</td>
<td>Drug-induced psychotic disorder with delusions</td>
<td>358</td>
<td>7.12 %</td>
</tr>
<tr>
<td>TOTAL</td>
<td>5 first diagnoses</td>
<td>2 222</td>
<td>44.2%</td>
</tr>
</tbody>
</table>

Source: Authors’ own based on data from the BMSD Registry of hospital patient discharges in the National Health Service (MSSSI, 2014).

Table 2. First five main diagnoses that have drug consumption as a secondary diagnosis.

<table>
<thead>
<tr>
<th>Code</th>
<th>Code Description</th>
<th>Number of discharges</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>295.34</td>
<td>Paranoid type schizophrenia chronic state with acute exacerbation</td>
<td>444</td>
<td>6.95%</td>
</tr>
<tr>
<td>298.9</td>
<td>Unspecified psychosis</td>
<td>376</td>
<td>5.89%</td>
</tr>
<tr>
<td>303.91</td>
<td>Other and unspecified alcohol dependence continuous drinking behavior</td>
<td>313</td>
<td>4.90%</td>
</tr>
<tr>
<td>295.3</td>
<td>Paranoid type schizophrenia unspecified state</td>
<td>263</td>
<td>4.12%</td>
</tr>
<tr>
<td>301.83</td>
<td>Borderline personality disorder</td>
<td>143</td>
<td>2.24%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>First 5 diagnoses</td>
<td>1 539</td>
<td>24.10%</td>
</tr>
</tbody>
</table>

Source: Authors’ own using data from the BMSD Register of hospital discharges for the Spanish Health Services (MSSSI, 2014).

Table 3. Cost of infectious diseases caused by drug consumption

<table>
<thead>
<tr>
<th>Disease</th>
<th>Stay (days)</th>
<th>Cost (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viral hepatitis</td>
<td>49</td>
<td>45 445</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>117</td>
<td>75 560</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>491</td>
<td>278 230</td>
</tr>
<tr>
<td>TOTAL</td>
<td>657</td>
<td>399 235.03</td>
</tr>
</tbody>
</table>

Source: Authors’ own using data from the BMSD Register of hospital discharges from the National Health Service (MSSSI, 2014).
**Table 4.** Estimated number of cases and outpatient care cost for HIV in Spain (2012)

<table>
<thead>
<tr>
<th>Estimate based on registered AIDS cases</th>
<th>Outpatient treatment costs (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>66,593 known HIV cases (ID)</td>
<td>659,118,868</td>
</tr>
<tr>
<td>54,104 known HIV cases (ID)</td>
<td>535,506,243</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Estimate based on ISC III prevalence study</th>
<th>Outpatient treatment costs (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>45,500 known HIV cases (ID)</td>
<td>450,346,260</td>
</tr>
<tr>
<td>54,600 known HIV cases (ID)</td>
<td>540,415,512</td>
</tr>
</tbody>
</table>

Source: Authors’ own based on data from MSSSI (2013).

**Table 5.** Estimating cost of deaths from substance abuse in Spain for 2012

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>Deaths</th>
<th>PPYLL Women</th>
<th>PPYLL Men</th>
<th>Total PPYLL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality due to an acute reaction to psychoactive substances</td>
<td>370</td>
<td>957</td>
<td>5,967</td>
<td>6,924</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Values Sensitivity Analysis</th>
<th>Estimated cost (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum value</td>
<td>Discount rate = 5% Productivity increments(a) = 1%</td>
<td>60,772,014</td>
</tr>
<tr>
<td>Base case</td>
<td>Discount rate = 3% Productivity increments = 1%</td>
<td>97,602,024</td>
</tr>
<tr>
<td>Maximum value</td>
<td>Discount rate =0% Productivity increments = 1%</td>
<td>211,042,450</td>
</tr>
</tbody>
</table>

Source: Produced by the authors using data from INE (2014a; 2014b; 2014c).

Note: (a) 1% increases in productivity are considered on the basis of United Nations estimates for average productivity in Spain between 1961 and 2000 [34].

**Table 6.** Estimated cost of mortality associated with the consumption of illegal drugs.

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>Total Deaths</th>
<th>Total PPYLL</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV/AIDS, tuberculosis, viral hepatitis, infective endocarditis and road crashes</td>
<td>571</td>
<td>8,013</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Values Sensitivity Analysis</th>
<th>Estimated cost (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum value</td>
<td>Discount rate = 5% Productivity increments(a) = 1%</td>
<td>54,719,591</td>
</tr>
<tr>
<td>Base case</td>
<td>Discount rate = 3% Productivity increments = 1%</td>
<td>97,602,024</td>
</tr>
<tr>
<td>Maximum value</td>
<td>Discount rate =0% Productivity increments = 1%</td>
<td>303,642,626</td>
</tr>
</tbody>
</table>

Source: Produced by the authors using data from INE (2014a; 2014b; 2014c).

Note: (a) 1% increases in productivity are considered on the basis of United Nations estimates for average productivity in Spain between 1961 and 2000 (UN; 2015).
<table>
<thead>
<tr>
<th>Economic costs of drug consumption in Spain (2012)</th>
</tr>
</thead>
</table>

### DIRECT HEALTH CARE COSTS

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitalisations- main diagnoses</td>
<td>24,377,710</td>
</tr>
<tr>
<td>Hospitalisations-secondary diagnoses</td>
<td>8,103,635</td>
</tr>
<tr>
<td>Hospitalisations- Infectious diseases</td>
<td>399,235</td>
</tr>
<tr>
<td>Primary care</td>
<td>4,080,400 – 5,387,195</td>
</tr>
<tr>
<td>HIV/AIDS outpatient care</td>
<td>450,346,260 – 659,118,868</td>
</tr>
<tr>
<td>Specific resources for support services</td>
<td></td>
</tr>
<tr>
<td>Programs</td>
<td>198,974,652</td>
</tr>
<tr>
<td>Pharmacy costs for opioid dependent</td>
<td>2,698,876</td>
</tr>
</tbody>
</table>

**TOTAL DIRECT HEALTH CARE COSTS**: 688,980,768 – 899,060,171

### DIRECT COSTS OUTSIDE OF HEALTH CARE

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevention</td>
<td>29,933,215</td>
</tr>
<tr>
<td>Training, information and research</td>
<td>1,245,226</td>
</tr>
<tr>
<td>Coordination</td>
<td>3,866,755</td>
</tr>
<tr>
<td>Other</td>
<td>1,059,883</td>
</tr>
</tbody>
</table>

**TOTAL DIRECT COSTS OUTSIDE HEALTH CARE**: 36,105,080

### INDIRECT COSTS

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premature deaths</td>
<td>97,602,024</td>
</tr>
<tr>
<td>Severe reaction to drugs</td>
<td>60,772,014 - 211,042,450</td>
</tr>
<tr>
<td>Infectious diseases</td>
<td>100,260,895.93</td>
</tr>
<tr>
<td>Traffic accidents</td>
<td>5,912,381</td>
</tr>
</tbody>
</table>

**TOTAL INDIRECT COSTS**: 236,870,314

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitalisations- main diagnosis</td>
<td>23,837,569</td>
</tr>
<tr>
<td>Hospitalisations- secondary diagnoses</td>
<td>8,830,707</td>
</tr>
<tr>
<td>Hospitalisations- Infectious diseases</td>
<td>426,737</td>
</tr>
</tbody>
</table>

**TOTAL COST**: 961,956,162 – 1,172,035,564